The Moderating Role of Education and Relationships in Intergenerational Income Mobility

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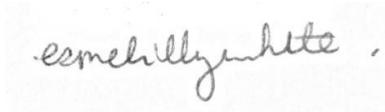
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Finally, and most importantly, thank you to Pablo the cat:

Abstract

Intergenerational income mobility is an important indicator of equality of opportunity and fluidity in society. This thesis aimed to estimate intergenerational income mobility in the UK and explore potential moderators. It investigated whether intergenerational income mobility varied by gender, educational attainment and relationships with family and teachers during adolescence. Additionally, it investigated whether the moderation effect varied by gender. It achieved this using data from the UK Household Longitudinal Study (N=1,165).

Firstly, the study estimated intergenerational income mobility in the UK, with results showing that around a third of inequality in offspring earnings were explained by inequality in parental income, even when taking account of educational attainment. It also found that intergenerational mobility did not vary meaningfully by gender and was linear across the parental income distribution. Next, the study investigated whether intergenerational income mobility varied by educational attainment. It found that intergenerational mobility was higher for those who completed a degree compared to those without a degree, although a significant intergenerational association remained for both groups. The study also found that this moderating effect of education did not vary by gender. Finally, the study explored whether intergenerational mobility was moderated by relationships with parents and teachers at age 14. Results showed that eating more frequently with family and perceiving more positive relationships with teachers at age 14 functioned as a protective buffer for the association between parental income and offspring earnings, especially for those from lower income backgrounds. This moderation effect also did not vary by gender.

These findings have implications for policymakers and practitioners, demonstrating the importance of measuring intergenerational mobility and its moderators. The study discusses approaches to improving intergenerational mobility, including targeting barriers both to those in higher education and improving opportunities for those who take routes other than higher education, and also an increased focus on relationship factors with families and teachers, especially for those from lower income backgrounds.

Table of Contents

List of figures

List of tables

List of abbreviations

Abbreviation	Explanation
BCS	British Cohort Study
BHPS	British Household Panel Survey
CI	Confidence interval
CPI	Consumer Price Index
DESO	Direct effect of social origin
EEF	Education Endowment Fund
FMI	Fraction of missing information
IGE	Intergenerational elasticity
MAR	Missing at random
MCAR	Missing completely at random
MNAR	Missing not at random
NCDS	National Childhood Development Study
OECD	Organisation for Economic Co-operation and Development
OED	Origin-education-destination
OLS	Ordinary least squares
SES	Socioeconomic status
SD	Standard deviation
SMC	Social Mobility Commission
UKHLS	UK Household Longitudinal Study
USoc	Understanding Society
VIF	Variance inflation factor

1. Introduction

1.1   Overview

Income mobility refers to the association between parental income during childhood (hereafter parental income) and an offspring's income in adulthood, an often used measure of equality of opportunity, openness and fluidity in society. It demonstrates how much a person's chance to excel in life depends on their family background. Income mobility is strongly linked with issues of inequality and child poverty. Equality of opportunity is an essential indicator of fairness in society, and social mobility has been a key goal of national policies such as the expansion of access to free universal education and the creation of the welfare state (Eurofound, 2017; OECD, 2018). In the UK, improving equality of opportunity and raising intergenerational mobility is at the heart of a range of policies, an aim of consecutive governments and a key societal value and belief (Social Mobility Commission, 2024). In an era of rising inequality, increasing educational inequalities and rising child poverty post-pandemic, it is crucial to address intergenerational mobility (Child Poverty Action Group, 2023; Elliot Major et al., 2024; Engzell et al., 2021). In order to address intergenerational mobility and understand how to improve it, it is necessary to understand how much intergenerational mobility there is and investigate potential heterogeneity. This study aimed to address this, firstly by providing an estimate of intergenerational income mobility in the UK. It also tested the linearity of the relationship between parental and offspring income, and whether it varied across gender.

It is widely acknowledged that education plays a key role in intergenerational mobility. It is both a driver of intergenerational mobility, where young people from any background can attain an education leading to better socioeconomic outcomes, and a reinforcement of inequality, where young people from more privileged backgrounds tend to excel in education, keeping their place in the social hierarchy (Bourdieu et al., 1977; Bowles & Gintis, 1976). However less is known about whether income mobility varies by level of education, especially in a UK context. Many key policies aiming to improve social mobility have focused on higher education, such as widening participation initiatives, but have rested on the assumption that higher education is associated with higher income mobility. However, previous studies have had mixed findings on whether this is true for income mobility in the UK (e.g., Vandecasteele, 2016). It is important to address this assumption and find out more about income mobility for those with differential educational attainment as it can guide policy toward areas that need improving for promoting equality of opportunity for all. The

second part of the study addresses this issue by investigating the moderating role of education in intergenerational income mobility, and whether it varied by gender.

Even when accounting for educational attainment, a large part of income mobility remains unexplained. Global research points toward the role of factors such as non-cognitive skills, employment and neighbourhood, however these can only partially explain the intergenerational persistence of income (Blanden et al., 2007). The third part of this study aimed to explore factors that are rarely considered in the context of income mobility: relationships with family and teachers in adolescence. The importance of positive relationships with adults is widely acknowledged in psychology and child development literatures (Davis, 2003; Pianta et al., 1997). It has also been suggested that these positive relationships can form protective buffers against growing up in certain risk contexts, such as growing up in a low-income household (Darling, 2007; Spera, 2005; Wright, 2018). Family policy has increasingly become part of governmental social mobility strategies (Hartas, 2015). Additionally, it's increasingly recognised that the quality of teachers and teacher relationships are integral to certain outcomes (EEF, 2022). However, there is a dearth of research on whether positive relationships with parents and teachers could a) have long-term socioeconomic consequences and b) be linked with higher intergenerational income mobility. Positive relationships with adults in adolescence have the potential to buffer the negative risks of growing up on low income, further explaining variation in income mobility above and beyond education.

1.2   Study background

This study aimed to estimate intergenerational mobility and its potential moderators. First, it estimated intergenerational income mobility in the UK, aiming to provide a summary measure to describe the level of income mobility for the general population. The choice of measure was informed by decades of mobility research and chosen to represent fluidity and movement across the income distribution across generations. Through providing a single descriptive summary statistic, it lays the groundwork for a deeper understanding of income mobility in the UK, achieved throughout the thesis.

This estimate describes the average level of intergenerational income mobility across the UK, however it may not be representative across the UK, so the study next investigated potential differences in the pattern of intergenerational mobility. Firstly, it tested whether the relationship between parental and offspring income was linear. Most estimates assume linearity of the relationship, in other words, that the association between parental and offspring income is consistent across the income distribution. However, some theory

13

suggests that income mobility would not be consistent across the income distribution, with those growing up in lower income families experiencing credit constraints which would not allow them to invest optimally into their children, leading to lower mobility at the lower ends of the income distribution (Becker & Tomes, 1979). Further theory and evidence also suggest that those at both ends of the income distribution may experience stronger intergenerational persistence than those in the middle due to 'glass floors' and 'glass ceilings' (Gugushvili et al., 2017; OECD, 2018). It also investigated whether intergenerational income mobility varied by gender. This was informed by theory and evidence of gender differences in key socioeconomic factors such as earnings, education and returns to education (Bukodi & Paskov, 2020; Diprete & Buchmann, 2006; Raaum et al., 2008). It was also driven by the fact that traditional models of income mobility mostly used data of fathers and sons (Black & Devereux, 2010) thereby excluding women, so to better understand patterns of mobility and potential gender differences, gender as a moderator was studied.

Next, the study examined educational attainment as a moderator. There are several theoretical reasons proposed for why higher mobility would be expected for those who achieve higher education. Some of the most prominent theories include a more meritocratic labour market for graduates (Hout, 1988; Torche, 2011); compensatory advantage theory, which explains the low mobility for non-graduates whereby those from more privileged backgrounds may be able to compensate for low education with other resources and gain higher socioeconomic status (Bernardi, 2014; Bernardi & Ballarino, 2016) and finally selectivity theory posits that those from lower income backgrounds gain entry to higher education based on unobserved attributes such as motivation and drive, which explains their higher mobility (Fiel, 2020; Zhou, 2019). However, some mechanisms work against these including advantages of those from higher income families including discrimination, elitist hiring practices and economic transfers from family. Additionally, some theories suggest why we might expect intergenerational income persistence at the graduate level, or even lower mobility at the graduate level. Vertical stratification in educational attainment posits that with increasing educational expansion, those from more advantaged backgrounds are the first to take these opportunities (Raftery & Hout, 1993) and horizontal stratification refers to students from more advantaged backgrounds utilising more prestigious programmes and institutions at the same levels of educational attainment (Lucas, 2001). In line with this, a boosting effect is hypothesised to take place where having a more privileged background may boost the opportunities for students who have achieved higher education (Bernardi & Gil-Hernández, 2021). International evidence largely supports the former hypothesis of a

14

moderating role of education; however some studies have suggested otherwise (Bernardi & Ballarino, 2016; Torche, 2011).

Finally, offspring's relationships with their families and teachers at age 14 were considered as moderators of intergenerational income mobility. The importance of relationships was drawn from applying child development theories to help understand intergenerational mobility, namely bioecological systems theoretical framework (Bronfenbrenner et al., 1999). The theoretical model posits human development within the context of a multilevel systems of relationships that form an individual's environment. According to this model, children's development is influenced by several factors of varying degrees of distance, including proximal and distal processes. Proximal interactions happen in a child's immediate environment such as interactions with parents in the home or teachers in school, however they should be understood in the context of distal processes such as socioeconomic status. It is also theorised that proximal factors such as positive relationships may act as protective buffers against negative consequences in risk consequences such as low income, also drawing from risk and resilience theories (Darling, 2007). Evidence has also supported these theories, suggesting that family and teacher relationships moderate the association between parental socioeconomic status and offspring socioeconomic status (Ogg & Anthony, 2020; Roorda et al., 2011).

1.3   Research problem

An extensive literature review revealed much existing evidence on intergenerational mobility, of which has been a central focus of sociology and economic disciplines for many decades (Atkinson, 1980; Glass, 1954). Many of these studies traditionally have been descriptive, focused on providing national estimates of mobility and focusing only on fathers and sons. More recently, studies have begun to explore mechanisms and heterogeneity in national estimates. In the UK, studies have been limited by access to prospective data on parental income. Most previous studies of income mobility in the UK have been limited to using one to two banded parental income observations for cohorts born in either 1958 or 1970 (Belfield et al., 2017; Blanden et al., 2013; Gregg, Jonsson, et al., 2017). In the wider international literature, it is now widely acknowledged that having only one or two income observations can lead to biased estimates (Chetty, Hendren, Kline, & Saez, 2014; Mazumder, 2016). Recently, household survey data in the UK has become available for a younger generation that offers rich prospective parental income data allowing estimates of income mobility to address these common biases (Rohenkohl, 2023). The current study aims to build on this and contribute to the evidence base by using this data to estimate income mobility for

the general population in the UK, testing nonlinearity and whether it varied across gender. It also extends previous research by using this as a basis to further understand mechanisms and potential protective factors.

The literature also suggests that educational attainment may play a moderating role in intergenerational mobility. International studies have explored education as a moderator in income mobility and its potential mechanisms, largely finding that achieving a degree is associated with higher intergenerational mobility (Bernardi & Ballarino, 2016; Torche, 2011). However, research in the UK is relatively scarce. The few UK-based studies that exist have been limited to parental social class measures of socioeconomic background (Breen et al., 2007; Vandecasteele, 2016). The current study aims to update the limited evidence base. This is an important contribution to the literature as existing studies have had mixed findings. These studies found that while the social class to social class association was disrupted to some extent by higher education, there was no meaningful moderation effect when looking at the association between parental social class and offspring income, which is at odds with the international literature (Vandecasteele, 2016). However, by investigating income to income mobility, another dimension of overall social mobility unique from social class mobility, this research provides new insight into the moderating role of education in intergenerational transmission of socioeconomic status in the UK. Parental income as a measure can also provide more granular detail on resources growing up (Fiel, 2020). Finally, previous estimates of intergenerational mobility have excluded those who are not working, which has been shown to bias estimates (Chetty, Hendren, Kline, Saez, et al., 2014; Gregg, Macmillan, et al., 2017; Mazumder, 2005). The present research aims to address these gaps, providing an analysis of the moderating role of educational attainment in intergenerational mobility, accounting for potential confounders, bringing knowledge of the UK more in line with international findings.

Finally, child development literature has suggested that relationships are paramount to development and linked with a range of positive outcomes (Davis, 2003; Pianta et al., 1997). The literature also suggests that positive relationships can act as protective buffers against the risk of growing up in low income on a range of outcomes (Ogg & Anthony, 2020; Spera, 2005). While some research has explored how these relationships can mitigate short-term risks related to growing up low income- such as educational attainment or behavioural issues during childhood and adolescence- there is limited research into how their influence on longer-term outcomes into adulthood such as socioeconomic outcomes can vary by socioeconomic circumstances growing up. Meanwhile, research into income mobility and its

mechanisms has traditionally had a relatively narrow lens, focusing on socioeconomic factors such as credit constraints and educational attainment and not tended to examine potential mechanisms that come from young people's subjective lived experiences. By bringing together the literature on intergenerational mobility and the literature on child development, the present research addresses gaps in both, examining something relatively unexplored in empirical research.

1.4   Research questions

Informed by the literature review, theoretical frameworks and in an attempt to contribute to the existing knowledge base, the study aims to address the following research questions:

1. To what extent is there intergenerational income mobility in the UK?
   a. To what extent is the association between parental income and offspring earnings nonlinear?
   b. To what extent does the association between parental income and offspring earnings vary by gender?
2. To what extent does educational attainment moderate the association between parental income and offspring earnings?
   a. To what extent does this moderation effect vary by gender?
3. To what extent do child-parent relationships moderate the association between parental income and offspring earnings?
   a. To what extent does this moderation effect vary by gender?
4. To what extent do child-teacher relationships moderate the association between parental income and offspring earnings?
   a. To what extent does this moderation effect vary by gender?

A directed acyclic graph of the research is shown below in Figure 1.1.
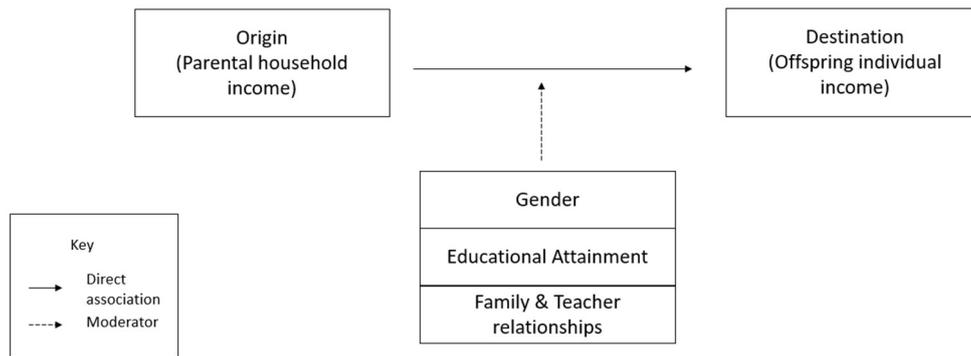
Figure 1.1 Directed Acyclic Graph of research questions

1.5   Aims of the study

Overall, the study aimed to address these gaps in the literature and provide a deeper understanding of income mobility in the UK and its moderators. To achieve this, the study undertook secondary data analysis, using the UK Household Longitudinal Survey (UKHLS). The household survey began data collection in 1991 and collects a range of information about individuals and their households. It also provides links between parents and their offspring, allowing intergenerational analysis. The study used measures of parental household income, offspring earnings and offspring educational attainment amongst other variables. Parental household income was used to represent resources available during childhood, and offspring earnings were chosen to reflect mechanisms of mobility such as education. Measures of relationships at age 14 included how often offspring ate with their family a week, how they felt about their families, and whether they got on with their teachers or not. These relationship variables were chosen to represent time investment and perceived relationships.

More specifically, the study aimed first to provide estimates of income mobility in the UK and evaluate potential heterogeneity across gender and parental income as an important first step in understanding how to improve income mobility. It achieved this by studying associations, examining their linearity, and using multigroup analysis to understand gender differences. Secondly, it aimed to explore education as a moderator, in other words, whether income mobility varied by educational attainment and whether that varied across gender. It achieved this through using a combination of multigroup analysis and interactions tests. Finally, it aimed to explore the moderating role of young people's relationships with parents and teachers in intergenerational income mobility, and whether this role varied across gender. It aimed to understand whether these positive relationships functioned as a protective buffer

against consequences of growing up on lower income on future outcomes, drawing on child development literature. It again achieved this through a combination of interactions tests and multigroup analysis, to understand how income mobility varied by quality of relationship.

1.6   Significance

As described above, intergenerational mobility is an essential indicator or equality of opportunity, fluidity and fairness in society. In fact, it was proposed as an indicator of education policy success by the Labour Party in 2023 (Labour Party, 2023). It is crucial to understand the mechanisms and protective factors underlying the intergenerational association, to ensure young people's life chances are not dominated by the circumstances they are born into. A deeper understanding of intergenerational income mobility can give insight into strategies that may help improve it.

The findings of the study represent a unique and new contribution to the existing knowledge base. Firstly, it estimated the general level of intergenerational income mobility, finding that around a third of the difference in offspring earnings were explained by difference in their parental household income growing up, linear across parental income and consistent offspring gender. These findings are an updated, representative estimate of intergenerational income mobility for those born between 1977-1991, roughly corresponding to the millennial generation who completed compulsory education under New Labour. The findings suggest that there has been no significant change in intergenerational income mobility between this generation and the cohort born in 1970 in line with previous findings (Social Mobility Commission, 2023a). It has also contributed to the existing evidence, finding that the level of intergenerational mobility was slightly higher than previous estimates based on the same cohort (Rohenkohl, 2023). The findings also show that there is intergenerational income persistence net of educational attainment, undermining the notion of the UK as an education-based meritocracy (Bukodi & Goldthorpe, 2018). These findings highlight the continued need to address intergenerational income mobility, to improve equality of opportunity in the UK.

Secondly, the study provided analysis of the extent to which educational attainment moderated intergenerational income mobility in the UK. This analysis is amongst the first UK-based research studies to look at the moderating effect of education on the association between parental income and offspring income. It contributed to the scarce evidence base which had mixed findings, reporting a lack of moderation effect of education for offspring's earnings (Vandecasteele, 2016). Instead, the findings showed a moderation effect, more in line with international evidence and theory (Fiel, 2020; Torche, 2011). These findings

demonstrate that higher education is associated with higher income mobility, however, there was still a significant intergenerational association of income for those with a degree. These findings have implications for education policy strategies addressed at improving income mobility going forward. Based on the findings of the current study, it is recommended that there needs to be a focus on improving intergenerational mobility for those in higher education, and for those without higher education who experience exceptionally low intergenerational mobility. Avenues for achieving this are discussed. Furthermore, it implies that education is not the silver bullet for improving intergenerational mobility, recommending that social mobility strategies should also focus on avenues outside of education, which motivated the final part of the study.

Finally, the study made an important contribution to the income mobility literature, highlighting a relatively unexplored potential protective factor in positive relationships with parents and teachers. This has crucial implications for both policy and practice. Existing policies already emphasise the importance of parenting and teachers in promoting equality of opportunities, but until now, the evidence base has been relatively scarce on the longer-term impact of these relationships and how they interact with socioeconomic background. The findings of the present study demonstrated that both parental time investment and positive relationships with teachers in adolescence acted as protective factors for those from lower income families. Crucially, time spent with family was found to be a protective factor from those from lower income families, but not effective for those from higher income families, in line with previous findings (Ogg & Anthony, 2020). This is important, as previous studies that have not considered the interactional effect can wrongly assume that a lack of relationship, or a general relationship across the socioeconomic distribution. It is especially concerning considering the socioeconomic gap in parenting (Kalil & Ryan, 2020). This has important implications for improving social mobility, including targeted interventions addressing parenting and teacher relationships, which is especially concerning given the current context of the teacher recruitment and retention crisis in the UK.

1.7   Structure

The study is structured as follows. In **chapter one**, an overview of the study is given in this introductory chapter. In **chapter two**, an extensive literature review is undertaken, allowing intergenerational mobility and relationships to be conceptualised and defined. The chapter then goes on to review the literature, presenting a greater context for this research and identifying gaps. It also provides an overview of the theoretical frameworks and mechanisms proposed in the literature. **Chapter three** provides an outline of the methodology of the

research, including a description of the data and sample used. **Chapter four** provides the results for the analyses. It begins with descriptive statistics, then goes onto the results for the estimates of income mobility, and how it varies by parental income distribution, gender, educational attainment and relationships using a combination of interactions tests and multigroup analysis. It concludes with the results of robustness checks. Finally, **chapter five** provides an in-depth discussion of the results, relating the findings to the existing literature, discussing implications for research and policy, and limitations and future research directions. **Chapter six** closes with a conclusion, summarising the findings and implications, and providing overarching findings, implications and suggestions for future research.

2. Literature Review

2.1   *Aim of chapter*

The aim of this chapter is to provide an overview of the literature regarding intergenerational mobility and the role of education and adolescent relationships. The second section considers the policy context for intergenerational mobility. The third section defines and conceptualises intergenerational income mobility and adolescent relationships. The fourth section explores the key underlying theoretical considerations and evidence on intergenerational income mobility. The fifth section then explores the theory and evidence surrounding the role of education in intergenerational income mobility, summarising gaps and limitations. The sixth section does the same for the moderating role of adolescent relationships in intergenerational mobility. In the final section, the research aims of the current thesis are outlined in context of the literature review. It concludes with a summary of the chapter.

Throughout, this literature review aims to comprehensively map existing knowledge and frameworks which the current research will build on, and the gaps to which this research contributes to.

2.2   *UK policy context*

Improving social mobility is a key policy priority in the UK and other countries, reflecting its importance as a measure of equality of opportunity, fairness and fluidity within society (Eurofound, 2017; OECD, 2018). Due to the complex nature of social mobility and its connections to inequality and disadvantage, a wide array of policies have sought to address it, including broad initiatives such as the expansion of higher education and the development of the welfare state (Beller & Hout, 2006). While a comprehensive review of these policies is beyond the scope of this thesis, this section offers an overview of the relevant UK policy context to provide background for the present research.

In the UK, social mobility has been a focal point of numerous initiatives and policies, ranging from areas of education to the labour market to social policy. The predominance of the issue can be demonstrated by the existence of the Social Mobility Commission (SMC), originally the Child Poverty Commission, an independent body dedicated to monitoring, promoting and advising on improving social mobility. While the UK aims to be a place where everyone has a fair chance to go as far as their talent and their hard work will take them, nearly half of people believe that in Britain today where you end up in society is mainly determined by your background and who your parents are according to a social

attitudes survey (Social Mobility Commission, 2021). Furthermore, the survey showed that more people believed that it was becoming harder for people from less advantaged backgrounds to move up in British society (Social Mobility Commission, 2021). This underscores the continuous importance of the initiatives and policies addressing social mobility.

Education is widely recognised as one of the most critical drivers of intergenerational mobility. In the UK, the education system is devolved, with each of the four nations - England, Scotland, Wales, and Northern Ireland - having its own education policies, curricula, and regulatory bodies. Education across the UK is compulsory from ages 5 to 16, while in England students are required to remain in full-time education, an apprenticeship, or a combination of part-time work and education or training until they are 18. Compulsory education is free and universally provided, though fees often apply to higher education with the exception of Scottish students attending Scottish universities. The UK education system has undergone numerous reforms over the past few decades and many policies have aimed to reduce disparities and promote equality of opportunity such as the phasing out of grammar schools and the introduction of widening participation initiatives. Like many other countries, the UK education system experienced an unprecedented shock in 2020 due to the COVID-19 pandemic, which led to country-wide school closures. Since then, there have been mixed signs of recovery, with mixed evidence of learning loss, a rise in school absences, mental health challenges, and ongoing issues exacerbated by the cost-of-living crisis (Elliot Major et al., 2024; Engzell et al., 2021; OECD, 2023). Below, an overview of the UK education system is given as context for the present research.

Primary and secondary education covers the ages of 5 to 16. There are several types of secondary school with different funding, including state schools that receive funding through their local authority or directly from the government and private fee-paying schools. Private schools are associated with high termly costs and better academic and occupational outcomes than state schools (Green, 2024). In primary and secondary schools, pupil premium funding in England (pupil equity funding in Scotland) is a grant allocated to schools based on the number of disadvantaged students to improve educational outcomes. Eligibility for pupil premium funding is based on parental income and is a prevalent measure of disadvantage in the UK.

Further education or upper secondary education in the UK refers to study after secondary school that's not part of higher education, encompassing sixth form colleges and vocational courses. There has recently been a push for higher quality post-16 options, including

vocational training, which has been reflected in multiple reforms to the further education sector (Department of Education, 2022). Students from disadvantaged backgrounds are more likely to attend vocational education and not continue to higher education, making it important grounds for improving social mobility (Lisauskaite et al., 2021).

Higher education encapsulates bachelor's degrees and postgraduate degrees, including Masters and PhDs. In the UK around 58% of 25–64-year-olds had tertiary education in 2022, above the Organisation for Economic Co-operation and Development (OECD) average of around 47%, which has been steadily increasing (OECD, 2022). In England, one of the biggest changes to the landscape of higher education over the past few decades was the introduction of tuition fees. Undergraduate tuition fees capped at £1000 were introduced in 1998, capped at £3,000 in 2005, up to £9,000 in 2013, currently capped at £9,250 in 2024. Fees and financial support differ across the devolved nations, and fee free undergraduate degrees are offered to Scottish students from Scottish universities. For Masters programmes, there is no cap on fees, with tuition ranging from around £4,900 a year to over £30,000. With exorbitant fees and limited financial support, postgraduate degrees have been hailed as a new frontier of social mobility (Wakeling & Laurison, 2017). While top universities have traditionally disproportionately accepted less state school and disadvantaged students, there is a wide array of initiatives to encourage 'widening participation', including financial support and contextual admissions.

More specifically, the New Labour government (1997-2010) led by Tony Blair followed by Gordon Brown prioritised education and equality of opportunities introducing policies such as Education Action Zones, establishment of academies, Education Maintenance Allowances, and raising the school leaving age, although they also introduced tuition fees for higher education (Heath et al., 2013). This is particularly important as the cohort examined in this research were born between 1977 and 1992, corresponding roughly to the millennial generation who completed compulsory schooling predominantly under New Labour.

Despite policies aimed at reducing disparities, educational inequality at every level remains a major concern in the UK. The disadvantage gap, or the socioeconomic attainment gap, measures the difference in achievement in GCSE English and Maths in England between pupil premium eligible students and non-eligible students. While there was slow and steady progress since 2010 when measures began, post-pandemic the disadvantage gap in 2021/22 rose to the highest since 2011/12, wiping out a decade of progress (Social Mobility Commission, 2023a). This loss raised major concern about a potential decline in social mobility in the aftermath of the pandemic (Elliot Major et al., 2024). Furthermore, there

exists a significant class pay gap for those from disadvantaged backgrounds compared to their more advantaged peers even in the same occupational class (Laurison & Friedman, 2016) and even with similar educational attainment (Britton et al., 2016). With increasing levels of child poverty, and unfair outcomes, social mobility is a persistent and key concern for the UK and its devolved nations (Child Poverty Action Group, 2023).

While socioeconomic background is one of the strongest predictors of education and occupational outcomes, this also interacts with other characteristics such as gender, ethnicity and place. Amongst the lowest educationally performing groups includes White working-class boys, demonstrating the intersectionality of the issue (Social Mobility Commission, 2023a). Meanwhile, women on average earn 7% less than men in the UK, although the gap is slowly narrowing (Office for National Statistics, 2024).

While these policy interventions have focused on education, other areas are also recognised as crucial to social mobility. For example, the *workplace* is another area recognised for its importance for social mobility, and the SMC provides recommendations and toolkits for workplaces to promote intergenerational mobility (Social Mobility Commission, n.d.). Furthermore, the socioeconomic duty, part of the Equality Act, aims to ensure that public bodies consider the impact of their decisions on socioeconomically disadvantaged groups, although it has not been enacted as law currently in England (Equality Trust, 2019). More recently, policies have also emphasised the important role that place and location have in social mobility and opportunities. This is reflected in the Levelling Up campaign which had aimed to address broader community factors influencing social mobility ("Levelling-up and Regeneration Act 2023," 2023).

Another area that has been increasingly acknowledged as important to social mobility and educational outcomes is the role of *parenting and the home learning environment*. This is concerning given the socioeconomic inequalities in parenting and the home learning environment. For example, widening socioeconomic disparity in time spent with parents has been reported, both in the UK and the US (Putnam, 2015; Richards et al., 2016). In recent years, parenting became a more central feature of social mobility policies (Hartas, 2015; HM Government, 2018). For example, interventions such as Family Hubs in England and the National Parenting Strategy in Scotland focused on improving the home learning environment and supporting parents. Furthermore, the Education Endowment Fund (EEF) found that parental engagement initiatives had a positive impact on average of four months' additional progress for pupils (EEF, 2023). However, these policies have faced criticism for sometimes oversimplifying the socioeconomic context of parenting and putting the onus on

parents rather than wider contextual inequalities (Hartas, 2015). The difficulty in policy influence in the family and home has also been acknowledged.

Teacher quality has also been widely acknowledged as crucial to young people's outcomes. For example, the Teaching and Leaderships Innovation Fund was introduced in 2017 in England with the intentions of improving social mobility and quality of teaching in disadvantaged areas designated as 'Opportunity Areas' (Steadman & Ellis, 2021). Currently, there is a teacher recruitment and retention crisis in the UK, especially in England, exacerbated by the pandemic. This has led to a range of measures introduced to boost teacher recruitment and retention, including most recently mental health and wellbeing support, workload reduction, and improving professional development.

While many of these policies and interventions have had a positive impact on individual outcomes and trajectories, overall intergenerational mobility levels in the UK tend to be resistant to change. There is little evidence to suggest that relative mobility has been increasing over time in the UK and arguably some evidence to show the reverse (Krutikova et al., 2023). There is also worry that absolute mobility is declining (Social Mobility Commission, 2023a). Some argue that this stagnation is happening because system- and culture-wide changes are needed to improve overall intergenerational mobility, for example through welfare state typology or overall levels of inequality (Beller & Hout, 2006; Jerrim & Macmillan, 2015). The UK's welfare state is typically classified as a liberal welfare state, characterised by market dominance and private provision, with means-tested benefits meant to provide for basic needs (Esping-Andersen, 1990). Trends in income inequality have been volatile recently, but there has been a growth in income and wealth for the very richest (Piketty, 2017). Overall, intergenerational mobility is a broad, multifaceted issue that encompasses many policy areas meaning that broad approaches are required to make a difference.

2.3   *Key concepts and definitions*

Key concepts are defined in this section. Firstly, the concept of intergenerational mobility is defined, and a rationale given for the present study's conceptualisation of intergenerational mobility drawing on existing research. The following section defines and conceptualises relationships with parents and teachers, also in the context of the existing literature.

2.3.1   Conceptualisation of intergenerational mobility

Intergenerational mobility has been a key topic of interest in sociology and economics for many decades (Atkinson, 1980; Glass, 1954). Intergenerational mobility is a broad term that

covers various concepts within it but generally refers to the relationship between parental socioeconomic status (SES) and that of their adult offspring. The opposite of mobility is persistence and refers to intergenerational cycles or transmission of (dis)advantage. There are important conceptual distinctions to be made within this broad idea of intergenerational mobility. First, the distinction between different socioeconomic dimensions of intergenerational mobility is discussed, with a focus on income, social class, education and wealth. Then, the distinction between absolute and relative mobility is defined. Finally, the distinction between intergenerational mobility and intragenerational mobility is made. The section concludes with a rationale for the conceptualisation of intergenerational mobility proposed in this thesis and outlines the limitations of this too.

Firstly, mobility can encompass many different socioeconomic indicators which can include but is not limited to income, social class, education and wealth. Social class mobility refers to the relationship between the social class of parents and their adult offspring (Bukodi et al., 2015; Friedman & Macmillan, 2017). Traditionally, sociologists examine social class mobility, and economists study income mobility, but increasingly they overlap (e.g., Fiel, 2020; Torche, 2015). Income mobility similarly refers to the association between parental and offspring income. While there is an overlap between social class and income, the two concepts of social class mobility and income mobility describe unique phenomena, substantively, theoretically and methodologically.

There are a few key differences between social class mobility and income mobility. Firstly, social class is categorical by nature, grouping individuals together often using occupation-based categories related to power relations, skills, or prestige. These broad classes can conceal disparities in income between different occupations. Secondly, social class tends to be contextual to place and time, reflecting the composition of the labour market; hence trends and cross-national differences can often partly be explained by differences in the labour market. Instead, income can solely capture repositioning across generations, without reflecting occupational composition. Thirdly, social class measures tend to also capture concepts such as social and cultural capital, whereas income is a more focused measure of financial resources available although there is of course an overlap. Based on these differences, social class mobility and income mobility display different patterns and reflect different mechanisms. For example, Bukodi et al. (2015) found that while income mobility declined between two birth cohorts in the UK, social class mobility was found to be relatively stable. In sum, social class mobility and income mobility are two distinct aspects of the intergenerational transmission of socioeconomic status. Each approach has its own

benefits, and they can be used in tandem to provide a deeper understanding of the intergenerational persistence of SES.

In this thesis, mobility is conceptualised using income as an indicator of both parent and offspring SES. Even within income, there are various dimensions that reflect different mechanisms. For example, using offspring household income rather than individual income can capture mechanisms of assortative mating (Belfield et al., 2017). Furthermore, the use of net income rather than labour earnings alone tends to capture the redistributive effects of the welfare system, whereas labour earnings alone capture labour market mechanisms (Belfield et al., 2017). These small differences in operationalisation can lead to important differences in findings (Engzell & Mood, 2023). For the present research, parental household earnings are used as a measure of resources available during childhood and individual offspring earnings in adulthood are used to help understand the underlying mechanisms.

There is also a substantial body of literature that seeks to understand the intergenerational transmission of educational attainment (Andrade & Thomsen, 2018; Fleury & Gilles, 2018; Strömberg & Engzell, 2023). The benefits of using educational attainment as a measure of SES in intergenerational analysis include the wealth of data available on offspring, parental, and even multigenerational education. Educational attainment has been used to proxy income in several mobility studies, or to predict future income for younger generations (Blanden, 2013; Chetty, Hendren, Kline, Saez, et al., 2014; Stuhler, 2018). However, education is not a perfect proxy for income, as there can be wide disparities in earnings amongst educational levels (Britton et al., 2016). Furthermore, the transmission of education relies on different mechanisms than the transmission of income, especially as education is believed to be one of the most important mechanisms of transmission of income and class. Thus, by studying educational mobility, it becomes difficult to untangle the role education plays in social mobility.

Another dimension that has been examined in recent literature explores the intergenerational transmission of wealth and wealth inequality. This topic has gained attention recently, partly thanks to the work of Thomas Piketty in *Capital in the Twenty First Century* Piketty (2017) which draws attention to rapidly increasing wealth inequality in rich countries. Wealth inequality in general is much higher than income inequality, thus it is vital to understand the role that wealth plays in the intergenerational transmission of inequality (Skopek et al., 2014). In general, wealth transmission is also stronger than income transmission, which can be expected considering the nature of wealth to accumulate over generations (Pfeffer & Killewald, 2018). There are different mechanisms at play in wealth transmission, with some

of the most important factors including direct inheritance and gifts, and investment into education (Gregg & Kanabar, 2021; Nolan et al., 2020; Pfeffer & Killewald, 2018). As income cannot be directly inherited, the mechanisms at play tend to be less clear. While the present work focuses on income mobility and the role of education, wealth remains an important piece of the puzzle, and increasingly so (Hällsten & Thaning, 2022).

While social class, income, education and wealth are the main focus of a lot of mobility research, studies have also investigated the intergenerational transmission of worklessness, welfare recipiency and binary indicators of poverty (Friedman et al., 2017; Parolin et al., 2023; van der Erve et al., 2024). Studies have also tended to mix socioeconomic indicators to serve as proxies for missing information (Chetty, Hendren, Kline, Saez, et al., 2014; Jenkins et al., 2017). In summary, there are many possible dimensions of intergenerational mobility, with each dimension reflecting unique trends and mechanisms.

In addition to different socioeconomic dimensions of mobility, there is also a distinction between absolute and relative mobility, which especially applies to income mobility. *Absolute income mobility* refers to the proportion of the population whose income is higher than their parents at roughly the same age, adjusting for inflation (Chetty et al., 2017; Kennedy & Siminski, 2021; Stockhausen, 2021). Absolute mobility represents rising (or declining) living standards from one generation to the next, as the main mechanism behind it is overall growth. As Chetty and colleagues put it, the aspiration that children have a higher standard of living than their parents is "one of the defining features of the America dream" (Chetty et al., 2017, p. 398). On the other hand, *relative income mobility* considers the strength of the association between the relative income of parents and children. In other words, it positions or ranks parents and offspring in their own distributions and measures the movement (or lack of) between those positions (Blanden, 2019; Jäntti & Jenkins, 2015). Hence, relative income mobility demonstrates the differences in outcomes for those who grew up in families of different income, for instance in a low-income family versus a high-income family. When one individual changes position, another must take their place. In some ways, this measure presents a controversial concept, as it captures downward mobility too, something regarded as largely undesirable. Accordingly, some research separates the concepts of upward and downward mobility, which also is often driven by distinct mechanisms (Friedman & Macmillan, 2017). However, overall relative mobility is often considered a measure of equality of opportunity, fairness and fluidity in society as it describes to what extent an individual's SES relies on that of their parents. Measures of relative mobility generally mirror the findings of dedicated equality of opportunity measures

as well (Deutscher & Mazumder, 2021). The present study employs the concept of relative mobility so as to better understand its complex underlying mechanisms.

One more distinction to be made is between *inter*generational mobility and *intra*generational mobility. The former refers to mobility between parents and their offspring, and the latter refers to mobility across the life course. Intergenerational mobility refers to the link between parents and their adult offspring, or even across multiple generations. SES is often measured during similar periods of life between generations, but not always. To a certain extent, the two concepts overlap, by measuring parental SES while the offspring live with their parents. The present study uses the concept of intergenerational mobility, but measures parental household income during childhood, encompassing both concepts in this way.

A review of the literature demonstrates the complexity and occasional inconsistency in terminology and conceptualisation of mobility, which has led to confusion in the past. For example, findings by Blanden et al. (2001) showed a decline in intergenerational income mobility in the UK between cohorts born in 1958 and 1970. These findings were shared by politicians and media outlets as a decline in social mobility, which many took to mean a decline in social class mobility (Goldthorpe, 2013; Gorard, 2008). This was misleading, as research shows that in fact relative social class mobility has been stable in those years in the UK, while absolute rates of both social class mobility and income mobility had declined (Goldthorpe, 2013). For these reasons, it is vital to consider the distinctions between the different dimensions of mobility, while acknowledging their complexity and avoiding ambiguity.

Overall, this section has reviewed various conceptualisations of intergenerational mobility. Based on this review, this thesis has chosen to conceptualise intergenerational mobility as intergenerational relative income mobility. It uses this as a measure of intergenerational transmission of (dis)advantage and draws on prior literature based on broad conceptualisations of mobility. Income mobility henceforth refers to relative intergenerational income mobility unless specifically stated otherwise, and terms of social and intergenerational mobility refer to broader terms of mobility based on a range of socioeconomic indicators. Both language of mobility and persistence are used, as two sides of the same coin. This conceptualisation also comes with its limitations. A caveat of using only one dimension of mobility is that it does not fully capture the multidimensional nature of the intergenerational transmission of (dis)advantage. By using offspring earnings, it is necessary to stress that this does not represent the only important outcome for individual's lives. While it is meant to represent economic success to an extent, the present study

acknowledges that many other outcomes are also important to an individual's life including health and happiness that are not generally reflected in mobility studies.

2.3.2 Defining relationships with parents

Parental relationships, or child-parent interactions is not a well-defined concept and can encapsulate a range of concepts including parental emotional warmth, parenting style and parental investment. It is important to distinguish between these related yet unique concepts and aspects of parental relationships with their offspring.

A common approach to studying the quality of parental relationships is to study a dimension of parenting, emotional warmth. Parental warmth tends to encompass supportive, accepting and responsive parenting characterised through behaviour such as affection, comfort, concern, nurturance and love (Pinquart, 2017b). Sometimes, parental warmth is contextualised in the Parental Acceptance-Rejection Theory. The theory conceptualises parental warmth as a scale from parental acceptance to parental rejection and represents the quality of the affectional bond between parents and their children (Rohner, 1986). The absence of warmth, or parental rejection may be characterised by cold, unaffectionate, hostile, aggressive, indifferent or neglectful behaviour.

Another common approach to studying child-parent relationships considers parenting styles which categorises parenting behaviours and dimensions into styles. There are four parenting styles across two dimensions of warmth and control (Maccoby & Martin, 1983; Pinquart, 2017b). Authoritative style is characterised by high warmth and high control, authoritarian style is characterised by low warmth and high control, a permissive style is characterised by high warmth and low control and neglectful style is characterised by low warmth and low control.

Another facet of parenting is parental investment, which not only refers to financial investment but can also refer to investment of time, energy or resources that benefit the children (Francesconi & Heckman, 2016). Time investment includes spending time with parents and can also more specifically refer to specific activities done together with parents such as eating meals together, having conversations, to activities such as reading together, talking about homework, or trips together to places such as zoos, museums or theatres. Parental time investment compared to parental warmth discussed above is sometimes described as quantity and quality, and both are important to the concept of parenting. For example, spending time more time with parents allows more time for children to benefit from parental warmth or support. Thus, both quality and quantity of parenting are important

to understanding parenting and also interact. While specific activities done together such as family meals together can reflect time investment, they can also reflect other factors such as family values, routine or nutrition (Putnam, 2015; Snuggs & Harvey, 2023).

Moreover, it is important to distinguish child-parent relationships from the concept of parental involvement or engagement. These latter concepts refer to the level of parental involvement in their children's education and learning, characterised by a range of behaviours from attending parents' evening, reading with children at home to helping with homework (Goodall & Montgomery, 2014). Warmth or parental investment are sometimes treated as dimensions of parental involvement or engagement, and the literature on these concepts increasingly recognise the importance of the quality of the relationship between children and parents as a component of parental involvement and engagement (Jeynes, 2023).

It is also important to note that relationships with mothers and fathers are often distinct and that wider interactions within the family are also important factors (Jeynes, 2023). Measures can also be subjective or objective and can be perceived from the child or adolescent's point of view, from the adult's point of view, through third-party observation or various combinations of these. Additionally, these concepts of parental relationships and behaviours can be applied to all stages of childhood and adolescence, although different aspects have varying relevance across the different stages of childhood and adolescence. They can also be applied to relationships with adult offspring, although they less often are.

Overall, offspring-parent relationships can refer to a range of relationship dimensions. It is important to remember that the various concepts can capture many aspects, and it can be difficult to measure such a subjective and broad concept quantitatively. It is multifaceted in nature as it subsumes a variety of behaviours and practices. In this thesis, multiple facets of parental relationship quality are used, namely parental warmth and parental time investment, although other facets are also discussed throughout the literature review and discussion. More specifically, it uses a measure of parental time spent together in the frequency of family meals together. It is important to acknowledge though that family meals together may also be capturing other facets of parenting and family life such as routine or family values, of which the implications are discussed.

This thesis also primarily focuses on parental relationships in adolescence. Adolescence represents a crucial second stage of development, where young people are forming their social identities, and experiencing growing peer influences and making important decisions

for their long-term future (Dahl et al., 2018). However, the thesis also considers relationships across stages of childhood too in its evidence review.

2.3.3 Defining student-teacher relationships

Similarly, student-teacher relationships refer to the strength or characteristics of the relationships between teachers and students and are important to a range of outcomes. Like parent relationships, there are different dimensions and aspects to conceptualising relationships with teachers, or student-teacher relationships, although they largely draw from theories and models of child-parent relationships (Sabol & Pianta, 2012).

For example, three distinct dimensions include closeness, conflict and dependency. Closeness can be characterised by degree of warmth, conflict can be characterised as lack of rapport or negativity, and dependency can refer to clinginess of possessiveness of the child with the teacher (Pianta & Nimetz, 2001). According to the Student-Teacher Relationship scale, a positive student-teacher relationship is characterised by scores high in closeness and low in conflict and dependency, whereas a negative student-teacher relationship can be characterised by scores low in closeness and high in conflict and dependency. This conceptualisation has also been modified, removing dependency as it not considered negative in all cultures, at all ages or with all attachment histories (McGrath & Van Bergen, 2015; Roorda et al., 2011). McGrath and Van Bergen (2015) go further to conceptualise relationship quality as positive when it is beneficial to both the student and the teacher, and negative when it harms either or both members. Other key constructs characterising emotional quality of child-teacher relationship can include perceived support, willingness to rely on the teacher, and sense of relatedness (Davis, 2003).

Like child-parent interactions, student-teacher relationships can be teacher perceived, child perceived or observed by a third party. Additionally, student-teacher relationships are often conceptualised for children and adolescents, although have also been conceptualised for adults in higher education too. It can be difficult to operationalise such complex and broad concepts as closeness in relationships with teachers, particularly in quantitative research.

Accordingly, in this research, multiple facets of student-teacher relationships are considered, with student-rated warmth and conflict being the main conceptualisation. The present thesis retains a focus on relationships in adolescence, although draws on research on relationships across stages of development.

2.4   Intergenerational income mobility

This section provides an overview of the theoretical considerations and evidence of intergenerational income mobility. Firstly, it explores the theory behind the intergenerational transmission of income, then reviewing the evidence base on intergenerational income mobility internationally and in the UK. Next, it outlines the theory and evidence of potential nonlinearity in the intergenerational income association and then the literature on variation across gender. The section concludes with a summary of the key issues and gaps found in the literature.

2.4.1 The intergenerational association of socioeconomic status

Theoretical considerations

Figure 2.1 Model of intergenerational mobility.

Firstly, the total association between parental SES and offspring SES is visualised in a model in Figure 2.1. The association is purely descriptive, and it encompasses any of the numerous underlying mechanisms or confounding effects. The literature has theorised and found evidence of mechanisms including but not limited to education (Bukodi & Goldthorpe, 2016), credit constraints (Becker & Tomes, 1979), genes (Belsky et al., 2018), culture and social capital (Bourdieu et al., 1977), cognitive skills (Blanden et al., 2007), neighbourhood effects (Chetty & Hendren, 2018) and peer effects (Chetty et al., 2022). Traditional theories in sociology and economics have tended to focus narrowly on factors such as education, human capital and culture, however more recently theories have become more interdisciplinary, acknowledging broader factors including skill formation and the timing of inputs (Cunha & Heckman, 2008). Despite the many theorised mechanisms, part of the intergenerational persistence of SES tends to remain unexplained (Blanden et al., 2007). A comprehensive overview of all theorized mechanisms underlying intergenerational mobility is beyond the scope of this thesis, but a review can be found in Cholli and Durlauf (2022).

National estimates of intergenerational mobility

Much of the early literature on intergenerational mobility was descriptive in nature, providing national estimates of intergenerational mobility in the UK (Atkinson, 1980; Glass, 1954). Traditionally, studies only considered father-to-son transmission of SES, due to women's lower labour market participation. However, more recent research includes mothers, daughters, or uses combined parental measures of SES (Black & Devereux, 2010).

Measurements of intergenerational income mobility are usually a number between zero and one, with zero representing full mobility, with no association between parental income and offspring income, and one representing a complete lack of mobility with offspring income totally explained by parental income. Internationally, studies have consistently found intergenerational income persistence to a certain extent across countries of different time periods, development stages and welfare states. Exact measurement of intergenerational income persistence varies by methodological design, making it difficult to make direct comparisons, or interpret much from singular statistics without comparison (Engzell & Mood, 2023). For example, intergenerational income persistence has been estimated at 0.34 (Chetty, Hendren, Kline, & Saez, 2014) to 0.4 (Mazumder, 2005) in the US; 0.25-0.3 in Italy (Acciari et al., 2019), 0.19-0.22 in Australia (Deutscher & Mazumder, 2021) and 0.46 in China (Jin et al., 2019) to name just a few. However, without context, these numbers can lose their meaning.

Another body of literature has aimed to estimate trends in national intergenerational income persistence over time. Again, this endeavour is limited by data availability, which has led to some contention. In the US, where rich longitudinal data is available, one paper surmised that intergenerational income persistence has remained "extremely stable" for cohorts born between 1971 and 1986 (Chetty, Hendren, Kline, Saez, et al., 2014). On the other hand, analysis of administrative data in Sweden concluded that intergenerational income mobility had declined over time for cohort born between 1958 to 1977, largely due to women's increasing labour market participation which resulted in increased intergenerational persistence for women (Engzell & Mood, 2023).

Returning to the context of the UK, there is a range of existing national estimates of intergenerational income mobility. Most studies have estimated income mobility for people born in 1958 and 1970 (Belfield et al., 2017; Björklund et al., 2017; Blanden, 2013; Bolt et al., 2021; Gregg, Jonsson, et al., 2017). Estimates have ranged from 0.20 to 0.25 for the cohort born in 1958 (Belfield et al., 2017; Blanden, 2013) to 0.27 to 0.43 for the cohort born in 1970 (Björklund et al., 2017; Gregg, Macmillan, et al., 2017). Measures can vary significantly depending on methodology (see Chapter 3 Methodology for more details on measurement issues). The two cohort studies have been used in tandem to demonstrate trends in income mobility over time. For example, Blanden et al. (2005; 2007) found a stronger association between sons' earning and parental income in the 1970 cohort compared to the 1958 cohort (0.29 compared to 0.21), making the influential claim that mobility in Britain was declining. However, this claim has been much disputed on methodological grounds

(Bukodi et al., 2015; Gorard, 2008). In general, estimates based on these datasets have faced methodological and data limitations due to not being able to incorporate some of the methodological advances made in the wider international literature, such as using multi-year measures of parental income. These surveys rely on one or two observations of parental income at age 11 and 16, which is widely acknowledged to downwardly bias intergenerational mobility estimates (Gregg, Macmillan, et al., 2017; Mazumder, 2005; Nybom & Stuhler, 2017; Solon, 1992).

More recently, new survey data has become available for income mobility estimates for a younger cohort of people born between 1973 and 1992. Rohenkohl (2023) used this data to estimate an income persistence of around 0.26 to 0.30 using rich prospective information on parental income. While direct comparisons should be taken with caution, some have tentatively considered this to mean that intergenerational income persistence has been stable since the 1970 cohort (Social Mobility Commission, 2023a). Once more, these estimates face some methodological challenges, discussed in more detail in Chapter 3.

Based on the lack of income data available, particularly for the parent generation in the UK, some studies have used other measures as proxy for either parental or offspring income. For example, researchers at the Institute for Fiscal Studies have used linked data from Longitudinal Education Outcomes data, which contains detailed offspring earnings measures, and free-school meal eligibility during school years and measures of local area of residence. Using free-school meal eligibility and local deprivation measures, the researchers combined these to proxy parental SES (Carneiro et al., 2020; van der Erve et al., 2024). Using this, they estimated intergenerational income persistence to be 0.19 for men and 0.27 for women. Furthermore, previous studies also used survey data to estimate income mobility but using a proxy measure for parental income, finding estimates of 0.32 to 0.34 (Bididsha, 2009; Cavaglia, 2016).

However, national estimates of income mobility often obscure significant variation within them and recent literature has increasingly focused on exploring these variations within countries. For example, studies have shown that income mobility varies significantly by geographical region. A seminal study by Chetty, Hendren, Kline and Saez (2014) examined how income mobility in the US differed across time and across geographical areas using administrative data. They found that income mobility was largely stable across birth cohorts, but the largest persistent differences were in fact between geographical areas. According to these findings, they argue that national estimates are hiding important inequalities. In the UK, research has shown that in general there tends to be higher mobility in the South of

England and London, and lower mobility in the North of England, although patterns are more complex at a more granular level (Friedman & Macmillan, 2017; Rohenkohl, 2023; Yu, 2023; Van der Erve et al., 2024). Studies have also investigated other moderators of income mobility. For example, it's found that mobility varies by ethnicity and race in the UK and the US (Akee et al., 2019; Bididsha, 2009; Pfeffer & Killewald, 2019; Van der Erve et al, 2024).

2.4.2 Nonlinearities in intergenerational income mobility

Theoretical considerations

Parental income may impact their offspring's future income directly through investment into human capital, or indirectly through many different theorised mechanisms. In general, these theories assume that the association between parental income and offspring income is linear, in other words, consistent across the income distribution. However, some theories posit that there may be nonlinearity across the income distribution in intergenerational mobility (D'addona & Vitori, 2024). For example, the classic family investment model proposed by Becker and Tomes (1979) emphasised the role of parental financial resources in intergenerational mobility. The theory posits that parents invest into their children's human capital, for example through education. Parents with higher income have more resources available to make this investment than low-income parents and credit constraints limit the ability of parents to invest optimally in their children's development, causing persistence of disadvantage. According to a modified model which incorporates bounded rationality into parental decisions, different rates of persistence may also be expected across parental income distribution due to wealthier parents making better investment decisions into their children's human capital (Becker et al., 2018; Gregg et al., 2019). According to this theory, we would expect stronger rates of persistence of income at the lower and higher ends of the income distribution.

Additionally, lower mobility is theorised in both ends of the income distribution due to mechanisms such as glass floors and glass ceilings, or 'sticky ends' (Gugushvili et al., 2017; OECD, 2018). 'Glass floors' work through mechanisms such as opportunity hoarding, where those from more advantaged positions prevent downward mobility for their offspring via social networks, financial support and other influences. This can happen through attendance at expensive private schools that are associated with higher educational and socioeconomic outcomes in the UK. On the other hand, glass ceilings prevent upward mobility for those from lower income backgrounds. The term originally was coined to refer to the barrier preventing women from rising to top occupations but has been expanded to other disadvantaged groups. The glass ceiling effect may be enacted through mechanisms such as

discrimination, elitist hiring practices, and prohibitive practices such as unpaid and unadvertised internships (Laurison & Friedman, 2016). Some research has investigated the glass floors and glass ceilings mechanisms by focusing specifically on upward and downward mobility and found some evidence to support this (Friedman & Macmillan, 2017; Gugushvili et al., 2017). Cross-national research has also found evidence of 'sticky ends' across countries in the OECD (OECD, 2018). However, policies aimed at promoting equality of opportunity may act as a counterbalance to these mechanisms, such as the focus on fairer hiring practices and widening participation in higher education.

Evidence of nonlinearities in intergenerational income mobility

A small branch of literature has investigated the linearity of the association between parent and offspring income. Based on theories such as human capital theory and glass floors and ceilings, lower mobility is expected in the lower and upper ends of the parental income distribution, however the empirical evidence is mixed. For example, Bratsberg et al. (2007) compared intergenerational income mobility across family incomes for Denmark, Finland, Norway, the UK and the USA. In the UK and the US, they found a largely linear relationship. In comparison, they found that in the Scandinavian countries, while the intergenerational income association was relatively flat at the lower ends of the income distribution, higher income households experienced higher intergenerational income persistence. Another cross-national study found generally higher persistence at the higher and lower ends of the income distribution in Germany, Norway, Sweden and the US, in line with the expectations of glass floors and glass ceilings theories (Bratberg et al., 2017). Additionally, studies have pointed to a convex pattern in Canada, meaning higher mobility for lower income families and lower mobility for higher income families. (Chen et al., 2017; Corak & Heisz, 1999).

In the UK, in accordance with Bratsberg et al. (2007), a more recent study also found evidence of a linear association between parental and offspring income across the parental income distribution (Rohenkohl, 2023). On the other hand, Gregg et al. (2019) investigates how income mobility varies across the *offspring* income distribution, finding a J-shaped pattern meaning that there was evidence of lower mobility for those with lower earnings, and even lower mobility for high earning offspring, demonstrating existence of stronger cycles of poverty and privilege at the ends of the income distribution, also known as sticky ends. While further evidence of this effect in intergenerational earnings mobility is limited, there is also evidence of 'sticky ends' in social class mobility in the UK and cross-nationally (OECD, 2018; Elliot Major & Machin, 2018; Bukodi & Goldthorpe, 2018). In sum, there are some

mixed findings as to the linearity of the intergenerational association of income in the UK, and it seems to vary across country contexts.

2.4.3 Gender differences in intergenerational income mobility

Theoretical considerations

Some theories suggest that women experience higher intergenerational mobility than men, due to a stronger mediating role of education (Bukodi & Paskov, 2020; Bukodi et al., 2017). In other words, weaker association between women's parental SES and their educational attainment, and a stronger association between their educational attainment and their own SES in adulthood. Another possibility is that due to women's earnings tending to converge at a lower level, for example through taking part-time jobs due to childcare reasons, women from higher socioeconomic backgrounds may experience more downward mobility, increasing general levels of relative mobility for women (Bukodi & Paskov, 2020). In a similar vein, Bukodi et al. (2017) also suggest for the British context that women from more advantaged families may choose lower earning occupations than their parents to reconcile work and family more easily, which would lead to a weaker association between their earnings and that of their parents.

On the other hand, some theories and evidence suggest a parity of intergenerational mobility across men and women (Breen et al., 2010; Bukodi et al., 2016; Diprete & Buchmann, 2006). This could be due to similar levels of parental investment into their children's education (Breen et al., 2010), or women's career trajectories becoming more similar to men's (Bukodi et al., 2016), plus higher returns to education for women (Diprete & Buchmann, 2006). In fact, the increasing labour force participation of women in the past few decades has been attributed to rising intergenerational persistence in Sweden (Engzell & Mood, 2023). Assortative mating, where individuals with similar socioeconomic status are more likely to form a relationship, also can have differential effects across gender, especially as spousal income tends to be more important for women than men (Torche, 2015). Overall, there are mixed theoretical expectations for whether mobility differs across gender.

Evidence of gender differences in intergenerational income mobility

Research has also explored whether income mobility varies across gender. As mentioned, the older literature tended to focus on the intergenerational association between fathers and sons, excluding women due to differential participation in the labour market. This limitation is increasingly addressed in contemporary research, with more literature considering family income and both sons' and daughters' income. The evidence is mixed on whether

intergenerational income mobility varies across gender. For example, some studies have found income mobility to be similar across gender in the US (Chetty, Hendren, Kline, & Saez, 2014), Sweden (Engzell & Mood, 2023) and in the UK (Blanden et al., 2004; Rohenkohl, 2023), while others have found lower intergenerational persistence for women (Acciari et al., 2019; Eshaghnia et al., 2023; Vandecasteele, 2016). Another study concluded that women had higher intergenerational income persistence using a proxy for parental income (van der Erve et al., 2024). Furthermore, these estimates can hide important gender variation. For instance, differences in earnings, educational returns, labour force participation, upwards and downwards mobility, mother or father influence and spouse's impact (Chadwick & Solon, 2002; Hout, 2018; van der Erve et al., 2024; Vosters & Nybom, 2016). Overall, evidence is mixed on the extent to which income mobility varies across gender.

Summary of gaps

Overall, these studies provide an overview of intergenerational income mobility in the UK and how it varies, contextualised within the international literature. However, there are several limitations with the existing evidence estimating intergenerational mobility in the UK. Firstly, most previous literature has relied on cohort data from the BCS and the NCDS which limits analysis to those born in 1958 and 1970, and limits analysis to using one or two observations of parental income during childhood, which is acknowledged to downwardly bias estimates, with the exception of Rohenkohl (2023). Secondly, many estimates of intergenerational income mobility in the UK have also tended to exclude women and people on zero income from analysis. Thirdly, evidence is inconclusive on whether intergenerational income mobility in the UK follows a linear pattern, with some evidence suggesting a linear pattern, and others suggesting nonlinearity. Finally, the evidence is mixed as to how and whether intergenerational income mobility varies across gender, with some findings suggesting similar income mobility across men and women and some suggesting that women experience higher income mobility than men.

2.5   The role of education in intergenerational income mobility

This section now moves on to outlining the underlying theoretical considerations and evidence of the role of education in intergenerational mobility. A significant body of literature has focused on the mediating role of education in intergenerational mobility, demonstrating that educational attainment partially explains the intergenerational association. However, a smaller strand of literature focuses on the moderating role of education. This section presents a brief overview of underlying theory and evidence of the

mediating role of education in intergenerational mobility to provide some background, before going into detail on the theories and evidence of the moderating role of education, highlighting the key debates and contentions before finally summarising the gaps in the existing literature and contributions of this thesis.

2.5.1 The mediating role of education

Theoretical considerations

Education plays a key role in many theories of intergenerational mobility- from Blau and Duncan's status attainment model (1967), to Bourdieu's cultural reproduction (1977) and Becker and Tomes' human capital theory (1979). Education is theorised as a mediator of intergenerational mobility, meaning that it explains the link between parental SES and offspring SES. In one way, education can improve mobility by giving children equal opportunities to excel based on their abilities rather than their background, in line with the functionalist view of education. On the other hand, more critical theories posit that education hinders mobility, and instead can maintain and replicate inequalities across generations (Bowles & Gintis, 1976). For example, Bourdieu's theory of cultural reproduction posits that children of higher SES parents are given the cultural and social capital to succeed in education, meaning that educational institutions play an important role in the reproduction of inequality (Bourdieu et al., 1977).

OED triangle (model)
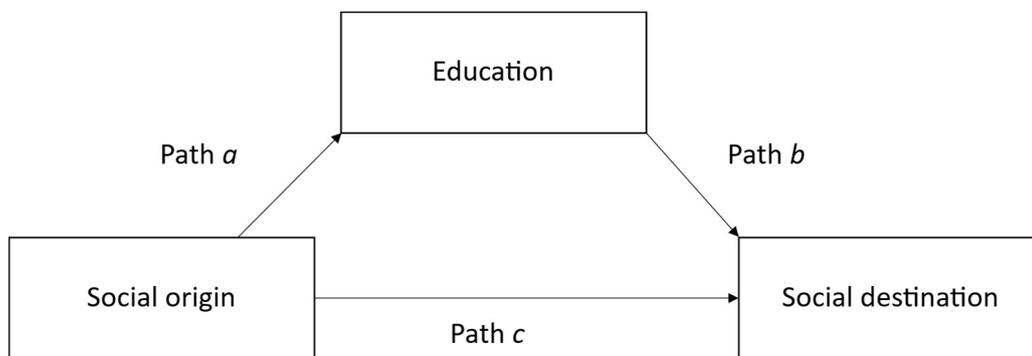
Figure 2.2 Directed Acyclic Graph of Origin-Education-Destination Triangle

The role of education in intergenerational mobility is often evoked as a model known as the origin-education-destination (OED) triangle (Goldthorpe, 2016). See Figure 2.2 for a visualisation of the model. Path *ab* that passes through education is known as the 'indirect' effect of social origin, the association between parental and offspring SES that is explained by educational attainment. Path *a*, the association between origin and education, reflects how children from more privileged backgrounds tend to achieve higher education, which is in

turn associated with higher future socioeconomic outcomes (Jerrim & Macmillan, 2015). Path *b* on the other hand measures the socioeconomic returns to education, in other words the association between educational attainment and socioeconomic outcomes (Shavit & Blossfeld, 1993). This association may work through multiple mechanisms, including human capital formation according to Becker and Tomes (1979). Another potential mechanism is screening and signalling, where education helps employers screen new hires based on their abilities, with education functioning to signal productivity. Additionally, job competition theory posits that education signals trainability and other desirable characteristics for the labour market, although in this way education would function as a relative good (Goldthorpe, 2014). The indirect effect has also been conceptualised as the 'achievement' pathway, where the effect on destination is based on how well an individual achieves in education. However, the paths are not necessarily as clear cut as ascription versus achievement, as the indirect path can also reflect unfair advantages outside of the individual's control such as wealthy parents paying for their child to get into expensive private schools that better prepare them for exams, or private tutors. In other words, opportunities for achievement may themselves be determined by ascriptive factors (Mijs, 2016).

On the other hand, Path *c* represents the 'direct effect' of social origin (DESO) (Bernardi & Ballarino, 2016; Mastekaasa, 2011). It refers to the path that is not explained by educational attainment but potentially explained by other factors. It is often conceptualised as the 'ascriptive' path as it can be based on qualities beyond the offspring's control that give advantage to those from higher SES families such as social network, cultural capital, or wealth outside of formal educational qualifications. The path can also include prejudice and discrimination. There is empirical evidence supporting the hypothesis that educational attainment is a partial mediator of intergenerational mobility, with findings consistently showing that it accounts for some of the transmission, but not all (Bukodi & Goldthorpe, 2016; Triventi & Passaretta, 2024).

The direct effect of social origin (DESO) is also the subject of a strand of social stratification literature (Bernardi & Gil-Hernández, 2021; Morris, 2023). Functionalist and modernisation theories of industrial and post-industrial societies suggest that over time, we would see a decreasing association between origin and destination and a disappearing DESO, as "the rising demand for qualified personnel will require the expansion of educational systems and their progressive reform aimed at creating great equality of opportunity, so that all available human resources can be utilised effectively as possible" (Goldthorpe, 2014, pp. 266-267). In other words, over time, societies would become education-based meritocracies, where jobs

would become increasingly allocated on the basis of achieved rather than ascribed characteristics (Bell, 1973). However, there is a lack of empirical evidence supporting this thesis (Bernardi & Ballarino, 2016; Bukodi et al., 2016; Gugushvili et al., 2017; Morris, 2023). On the other hand, many mechanisms may explain why there hasn't been a disappearing DESO, such as differences in skills, aspirations and motivations with social background, economic transfers from wealthy parents, social networks and discrimination (Bernardi & Gil-Hernández, 2021).

Evidence of the mediating role of education

There is an abundance of evidence that educational attainment partially mediates intergenerational mobility across different contexts. For example, Gregg, Jonsson, et al. (2017) conducted a cross-national study comparing the mediating role of educational attainment for men in the UK, the US and Sweden. They concluded that education partially mediated intergenerational income mobility in each of these countries although the differences in rates of overall mobility differed in the three countries due to the unmediated part of the association. Another study considered the mediating role of educational attainment amongst other factors including cognitive skills, non-cognitive traits and labour market attachment in intergenerational mobility for men in the UK across two cohorts born in 1958 and 1970 (Blanden et al., 2007). They found that post-16 education explained 21% of the intergenerational association, while education at 16 explained a further 9%. Additionally, Breen and Karlson (2014) examined the mediating role of education for men across different cohorts in the UK surveyed between 1972 and 1992 and found that the mediating role of education did not change significantly across the 20th century- around half of the association between social origin and destination was mediated via educational attainment, and that has stayed relatively constant over the years. Many more studies also explore the mediating role of education in intergenerational mobility in a range of contexts, using a range of measures (Goldthorpe, 2016; Iannelli & Paterson, 2007; Jerrim & Macmillan, 2015).

Education partially mediates the link between parental income and offspring earnings through two primary pathways: the association between parental income and educational attainment and the association between educational attainment and offspring earnings. Internationally and in the UK, there is plenty of evidence of a socioeconomic gap in educational attainment, with those from less advantaged backgrounds less likely to complete higher education (Early et al., 2020; OECD, 2022). In fact, family SES is one of the most important predictors of academic achievement and educational attainment, making it a key

policy issue (Social Mobility Commission, 2024). Furthermore, there is a body of literature that examines returns to education internationally, consistently finding an association between educational attainment and higher future earnings (Jerrim & Macmillan, 2015; OECD, 2022). Overall, there are consistent findings that education is one of the key mediators of intergenerational mobility, in line with theoretical expectations.

2.5.2 The moderating role of education

Theoretical considerations

In addition to a mediating role, education is also theorised to play a moderating role (see Figure 2.3). This is where people with different levels of educational attainment experience different levels of intergenerational mobility. In particular, some theories posit that those with higher education may experience a disappearance of intergenerational persistence, similar to the functionalist expectations underlying DESO. Some view this as the 'equalising effect' of education. There are four main theories that explain why we might expect to see lower intergenerational persistence for those with higher education. The theories are non-exclusive, and there is likely an interplay of the different mechanisms working simultaneously.
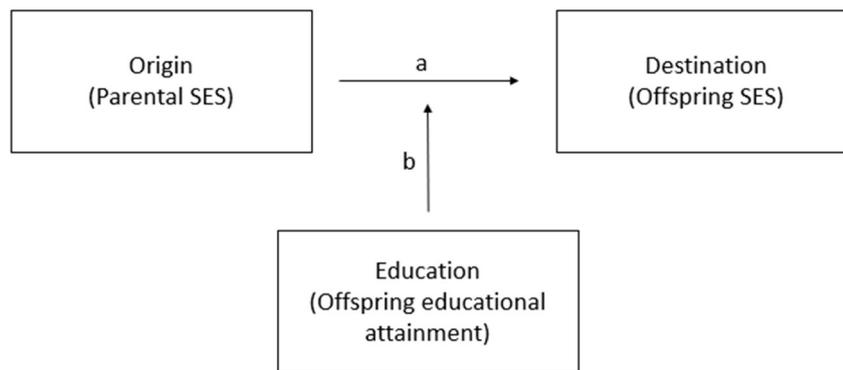
Figure 2.3: Directed Acyclic graph showing the moderating role of education.

Firstly, it has been suggested that the decline or, in some cases, disappearance of intergenerational persistence of socioeconomic status (SES) with higher education may be explained by a process known as *compensatory advantage* (Bernardi, 2014). The theory suggests that education can help those from lower socioeconomic backgrounds compensate for their disadvantage through accessing higher paying jobs, thereby moderating the intergenerational persistence of disadvantage. According to this theory, we would hypothesise that those with higher education experience lower rates of intergenerational persistence as those from poorer families compensate for their background through

education. Conversely, it can also explain how those from a higher SES background can compensate for low educational attainment with their background and still gain higher earning employment, for example through family network or social capital, resources that people from lower SES background tend not to have to fall back on. According to this, we would also hypothesise that those with a lower education experience higher rates of intergenerational persistence, as those from wealthier families compensate for the low educational attainment with other resources.

Secondly, another theory, emphasising the demand side of the labour market and educational qualifications, refers to a *more meritocratic* graduate labour market compared to occupations that do not require such qualifications (Hout, 1988; Torche, 2011). This theorises that the labour market for graduates relies less on socioeconomic background and networks, instead relying on the skills signalled by educational attainment. However, the finding that there is lower mobility for advanced degree holders seems to contradict this theory, as postgraduate degrees are even more specialised, meaning they should have even higher mobility according to this theory (Torche, 2011).

On the other hand, a third theory that emphasises the supply side posits that higher education fosters human capital and skill formation, allowing students from disadvantaged backgrounds to overcome initial disadvantages (Torche, 2011). In support of this theory, there is evidence to show that students from less advantaged backgrounds have higher earnings returns from attending higher education (Hout, 2012).

Finally, another possible explanation is *selectivity*. Students from disadvantaged backgrounds may have more obstacles to achieving a bachelor's degree compared to their more privileged peers, meaning those graduates from more disadvantaged backgrounds are more likely to have been selected in the labour market due to unobserved attributes such as motivation and cognitive and non-cognitive ability (Fiel, 2020; Karlson, 2019; Torche, 2011). These characteristics in turn would offset the advantage that their more privileged peers may have. While the former two theories posit that education has a causal effect on increasing intergenerational mobility, this theory argues that it does not, which has implications for the idea of education as 'the great equaliser' or the role that expanding higher education may have in mobility. Given this hypothesis, it is important not to assume that higher education is causally linked to higher mobility.

While these theories explain why we might expect higher mobility for those with higher education, some have found no evidence of a moderating role of educational attainment, and in some cases found that higher education, particularly at a post-graduate level, is in fact

associated with higher intergenerational persistence. There are two main theories that can explain this, in addition to the mechanisms already mentioned surrounding a persistent DESO such as discrimination, elitist hiring practices, and economic transfers from family. *Maximally maintained inequality* hypothesis contends that with educational expansion, individuals from higher SES backgrounds are the first to take these opportunities, also referred to as vertical stratification. Only once this has reached a 'saturation point' will people from lower SES backgrounds benefit from the expanded access to the education (Raftery & Hout, 1993). Additionally, the *Effectively maintained inequality* theory posits that with increasing access to a certain level of education, students from more advantaged backgrounds would utilise more prestigious programmes and institutions. Also referred to as horizontal stratification, educational programmes would become increasingly stratified by quality, so that those from higher socioeconomic backgrounds maintain their advantage (Lucas, 2001). In line with this theory, a *boosting effect* is hypothesised to take place where having a more privileged background may boost the opportunities of students who have achieved higher education, in other words, experiencing multiplicative advantage (Bernardi & Gil-Hernández, 2021). According to this, we would expect to see lower mobility for those with higher education. There is evidence from across high-income countries of both vertical and horizontal stratification taking place in higher education (Triventi, 2013).

These theories are posited to apply across genders, however due to varying economic returns to education and varying educational attainment, the moderating effect of education may be expected to differ across gender. Additionally, women may face different experiences of hiring practices, especially into leadership positions, in accordance with the glass ceiling effect.

Evidence of the moderating role of education

In the late 1980s, a seminal study by Hout (1988) found that social class destination was independent of social class origin for college graduates in the US who entered the labour force since 1973. In other words, the completion of a college degree totally cancelled out the effect of socioeconomic background on socioeconomic destination, leading the author to assert "this finding provides a new answer to the old question about overcoming disadvantaged origins: a college degree can do it" (Hout, 1988, p. 1391). With these findings, the paper declared education the great equaliser, arguing that increasing access to higher education would result in greater overall equality of opportunity. Hout hypothesised this was due to fairer recruitment policies in the graduate labour market compared to occupations that do not require such qualifications.

46

Since then, research has provided more nuance on this finding, empirically and theoretically, and across a range of socioeconomic indicators. For instance, it is disputed as to whether the influence of parental SES is completely diminished amongst graduates, in other words a *total moderation effect*. This is referred to as the equalisation thesis, when getting a degree is associated with a disappearance of intergenerational persistence and demonstrates the so-called 'meritocratic power' of a degree (Witteveen & Attewell, 2020). One study found that the influence of parental earnings and parental family income on offspring virtually disappeared for men in the US, albeit only weakened the association among women (Torche, 2011). On the other hand, another study explored intergenerational mobility across educational attainment for three cohorts born between 1938 and 1985 in the US and found that higher parental income was associated with higher incomes for college graduates, concluding that a college degree did not fully moderate the effect of parental income, casting doubt on the equalisation thesis (Witteveen & Attewell, 2020). Another US study corroborated these findings, showing that earning a college degree only partially moderated the association between parental income and offspring income (Karlson, 2019).

Other studies have considered other indicators of parental SES on offspring earnings. One study, looking at the association between parental social class and offspring earnings, found that a college degree only partially moderated the intergenerational association in the US (Witteveen & Attewell, 2020). Similarly, another study using parental education to proxy parental SES also found that having higher parental education was associated with higher offspring earnings for graduates and even more so for advanced degree holders (Oh and Kim, 2020). As for other indicators of SES, two studies found that the influence of parental social class and occupational status on offspring social class completely disappeared among college graduates, further evidence of the equalisation thesis and in line with Hout's 1988 findings on social class (Torche, 2011; Karlson, 2019). To recapitulate, there are mixed findings as to whether the influence of parental income on offspring income totally disappears amongst college graduates as is suggested by the equalisation thesis. As for other measures of SES, studies suggest that the influence of parental SES on offspring income does not completely diminish amongst college graduates, while evidence suggests that a college degree does completely moderate the intergenerational association of social class.

So far, these studies have all been limited to the context of the US. There is less evidence on the moderating role of education on intergenerational mobility outside of the US, with the notable exception of Bernardi and Ballarino's (2016) comparative study across 14 countries. The studies used a mix of occupational status, social class and income to measure parental

SES. Overall, looking at the influence of parental SES on offspring income, they found that in the majority of countries, including the UK, Germany and Sweden among others, there was no moderation effect of education, challenging findings of partial or complete moderation in the US-based studies mentioned so far. Two exceptions were the US and Spain, where a partial moderation effect of a bachelor's degree was found, suggesting that national context plays an important role in the moderating effect of education. Interestingly, a small number of countries in fact showed a stronger intergenerational association amongst the higher educated and more advantaged individuals when relaxing the assumption of linearity across parental SES. To explain this pattern, the authors proposed that a 'boosting effect' was taking place, where social origins may provide an extra advantage to those from more privileged backgrounds and with higher educational qualifications, where their families may push them toward higher earning occupations, echoing the effectively maintained inequality argument. Further evidence of this effect was found by a study conducted in Spain, which found that the influence of parental occupational status was stronger on offspring income for degree holders, but weaker on offspring occupational status for non-degree holders, arguing that a boosting effect was taking place on offspring income for those with higher degrees (Bernardi & Gil-Hernández, 2021). Again, these studies focused on parental occupational status or social class, meaning there is a lack of evidence on the moderating role of education in intergenerational income mobility, particularly in the UK which could bring new insights to the field. When looking at the moderating role of education in the intergenerational association between parental social class and offspring social class, the results of the comparative study showed that a partial moderation effect took place in the majority of countries, more in line with the US evidence (Bernardi & Ballarino (2016). In summary, some evidence finds that higher education does not necessarily reduce intergenerational persistence, and might even increase persistence, dependent on SES measures and on national context.

A related strand of literature considers 'direct effect of social origin' (DESO), which examines intergenerational persistence net of educational attainment. By definition, the existence of a DESO is in contention with the finding that a college degree totally cancels out the influence of socioeconomic background on offspring SES and the literature consistently finds evidence of DESO across different contexts. This literature has mostly focused on social class measures of intergenerational mobility. Cross-national work in Bernardi and Ballarino (2016) confirms the existence of DESO, finding in all countries, that once educational attainment was accounted for, the intergenerational persistence of social class decreased by 50-75%, but with a direct association remaining in every country. This

again negates the evidence of total moderation from Hout and the equalisation thesis but does not negate the possibility of partial moderation. Gugushvili et al. (2017) also find a direct effect of parental social class on offspring social class net of educational attainment using British birth cohort data. However, they argue that the direct effect can be underestimated using single measures of socioeconomic background. Furthermore, they argue that DESO can be overestimated by not including later-life educational attainment. They also find that offspring cognitive and non-cognitive skills partially explains the remaining association. Another study using data from the UK and Germany finds that national estimates obscure important regional variations in DESO (Morris, 2023). In sum, evidence of DESO provides further contention as to whether educational attainment eliminates intergenerational persistence, and there is a lack of research investigating DESO when it comes to intergenerational income transmission.

While there are few studies looking at the moderating role of educational attainment in intergenerational mobility in the UK, there is evidence of differential earnings for graduates by socioeconomic background in the UK, further questioning a total moderation effect of educational attainment on intergenerational persistence. Britton et al. (2016) found that when individuals from lower income backgrounds attain a degree, they still earned less than their more privileged peers despite having the same level of education. Their findings suggested that men with a degree from higher income household earned approximately 60% more than their peers from lower income households with a degree, with women earning approximately 45% more. Even when adjusting for institution attended, subject studies and other student characteristics, the gap remained at approximately 10%. These results suggest that education does not completely moderate intergenerational persistence, degree holders experience intergenerational persistence of SES, and degree-holders from higher income backgrounds experience an earnings premium compared to degree-holders from lower income backgrounds. Overall, there is limited evidence as to whether intergenerational persistence of income disappears amongst graduates, especially in the UK.

Post-graduate degrees and intergenerational mobility
Another debate within the literature revolves around whether the influence of parental socioeconomic status diminishes in a linear fashion as educational attainment increases, which has important implications for underlying mechanisms. In other words, some evidence suggests that those with postgraduate degrees experience lower mobility than those with degrees. For instance, Torche (2011) found evidence of a U-shaped curve in the US, with intergenerational persistence of income and earnings for men weakening or disappearing for

those with a college degree, and higher levels of persistence for those with lower educational attainment but also for those with postgraduate qualifications. Similar patterns were found for other SES measures such as social class and occupational status.

Other studies have also examined intergenerational persistence for degree-holders and post-graduate degree-holders using parental education as a measure of socioeconomic background. For example, Torche (2018) expanded her previous study with a large sample of PhD holders. The findings confirmed that intergenerational persistence was stronger for men with postgraduate degrees compared to those with bachelors' degrees, however this was not so for women. The pattern also varied across race and ethnicity for men, with stronger intergenerational persistence for highly educated Hispanic men, and lower for Asian men. Another study considered the association between parental educational attainment and offspring earnings for graduates and advanced degree holders (Oh & Kim, 2020). They found that the offspring of higher-educated parents earned more than the offspring of lower-educated parents amongst degree holders, but even more so amongst offspring with advanced degrees, across men and women. Furthermore, they demonstrate that this effect is fully attributable to three mechanisms, where children from higher-SES families obtain expensive and financially rewarding advanced degrees; attend selective institutions in lucrative fields of study; and complete their education at a younger age, allowing them to experience income growth over more years in the labour market.

Another study in the UK, this time using parental social class to measure socioeconomic background, also looked at intergenerational mobility for degree holders and postgraduate degree holders across five age-group cohorts (Wakeling & Laurison, 2017). They found that there was stronger intergenerational persistence of social class for postgraduate degree holders compared to bachelors' degree holders for the more recent cohorts studied, in line with maximally maintained inequality thesis (Raftery & Hout, 1993). Whereas a study in France identified a U-shaped pattern in social class mobility of decreased mobility for those with advanced degrees, similar to the findings of Torche (2011) (Falcon & Bataille, 2018). Overall, these findings suggest that while degrees may be associated with higher mobility, postgraduate degree holders may experience lower mobility. This may be due to higher cost of access to postgraduate degrees, and less focus on widening participation at this level of education (Wakeling & Laurison, 2017).

Evidence of mechanisms of the moderating role of education
Another contention in the literature also concerns the underlying mechanisms of the moderating role of education. While Hout declared that education played a causal role in

improving individual's chances of social class mobility, suggesting that the expansion of higher education would improve mobility, it has since been argued that another mechanism may be at play known as selectivity. This concept refers to how students from lower socioeconomic backgrounds face significant barriers in accessing higher education, meaning that those who against the odds do earn a college degree are selected based on unobserved characteristics such as motivation or cognitive ability (Torche, 2011). Whereas, for more advantaged young people, college is generally the norm. According to this mechanism, universities play less the role of equalisers, but more as selectors of students who are already more likely to experience mobility. Some studies have investigated this potential mechanism. For example, using data from the US, Zhou (2019) found that once adjusting for selection processes, income mobility amongst degree holders was similar to non-degree holders, demonstrating there was no causal effect of college itself in improving mobility. Moreover, Fiel (2020) found that, once accounting for selectivity and measurement bias, income mobility was higher for those who complete high school, rather than college. In other words, they found stronger intergenerational association of income for high-school dropouts, but relatively similar levels across higher levels of educational attainment for men and women. On the other hand, another study also investigated the selectivity mechanism. They found that degree holders in the US experienced greater income mobility compared to the general population, and that accounting for selectivity did not make any difference to these findings. Similar results were also obtained when using occupational status measures. These results showed that educational attainment had a partial moderation effect, and this was not accounted for by selectivity (Karlson, 2019). They concluded that education *does* have an equalising effect, meaning that findings are somewhat mixed as to the underlying mechanisms.

In a related literature that touches on the underlying mechanisms behind the moderating role of education, some longitudinal studies have investigated the dual role of education as a mediator and a moderator to explain changes in social mobility over time. There are three paths in which education could contribute to the weakening of intergenerational persistence over time. Firstly, a weakening association between socioeconomic background and education; secondly a weakening association between educational attainment and socioeconomic destination; and thirdly the interaction effect where more people are achieving a level of attainment that weakens the association (e.g., a bachelor's degree). The latter is known as the *compositional effect*, as the changes over time are due to the changing educational composition of the population. A few studies have explored these pathways. For example, Vallet (2004) considered these three pathways using social class data in France,

finding that since the 1970s, there has been weakening association between education and social origin, and education and social destination, and especially, a greater compositional effect over time. In addition, Pfeffer and Hertel (2015) looked at how educational expansion impacted changes in social mobility trends over time in the US. They conclude that for men in the US, the observed gradual increase in social class mobility across the 20th and early 21st century could almost entirely be attributed to the compositional effect. Finally, Breen (2010) compared Britain, Sweden and Germany and found that the compositional effect explained a rise in social mobility in all three countries. On the other hand, for men in the UK, Bukodi and Goldthorpe (2016) found that all three paths have been relatively constant when considering education in both absolute and relative terms across cohorts born in 1946, 1958 and 1970. Although, they note that when measuring social class destination at age 27 rather than age 38, a compositional effect does take place across three birth cohorts, suggesting that the compositional effect may weaken over the life course. While the compositional effect has largely been interpreted as a weakening of the association between social origin and destination for higher levels of educational attainment, another interpretation of this is that those from lower socioeconomic backgrounds have higher returns to education than their more advantaged peers (Goldthorpe, 2014). In fact, Karlson (2019) argues that the interaction term presented in Hout's original research can be interpreted this way (Hout, 1988). However empirical research has tended to suggest the opposite, that those from higher social origins have higher returns to education (Oh & Kim, 2020; Witteveen & Attewell, 2020). In summary, it is clear that the moderating role of education has an important role to play, but it is less clear as to whether higher education expansion alone can increase intergenerational mobility.

Evidence of gender differences in the moderating role of education

Finally, there is some contention as to whether the moderating role differs across gender. For example, Torche (2011) tested the moderating role of education in intergenerational mobility across a range of socioeconomic measures and across men and women. The results suggested a 'U-shaped' pattern for most, except for women's earnings and family income mobility. Torche's later study also showed evidence of intergenerational persistence for male PhD holders but not for female PhD holders. The author suggested that this may be due to how women's earnings tend to converge at the lower end of the distribution, which in turn means lower persistence across different educational levels. On the other hand, Karlson (2019) runs similar analysis, but reports that while the intergenerational association for men is slightly stronger, there is no statistically significant differences in the moderating effect of education between men and women. As for the UK, Vandecasteele (2016) found that while the

association between parental and sons' occupational status was weaker for tertiary educated individuals, she did not find a moderating effect of education for the association between parental occupational status and daughters' occupational status or earnings. The research argued that this could be explained by the wide dispersion of earnings inequality within the UK at the top of the income distribution which affects the group of people with higher educational qualifications, and especially women. With more variation in outcomes, there is more scope for parental background to influence outcomes. The measure of parental social class using the dominance approach in this research may have also limited the analysis, as it tends to overrepresent paternal SES which can especially bias estimation of women's intergenerational mobility (Thaning & Hällsten, 2020). Overall, the evidence tends to suggest that women may experience less of a moderating role of education in intergenerational mobility, depending on socioeconomic measure used.

Summary of gaps

Overall, there remains some questions and inconsistencies in the literature on the moderating role of educational attainment in intergenerational mobility. Firstly, it is not clear as to whether a bachelor's degree cancels out the effect of socioeconomic background. While one study found that a college degree totally cancelled out the influence of parental income on son's income in the US (Torche, 2011), other studies disputed this finding (Karlson, 2019; Witteveen & Attewell, 2020). This contrasts with findings using social class of a total moderation effect in the US (Hout, 1988; Torche, 1988; Witteveen & Attewell, 2020) and partial moderation effect across mixed socioeconomic indicators (Oh & Kim, 2020; Bernardi & Ballarino, 2016). Secondly, there is contention as to whether the moderating role of education varies across gender, with some concluding that there is less of a moderation effect of education for women (Torche, 2011; Vandecasteele, 2016) and some concluding there is no difference across gender (Karlson, 2019; Witteveen & Attewell, 2020). Finally, most of this research is carried out in a US context, with scarce research focus on the UK. What little research has been carried out in the UK has been focused on parental social class as an indicator of socioeconomic background, which may reveal different patterns and findings than income as an indicator of socioeconomic background (Breen, 2010; Bukodi & Goldthorpe, 2016; Vandecasteele, 2016).

2.6   The role of childhood relationships in intergenerational mobility

The theoretical considerations and evidence underlying the role of childhood relationships with parents and teachers in intergenerational income persistence is discussed in this section. First, the theoretical framework of bioecological systems theory is discussed, applying it to

the field of intergenerational mobility and linking it to risk and resilience theories. Then, theoretical considerations underlying how parental relationships may moderate intergenerational income mobility more specifically are explored, along with a review of the literature. This is followed by a discussion of the theoretical considerations underlying teacher relationships and young people's outcomes, and how teacher relationships can play a moderating role in intergenerational income mobility and the existing evidence. It concludes with a summary of gaps and the contributions of the present research.

2.6.1 Bioecological systems theory

Bioecological systems theory, which is most influential and applied in the fields of child development and educational psychology, theorises human development within the context of a multilevel system of relationships that form an individual's environment, including the interactions between persons, processes and contexts (Bronfenbrenner, 1979). The theory denotes five concentric levels of systems ranging in proximity in which child development is placed, as visualised in Figure 2.4. The first system is the *microsystem*, in which proximal influences on child development take place. It is the most immediate system that the child interacts with and includes the contexts that the child has direct contact with, including family, school and friends. The next layer is the *mesosystem*, where different microsystems interact to influence development, such as home and school environments. The *exosystem* encompasses environments that can influence children's development indirectly such as local government, parental friends, extended family and mass media. The *macrosystem* refers to wider societal context such as social norms, political and economic systems and culture. Finally, the *chronosystem*, referring to time, focusing on transitions, and timing of events (Bronfenbrenner, 1994). The theory considers interactions and bidirectional influences between the different systems, arguing that everything is related and bounded by context, culture and history, providing a holistic understanding of development.
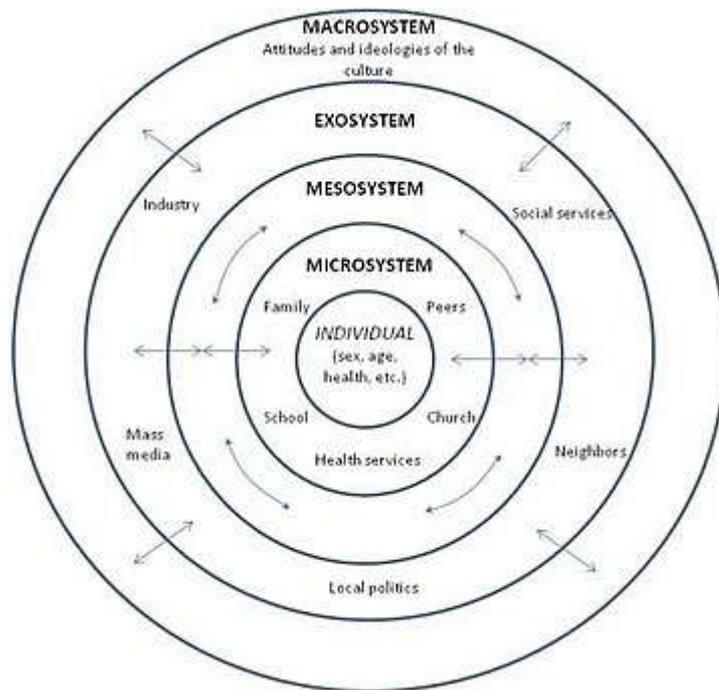
Figure 2.4 Ecological systems theory (Bronfenbrenner, 1979)

Over time, the theory was developed to emphasise a simultaneous investigation of all these elements, moving from emphasising the role of environments in development to a focus on processes and the role of the developing person (Darling, 2007; Tong & An, 2023). *Proximal processes* refer to the complex interaction between the developing person and the persons, objects and symbols in their immediate external environment (Bronfenbrenner & Morris, 2007). The theory posits that these proximal processes are the primary mechanisms producing human development (Bronfenbrenner & Morris, 2007). Proximal processes may include child-parent interactions, student-teacher interactions or peer relationships. However, in order to influence child development, the interactions must be increasing in complexity over time, be frequent and happen over extended periods of time, and be reciprocal (Navarro et al., 2022). According to Bronfenbrenner, better development occurs when positive relationships are formed with people in their environment (Bronfenbrenner, 1994). The theory offers a holistic framework to understand the significance of the interplay of proximal and distal factors that contribute to a person's development in their socioeconomic context.

The theory posits that these proximal processes take place in and should be understood in the context of distal processes too, which can include socioeconomic status. Bronfenbrenner showed that socioeconomic status as a context could influence different systems of development, and socioeconomic status has often been highlighted as a key context to

understand proximal processes in a range of studies (Eamon, 2001; Navarro et al., 2022; Véronneau et al., 2015).

The theory also distinguishes between proximal processes that promote positive development and those that protect youth from the negative influence of certain disruptive processes. In other words, not only do processes happen in multilevel context, but some proximal factors (e.g., positive childhood relationships) may act as protective buffers against negative consequences in risk contexts (e.g. low income) (Darling, 2007). This is also in line with risk and resilience theories, that posit how certain factors can act as protective buffers to adverse outcomes and has also been applied to research on education and social work amongst others (Rutter & Rutter, 1993). Positive relationships in this way can function as resources and resilience in counteracting the effects of risk mechanisms (Hamre & Pianta, 2005).

Thus, according to Bronfenbrenner's theory, we would expect family and school interactions to play a protective role in the reproduction of inequalities. While low SES is a known risk factor for adverse outcomes, positive proximal interactions may mitigate some of this risk.

Bronfenbrenner's theory has been widely influential and employed in a range of disciplines. In particular, the theory has been applied to understand subjects such as early life adversity, adolescent's outcomes, and education (Eamon, 2001; Navarro et al., 2022; Véronneau et al., 2015). However, it has rarely been applied to the study of intergenerational mobility. Traditional theories of intergenerational mobility have largely neglected perspectives from child development to understand how inequalities may be reproduced from one generation to the next, and crucially, how to disrupt this process. While influential intergenerational theories have emphasised environmental, contextual and individual factors such as educational attainment, skills formation and culture, an understanding of the complex interactions between these systems has rarely been applied, although there has been a recent push towards understanding how children respond to parents, mentors and teachers according to Heckman & Mosso (2014). The emphasis on bidirectionality in bioecological systems theories also underscores children's agency and their own influence on their trajectories. Furthermore, the emphasis of the bioecological systems theory on proximal process within the child's immediate environment, and a focus on children and young people's experiences in general is missing from the discussion. This is evident from the dearth of research into the role of proximal processes in intergenerational transmission of SES, despite evidence showing how important they are in other outcomes and in the context of SES (Pinquart, 2017b; Roorda et al., 2011; Wright, 2018). As the 'primary driver of

development', theorised by Bronfenbrenner, and as a potential protective factor, applying the theory to the study of intergenerational mobility may shed light on under-explored mechanisms. See the hypothesised moderation model visualised in Figure 2.5.
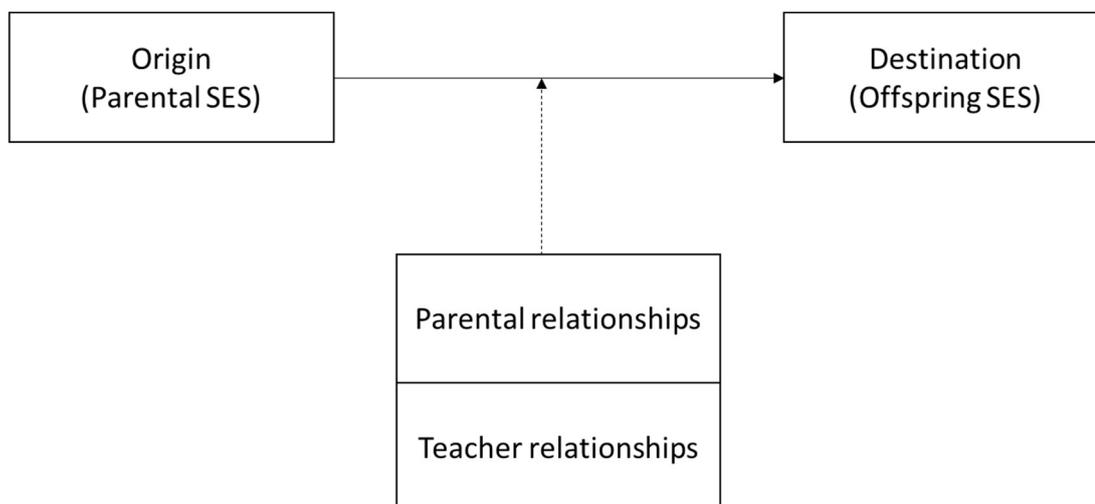
Figure 2.5 Directed Acyclic Graph of the moderating role of relationships

Gender differences in the role of relationships

There are also contending theories as to how relationships may impact young people's outcomes differentially across gender. Bronfenbrenner's theory distinguishes how boys and girls may experience these processes differently. For example, Bronfenbrenner highlighted how warm relationships with adults may foster leadership in sons but discourage it in daughters, due to different dominant socialisation practices, such as different discipline practices used for girls and boys (Bronfenbrenner et al., 1999; Darling, 2007).

Furthermore, the *gender role socialisation perspective* suggests that girls may benefit more from close relationships as they reflect the social skills expected of girls. Similarly, girls would have worse consequences of negative relationships, as conflict is often perceived as a less acceptable trait for girls than boys (Maccoby, 1998). Additionally, the *academic risk perspective* posits that as working-class boys tend to be more at risk of academic failure than girls, positive relationships are more important for boys (Hamre & Pianta, 2001; Stahl, 2022). This theory highlights how gender and relationships can interact on their effect on young people's outcomes.

2.6.2   Parental relationships

Bioecological systems theory posits that interactions between young people, their parents and their teachers are crucial proximal processes that influence their development and interact with the contexts of multiple systems including SES. This section looks more

specifically at parental relationships, first looking at the underlying theoretical considerations. Several theories offer insight into why parenting matters for young people's outcomes and how SES may interact with parental relationships to varying outcomes. This is then followed by an exploration of the evidence on the moderating role of parental relationships in intergenerational transmission of advantage.

Theoretical considerations

Overall, positive relationships with adults during childhood and adolescence have been posited to contribute to healthy development, emotional regulation, social behaviour, social skills and emotional understanding (Hamre & Pianta, 2005). A few theories have been proposed to explain this. Firstly, attachment theory suggests that positive relationships with adults as a child can help children feel emotionally secure. Often applied to early relationships with parents, it emphasises the importance of high-quality early relationships to children's future and long-term outcomes. According to Ainsworth (1989), the quality of attachment influences the child's ability and willingness to explore the environment, using the primary caregiver as a safe base to start from. In the context of intergenerational transmission of income, a secure attachment may act as a protective factor for children growing up in low-income households, supporting their development and in turn future outcomes despite structural disadvantages associated with low income. As Hamre & Pianta point out, applying a risk perspective to attachment theory, children from lower socioeconomic backgrounds may be more strongly influenced by positive relationships as they have more to gain from these relationships. Thus, attachment quality with parents can moderate the association between parental income and offspring income, buffering the risk of growing up in a low-income household.

For later childhood relationships, self-determination theory (SDT) explains how positive relationships with adults in adolescence can also have a positive impact on children's future outcomes (Deci et al., 1991). For example, positive relationships may promote cognitive development, motivation and learning, supporting children and adolescent's motivation to explore (Davis, 2003; Deci et al., 1991; Pomerantz et al., 2005). In contrast, a cold relationship with a parent (or teacher) may reduce an adolescent's motivation for learning as educational activities may be stressful. Adolescence in particular is a crucial time for forming social identity and peer relationships and making important decisions with long-term consequences, making positive relationships even more important during adolescence (Dahl et al., 2018). This theory has been applied to understand the influence of childhood and adolescent relationships with adults on academic and behavioural outcomes but has had

limited application to longer-term outcomes such as socioeconomic outcomes. Positive relationships may have a long-term impact through motivation and secure attachments, while mostly applied to academic outcomes and educational attainment, these non-cognitive skills are also important beyond education (Carneiro et al., 2012). While educational achievement is reliant on a certain set of skills during childhood, future earnings may represent a broader range of skills applied throughout a lifetime. Thus, SDT suggests that young people's motivation and capacity to pursue long-term goals may depend not only on socioeconomic context, but on the quality of their parental relationships. Therefore, even in low-income contexts, supportive parenting may enable children to achieve higher SES. In this way, SDT suggests how intergenerational income mobility may vary by quality of parental relationships.

While attachment theory and SDT emphasise the developmental benefits of high-quality parental relationships, several theories explain how parenting behaviour can vary across socioeconomic contexts. For example, the family stress model outlines that chronic economic strain and poverty can undermine parenting quality, with stress from parents spilling into the quality of family relationships (Conger et al., 2010). Alternatively, the family investment model explains that low family income restricts parents' ability to provide enriching experiences and nutritional diets, leading to lower developmental outcomes (Mayer, 1997). Time constraints refer to the fact that poorer parents may work less regular hours, for example in evenings, nights and weekends, reducing the amount of time they can spend with their children (Spera, 2005). Cognitive biases and decision-making surrounding parenting practices may also differ by SES. Theories from behavioural science and behavioural economics explain how cognitive biases may affect parents' decision-making and may vary by SES due to factors such as differences in stress, how their peers behave, and their own experiences. Examples of cognitive biases include present bias, whereby parents might prioritise moments of instant gratification rather than behaviours that pay off in the long run. Evidence suggests that time preference can vary by SES, which can in turn impact how much parents invest into quality time with their children (Kalil & Ryan, 2020). These are just a few examples of mechanisms that could explain socioeconomic differences in parenting. See Kalil & Ryan (2020) for a comprehensive overview of the mechanisms that can explain socioeconomic gaps in parenting. Their review surmises that there is consistent causal evidence behind the family stress model, and cognitive biases encouraging a focus on the present rather than future gains. These theories explain how growing up in a low-income family may present a developmental risk to future outcomes, however positive relationships may act as a protective buffer to this risk or even counteract the risk with regards to

mechanisms of time investment and family stress. Again, while these mechanisms have most often been applied to behavioural and academic outcomes, they can also be extended to include future SES and explain how relationships can moderate the association between parental and offspring income.

Taken together, these theories suggest that parent-child relationships are influential for young people's outcomes and can vary by socioeconomic context. By applying a bioecological systems theory lens to these theories, it is understood that high-quality relationships may have a buffering effect on young people, buffering the risks associated with growing up low-income on future outcomes. However, quality of parental relationships may vary across socioeconomic context, which risks amplifying disadvantages, implying that the intergenerational transmission of advantage may vary by the quality of parental relationships.

Overall, applying development theories to intergenerational mobility constitutes an important theoretical contribution to the intergenerational mobility literature. Historically, intergenerational mobility theories, routed in economics and sociology, have not looked in depth at factors that are acknowledged to be some of the most important to children's development, despite evidence that parenting factors can improve confidence, motivation and non-cognitive skills which are crucial to achievement. By drawing on attachment theory and SDT, this theoretical framework could help explain why some children are 'protected' from the risk of growing up low income on future socioeconomic outcomes. Equally, development theories have not paid enough attention to how socioeconomic background can interact with these development mechanisms on how they impact children and go beyond short-term outcomes.

Evidence on parenting, socioeconomic status and outcomes

There are few studies directly exploring how parent-offspring relationships during childhood and adolescence can influence future earnings, and how this may vary by parental income. However, relevant evidence exists in three key areas: firstly, the association between positive parental relationships and intermediate outcomes, along the lines of attachment theory and SDT; secondly how parenting behaviour varies across SES in line with theoretical mechanisms such as family stress, family investment and cognitive biases; and finally, the small but growing body of work examining moderation.

Parenting and offspring outcomes

A large amount of literature has found evidence of associations between parent relationships and a range of behavioural and psychosocial outcomes. Several meta-analyses have

investigated the topic. In a meta-analysis of 1,435 studies, Pinquart (2017a) examined the association between parenting styles and dimensions with externalising behaviour. Externalising behaviour is characterised by behaviour such as acting out, antisocial behaviour and aggression. The review found that parental warmth, behavioural control, autonomy granting, and an authoritative parenting style (characterised by high warmth and high control) had a small negative association with externalising problems, while more negative aspects and styles of parenting were associated with higher levels of externalising problems. They also found that aspects such as parental warmth predicted a decline in externalising behaviours over time. Another meta-analysis looked at the association between parenting dimensions and styles with internalising symptoms in children and adolescents (Pinquart, 2017b). Internalising behaviour refers to symptoms such as anxiety and depression. Their meta-analysis of 1,015 studies found similarly that parental warmth, behavioural control, autonomy granting, and authoritative parenting style had a small negative association with internalising symptoms cross-sectionally and longitudinally, while more negative aspects and styles had an association with higher levels of internalising symptoms. They also found that associations of parental warmth and internalising problems were stronger for older children and adolescents, and parental warmth was also associated with a decrease in internalising problems over time. However, they did not consider socioeconomic status as a moderating variable of results.

There is also evidence that more positive parent relationships are associated with better academic outcomes. A meta-analysis considered the association between parenting dimensions and styles with children and adolescents' academic achievement (Pinquart, 2016). The meta-analysis of 308 empirical studies found a small association between parental warmth, behavioural control, autonomy granting and authoritative parenting style with better academic performance, whereas parental harsh control, psychological control, and neglectful, authoritarian and permissive parenting styles were associated with lower achievement with small effect sizes. They found that these associations did not vary according to gender, but that there were weaker associations between autonomy granting and authoritative parenting with academic achievement for ethnic minorities. They also note that the associations of parenting dimensions and styles with academic achievement tended to be smaller than those of parent involvement and academic achievement. Again, the meta-analysis did not consider socioeconomic status as a potential moderator.

Another meta-analysis considered the association between relational parental involvement (defined as parents having strong and positive relationships with their offspring) and

offspring academic and behavioural outcomes (Jeynes, 2023). The results indicated that stronger and more positive relationships were associated with higher levels of parental involvement, stronger academic outcomes and better behavioural outcomes. The study also found a general trend of stronger effect sizes for parental involvement and academic achievement with age, meaning positive relationships had a stronger effect on these outcomes for older children, although these differences were not statistically significant. While socioeconomic status wasn't included as a moderating variable, the paper did acknowledge that for studies including "sophisticated controls" which included SES, effect sizes were not significantly different.

It is important to note that according to these meta-analyses, parental warmth alone is not sufficient in predicting positive outcomes. As found through these analyses, a permissive parenting style was often linked with worse outcomes, which refers to high warmth, low discipline parenting. In other words, there are other parenting dimensions than warmth that are supportive to children. Similarly, another study showed that different aspects of parenting interact to influence young people's academic outcomes, for example parental warmth was found to moderate the effect of parental involvement on adolescent's academic outcomes (Chung et al., 2020).

There is also a body of literature that finds that parental time investment into their offspring is associated with various positive outcomes. A range of studies have found that parental time investment is related to positive academic, behavioural outcomes in childhood (Fiorini & Keane, 2014; Gialamas et al., 2020). There are fewer studies examining the impact of parental time investment during adolescence, but one study found that maternal time investment in adolescence was associated with positive behavioural and academic outcomes whereas they found no association for children aged 3-11 (Milkie et al., 2015). Furthermore, while most of these studies are descriptive, some causal research has also found that parental time investment has a causal impact on academic, cognitive and non-cognitive outcomes (Fiorini & Keane, 2014; Price & Kalil, 2019). Throughout the literature on parental time investment, it is acknowledged that time investment itself is important to be understood in the context of quality of relationships, and what the time is spent doing.

More specifically, studies have also linked family mealtimes with various positive outcomes including academic achievement and wellbeing (Fulkerson et al., 2006; Harrison et al., 2015; Snuggs & Harvey, 2023). However, research also shows that part of the association between family meals and young people's outcomes can be attributed to family relationship quality (Meier & Musick, 2014).

While these studies suggested that on average, positive aspects of parent relationships are linked with better offspring outcomes, results are mixed to some extent. For example, one study found that parental warmth did not predict academic growth in English, maths or science (Ogg & Anthony, 2020). They suggest this may be due to the fact that other factors than simply parental warmth are important to academic growth, and also that parental warmth may be more important as a moderator rather than a main effect. In fact, when they go on to model the interaction between parental warmth and socioeconomic background on academic growth, they find an interaction for science growth (discussed below). It's also important to note that their model accounted for SEB in their main models, whereas many other papers do not account for SEB, which may weaken the association. Furthermore, another study found no significant association between parental warmth and teacher ratings of reading, maths and sciences at the end of Key Stage 1 in the UK (Hartas, 2015). Their study argued that child-parent interactions were not the mechanism for improving social mobility, questioning whether social mobility could be improved through parenting interventions alone. Again, while this study included SES as a main effect, they did not consider its moderating role, which may be misrepresenting potential heterogeneity in the association between parental warmth and academic achievement, as discussed below. Another study found that frequency of family meals were not associated with adolescents' academic and behavioural outcomes when controlling for child fixed effects (Miller et al., 2012). Their findings suggest that invariant and unmeasured characteristics of children or their families may be confounding the causal association between family meal frequency and child outcomes. Overall, mixed evidence as to the association between parental relationships and some outcomes may be due to differential associations according to family SES as hypothesised in this thesis. Based on risk and resilience theory, positive relationships may play more of a protective role for students already at risk of lower outcomes, meaning they may not have the same impact across the socioeconomic distribution. However, this is not explored in most of the aforementioned literature. Or alternatively, mixed results may come down to unobserved confounding effects, and differences between descriptive and causal research.

The literature is also limited in that most studies explore children's and adolescent's short to medium term outcomes. For example, behavioural outcomes are often measured using cross-sectional data, or longitudinal data on average spanning approximately 3 years (Pinquart, 2017a). There is much less research focused on longer-term outcomes, into adulthood. Few studies have looked into the association between parental relationships in adolescence and outcomes in adulthood, but some findings have suggested that aspects of adolescent

relationships with parents influence wellbeing well into adulthood (Chen et al., 2019; Lloyd et al., 2017; Moran et al., 2018). As mentioned, intergenerational mobility studies are scarce on the role of parental relationships. However, one sibling correlation study found that measures of parent practices and behaviours accounted for sibling similarities in income above and beyond that of parental income. Parent attitudes included firmness and patience and significantly improved the explanatory power of their model in addition to parental income, demonstrating the potential importance of parental relationships in long-term outcomes that have gone relatively unexplored (Björklund et al., 2008). Otherwise, there is a dearth of research into offspring-parent relationships and their socioeconomic outcomes in adulthood.

Evidence indicates that parent-offspring relationships, particularly in adolescence, are crucial to their development, academic success, and subsequently, their labour market success and future earnings. While much research and theory has emphasised the importance of early childhood on development, it is also recognised in the development literature that adolescence represents a second period of growth and developmental changes (Crone & Dahl, 2012). According to a review of developmental science, adolescence encompasses structural and functional changes in the brain which are associated with a re-orientation of attention and motivation, and changes in social contexts, roles and responsibilities (Dahl et al., 2018). Adolescents start forming their identities, peer relationships and social pressures become significant, shaping long-term emotional and social skills during adolescence. In life-course research, it is also recognised that adolescence is an important time-period, associated with some of the most consequential decisions in life-course trajectories, making it a critical period for intervention where behaviours and identities are still forming (Schulenberg & Maslowsky, 2015). Adolescence is also a critical period for important educational transitions that can have long-term consequences. Accordingly, positive parent-offspring relationships during adolescence can act as a protective buffer by giving teenagers the resilience, academic success and skill to disrupt intergenerational cycles of disadvantage.

Parenting and socioeconomic status

The fact that both growing up low income and experiencing less positive parental relationships are associated with worse outcomes across the life course is concerning given the evidence that parenting behaviours tends to vary by SES. Studies have shown that family SES is associated with various parenting behaviours. For example, a meta-analysis found that higher SES was associated with more parental warmth which may happen through mechanisms such as parental stress models (Ayoub & Bachir, 2023). In his book Our Kids:

The American Dream in Crisis, Putnam made salient the topic of 'the parenting gap' between richer and poorer parents (Putnam, 2015). Through qualitative interviews and evidence reviews, he finds that there has been a growing gap in social capital between families of higher and lower SES. In particular, he shows a growing socioeconomic divide in the frequency of family dinners eating together, arguing that this is representative of the growing divide in family investments into their children. The analysis was also replicated for England and Wales by the Social Mobility Commission (SMC), finding that there was less stratification in parenting and family practices than the US. Specifically, findings showed that eating with family was not stratified by social class, but certain aspects of time investment were stratified by social class (Richards et al., 2016). Kalil and Ryan (2020) also look at the growing gaps in parental engagement and time use between richer and poorer families, arguing that children born to lower-income families are less likely to spend quality time with their parents which compounds their relative disadvantage. They also suggest that this is likely due to parental stress and financial strain which makes it harder for poorer parents to interact with their children in stimulating and nurturing ways. Accordingly, one study found that parental involvement mediated the association between family socioeconomic disadvantage and educational attainment, although this depended on age when involvement was measured, and type of involvement by parent gender (Hango, 2007).

Overall, the evidence suggests that there are some socioeconomic gaps in parental relationships. When the stresses inherent to growing up low income are coupled with lower quality relationships, this can put children at greater risk of worse outcomes. However, having more positive relationships in low-income contexts may be key to moderating the intergenerational association of income, and thus play a protective factor in disrupting cycles of disadvantage.

The moderating role of parental relationships

As mentioned, there is limited research looking at how parental relationships may moderate intergenerational mobility. This section of the literature review again draws on the evidence on the influence of parental relationships on wider outcomes and how it varies by parental SES to argue how and why this would also apply to offspring future income. Largely drawing on bioecological systems theory, the existing research places relationships in a wider socioeconomic context, also drawing from risk and resilience perspective, arguing that positive childhood relationships with adults are especially important for children at risk. In fact, it has been suggested that "a relationship with at least once caring adult […] is perhaps the single most important element in protecting young people who have multiple risks in

their lives" (Sabol & Pianta, 2012, p. 213). From an earlier section of the literature review, it is known that family SES is one of the strongest predictors of children's socioeconomic and educational outcomes. However, some evidence shows that childhood relationships with their parents may function as a protective factor in this intergenerational transmission.

Aspects of parental relationships have been found to moderate the association between family SES and academic achievement. One study found that parental warmth and SES had an interaction effect on science achievement for children from kindergarten to fourth grade in the US (Ogg & Anthony, 2020). They found that warmth positively predicted science growth for those from lower SES backgrounds, whereas warmth negatively predicted science growth for those from higher SES backgrounds. However, they found no main or interaction effects of parental warmth and family SES on reading or maths outcomes. The findings imply the importance of parental warmth as a protective factor for supporting a child's achievement and growth in science. The association between more parental warmth and lower science achievement for higher SES families was unexpected, but they note that lower warmth is only relatively lower warmth, not absolute low warmth, and that a potential explanation could be that higher warmth comes at the expense of other positive parenting aspects, such as control (such as characterised by the permissive parenting style) meaning that higher warmth could be counterproductive in this context. After all, it is important to keep other parenting aspects in mind, as we know from the literature that it is not only warmth that is important to outcomes. Another study also found that parenting behaviours had a stronger relationship with children's pre-reading scores for lower income families than higher income families (Hill, 2001). Thus, evidence suggests that parental relationships can moderate the association between family SES and offspring academic achievement to an extent, which in turn could well influence future job attainment and earnings, suggesting that parental relationships may function as a moderator in the intergenerational transmission of income.

Another study found that socioeconomic status moderated the association between parent stressors and practices and pre-school achievement in the US (Oxford & Lee, 2011). The study showed that whilst for families from a disadvantaged background, parenting stress was associated with lower language performance in pre-school, this was not so for more advantaged families. Additionally, parental sensitivity was associated with offspring maths achievement for those from disadvantaged backgrounds, but again no such association was found for the more advantaged families. Again, this research demonstrates how protective factors can work differently across socioeconomic contexts.

Parental time investment has also been found to moderate the association between family SES and their offspring's outcomes. For instance, one study found that equalising parental time investments notably increased intergenerational mobility, especially during pre-school years (Yum, 2023).

Another body of literature focused on the association between parental involvement and academic outcomes, and the moderating role of SES. For example, one study found that school-based parental involvement during adolescence had a stronger impact on academic achievement and attainment for more disadvantaged young people in line with risk and resilience perspective, whereas parent academic socialisation had a stronger effect for more advantaged young people (Benner et al., 2016). Additionally, a meta-analysis of 98 studies found that the benefits of certain aspects of parental involvement were stratified by family SES. The study found that parental learning support, academic emphasis, and parent-teacher communication had a stronger association with offspring academic outcomes for higher educated families, which is more in line with a boosting effect of family SES (Tan et al., 2020).

Overall, the evidence and theory suggest that relationships with parents during childhood and adolescence may moderate the association between parental SES and children's educational outcomes and non-cognitive outcomes. While there is a distinct lack of evidence on how parental relationships may moderate the intergenerational association of socioeconomic status, these outcomes may in turn influence future earnings.

2.6.1   Teacher relationships

Theoretical considerations

Theory also suggests that positive teacher relationships would be associated with a range of positive outcomes for children and teenagers. The theory largely draws on parental relationship theories including attachment theory and SDT, how positive nurturing relationships with adults such as teachers can drive positive academic and non-cognitive outcomes which in turn may drive future earnings. These theories have been extended to understand the role of early relationships with teachers (Davis, 2003). While these theories are generally applied to suggest that positive teacher relationships are associated with positive outcomes for all children, in line with Bronfenbrenner's bioecological systems theory, they can also be applied to understand why positive teacher relationships may especially play an important role for children from low-income backgrounds, acting more as a protective buffer, to improve wellbeing, confidence and resilience to overcome some of the

barriers associated with growing up in low income circumstances. Along these lines, students from higher income backgrounds may not benefit as much from strong teacher relationships, as they have less barriers to success. It's important to understand this underlying relationship between teacher relationships and outcomes, in order to understand how it may also vary across socioeconomic status. Thus, incorporating developmental theories into understanding the processes of intergenerational mobility, creating a cross-disciplinary theoretical framework to understand how the intergenerational transmission of income may be moderated by teacher relationships presents an important theoretical contribution to mobility scholarship.

It is also important to consider how the quality of teacher relationships may vary by family SES, in order to understand how the influence of teacher relationships may also vary by family SES in line with bioecological systems theory and risk and resilience theories. Some theories suggest why students from different socioeconomic backgrounds may have differential relationships with teachers. Teachers in schools serving low-income communities can face extra pressures that can impact their relationships with the pupils, especially in the British context where teachers feel that disadvantaged communities are harder to teach in and are not incentivised to do so (Allen & McInerney, 2019). Additionally, students from working class backgrounds may be more likely to feel alienated in the classroom and from their teachers (Bourdieu, 2018; Jones, 2024). Teachers may also have worse relationships with those from lower income backgrounds due to associated factors such as parental involvement, variability in cognitive abilities, or externalising issues which are known to influence teacher-student relationships (Wyrick, 2011). On the other hand, worse student-perceived relationships with teachers have been hypothesised for more advantaged students based on a stronger sense of entitlement, and likelihood of attributing academic failure to external reasons such as teacher support (Atlay et al., 2019; Lareau, 2002). Overall, teacher relationships may vary by socioeconomic context, with some young people experiencing compounded disadvantage, highlighting the potential moderating role teacher relationships may play in intergenerational mobility, and constituting an important theoretical contribution to development literature.

Evidence on teacher relationships and children's outcomes

There is limited research into how student-teacher relationships are associated with children's future income, and how this association may vary across parental income. However, student-teacher relationships have been linked to a range of other outcomes for young people, in line with attachment theory and SDT. For example, a meta-analysis

examined the association between positive and negative student-teacher relationships and students' school engagement and achievement (Roorda et al., 2011). The analysis based on 99 studies of primary and secondary school students found that both positive and negative relationships were associated with both school engagement and achievement, using a general operationalisation of positive and negative relationships. Effect sizes of positive relationships were larger for older children and adolescents. They also found that the effect sizes differed significantly by gender and ethnicity, with boys experiencing stronger associations of both positive and negative relationships with engagement, and larger effect sizes for positive relationships and achievement for girls and samples with less ethnic minority students. The study also suggested that school engagement may mediate the association between student-teacher relationships and achievement. Another meta-analysis of 119 studies found an association between positive student-teacher relationships and positive cognitive, affective and behavioural outcomes (Cornelius-White, 2007).

Other studies have also corroborated the association between student-teacher relationships and children's outcomes. Evidence showed associations between closeness and conflict in student-teacher relationships and children's social and academic skills in first grade (Pianta & Stuhlman, 2004). Other studies too have found an association between student-teacher relationships and cognitive performance, achievement, social-behaviour, self-esteem and educational beliefs and aspiration (Ahnert et al., 2013; Ansari et al., 2020; Bussemakers & Denessen, 2023; Chan et al., 2013; McCormick & O'Connor, 2015). The associations have also been found to differ by gender, for example, one study found that girls with more conflictual relationships showed lower overall levels of maths achievement than boys with similar levels of conflict (McCormick & O'Connor, 2015), in line with gender role socialisation perspective. Evidence of the influence of teacher-student relationships on children's academic and non-cognitive outcomes may in turn lead to influencing future earnings. Particularly, this may be true for children growing up low income, as the positive relationship with teachers may act as a protective buffer on their future earnings, improving children's resilience for overcoming barriers associated with growing up low income. Overlooking how the association between student-teacher relationships and students outcomes may vary across parental income may result in missing important associations, for example, while children of higher SES parents may be well equipped to succeed in school no matter their relationship with their teacher, a positive relationship with a teacher may act as a protective buffer for students from lower income backgrounds.

Many studies focus on cross-sectional effects, or short-term effects, however some studies explore the association in a longitudinal context, looking at trajectories and cumulative effects (Ansari et al., 2020; Hamre & Pianta, 2001; McCormick & O'Connor, 2015). The consensus in general is that student-teacher relationships have lasting, cumulative effects, and are associated with growth in academic skills over time too. However, there is a dearth of studies looking at longer-term associations of student-teacher relationships and outcomes in adulthood. To the author's knowledge, there are no studies on the association between student-teacher relationships and adult socioeconomic outcomes, despite many papers suggesting a potential long-term effect of positive (and negative) teacher relationships.

Additionally, adolescence is a time associated with stressors and additional challenges, where many teenagers become disengaged or alienated from schools, making strong teacher relationships more important than ever (Bernstein-Yamashiro & Noam, 2013). Positive teacher relationships have the potential to moderate the association between parental income and offspring income in this way, disrupting cycles of disadvantage at a crucial time, but there is a lack of direct evidence on this role.

Overall, the evidence indicates that teacher relationships can be influential for young people's outcomes, however most of these studies do not consider how this association may vary by socioeconomic context.

Teacher relationships and socioeconomic status

Research has also found that students from lower socioeconomic backgrounds are more at risk of having worse relationships with their teachers. For example, a review found that students from low-income families were more likely to experience student-teacher relationships characterised by low closeness and high conflict which could contribute to cycles of disadvantage (McGrath & Van Bergen, 2015). Other studies also found teachers to have worse perceptions of students from lower socioeconomic backgrounds, especially boys (Auwarter & Aruguete, 2008; Wyrick, 2011).

On the other hand, some have found evidence that those from lower socioeconomic backgrounds have better perceptions of teacher support compared to students from higher income backgrounds (Atlay et al., 2019). Thus, there is somewhat mixed evidence on the association between student-teacher relationships and socioeconomic background. Given the evidence that student-teacher relationships may vary across socioeconomic background, positive teacher relationships may be especially important to students from low-income

backgrounds who are at risk of lower academic and non-cognitive outcomes, which in turn may moderate intergenerational income mobility.

The moderating role of teacher relationships

While there is a lack of research into whether the association between parental and offspring SES varies by student-teacher relationships, there is some evidence of this moderation effect on children's academic outcomes, which in turn may drive future earnings. For example, in a meta-analysis of 99 studies, Roorda et al. (2011) found that SES was a significant moderator in the association between child-teacher relationships and student's engagement and achievement. The results of their meta-analysis showed that child-teacher relationships were more influential for students from lower SES backgrounds, in line with the academic risk hypothesis. Furthermore, Hamre and Pianta (2005) found that children at demographic risk of low achievement (children of mothers with low educational attainment) were more likely to academically perform similar to their peers with highly educated mothers if they had a supportive teacher in first grade, suggesting that positive teacher relationships can compensate for the risks associated with coming from lower SES backgrounds. Additionally, another study found that when student-teacher relationships improved, children from lower socioeconomic backgrounds exhibited improvements in academic outcomes through primary school, although the findings were more consistent for reading outcomes than maths outcomes (McCormick et al., 2017). Finally, another two studies examined the interaction between student-teacher relationships and maths and reading achievement in early childhood. They both found that whilst closer relationships were beneficial for all students, they were more beneficial for students from lower socioeconomic backgrounds (Olsen & Huang, 2021, 2022).

On the other hand, another study found that the association between teacher-student relationships and achievement motivation was not moderated by SES (Bergeron et al., 2011). Similarly, Desmet et al. (2023) looked at how student-teacher relationships affected mathematics motivation across EU countries, finding that it did not vary across economic, social and cultural status. Thus, there are some mixed results with regards to the moderating role of student-teacher relationships in the association between family SES and achievement, although this may be due to the different operationalisations of relationships, SES and achievement.

Overall, there is a distinct lack of evidence on how teacher relationships may moderate the association between parental income and offspring income, or more broadly, how they may moderate the intergenerational transmission of socioeconomic status, which presents an

important opportunity to facilitate greater understanding of the potential moderator, drawing on evidence presented here.

Summary of gaps

This section discussed the evidence on the potential moderating role of parent-offspring relationships and of student-teacher relationships in intergenerational income mobility. Overall, there are several key gaps in the literature. Firstly, there is little evidence of the moderating role of parent-offspring relationships in intergenerational income mobility. There is a distinct lack of intergenerational mobiltiy studies exploring the potential moderating role of parent relationships, despite the prominence these relationships take in theories of child development, making an important theoretical contribution to mobility literature. While there is some evidence to suggest that positive parent-offspring relationships may moderate the association between parental SES and children's outcomes including educational attainment and some non-cognitive skills in development and education literature, (Ogg & Anthony, 2020; Hill, 2001; Oxford & Lee, 2011), there is a lack of research looking into how it may influence future earnings, despite findings that relationships explain a significant amount of similarity in sibling income net of parental income (Björklund et al., 2008).

Secondly, there is a similar lack of evidence on the potential moderating role of teacher relationships on the association between parental income and offspring future income, or in intergenerational mobility studies more generally, despite their importance in development literature, again meaning this thesis makes an important theoretical and empirical contribution to the literature. Again, some research does suggest that parental SES may moderate the association between teacher relationships and student academic outcomes (Roorda et al., 2011; Hamre & Pianta, 2005; Olsen & Huang, 2021, 2022). However, this has not been explored with regards to longer-term outcomes, such as future earnings.

Finally, there is a dearth of research looking specifically at teenager's outcomes and experiences (Schulenberg & Maslowsky, 2015), despite the importance of adolescence as a developmental period. This certainly applies to the moderating role of relationships on intergenerational income mobility, but this is also somewhat a gap in the literature looking at relationships and young people's broader outcomes. This literature review highlighted that some evidence suggests the association between relationships and future outcomes may be stronger for older children (Jeynes, 2023; Milkie et al., 2015; Roorda et al., 2011), showing how important it is to consider adolescent's relationships too.

2.7   Research Aims

This study aims to estimate intergenerational income mobility in the UK, and examine its moderators including gender, educational attainment and relationships with family and teachers in adolescence. Intergenerational income mobility is used as a measure of equality of opportunity, openness and fluidity in society making it an indicator of fairness in a society (Björklund & Jäntti, 2020; Deutscher & Mazumder, 2021). In this spirit, social mobility has been a key goal of broad policies from successive governments, including educational and social policy such as educational expansion and design of the welfare system (Beller & Hout, 2006). Through understanding these moderators, this study aims to shed light on processes driving intergenerational mobility and therefore provide a deeper understanding of how policies and interventions can improve intergenerational mobility and address intergenerational inequality. To achieve this, three studies were conducted.

The first study estimated intergenerational income mobility in the UK and further examined whether the association was linear, and whether it varied across gender. The literature review identified certain gaps in the literature. For example, internationally, evidence shows that using single observations of parental income can downwardly bias intergenerational income association. Much of the research in the UK relies on single observations of parental income, based on data for those born in 1970 as the most recent cohort. Hence, this research builds on the work of Rohenkohl (2023), using a more recent dataset, and multiple observations of parental income to estimate intergenerational income mobility and its moderators for a cohort born between 1977 and 1992. This is an important contribution, as it provides an understanding of the state of intergenerational income mobility for adults today, which is a necessary foundation for policy and practitioners aiming to improve intergenerational mobility. By using new data that has rich information on parental income, it also provides a methodological contribution, reflecting the latest methodological advancements in the field, more in line with international studies. The cohort studied also presents an interesting historical context, roughly encompassing the millennial generation who largely completed compulsory education under New Labour, an era of great change in the education policy landscape.

Furthermore, while theory suggests that there may be nonlinearities in the intergenerational income association, with higher persistence in the lower and higher ends of the income distribution, some evidence suggests that the association is linear in the UK (Bratsberg et al., 2007; Rohenkohl, 2023). Understanding whether and how income mobility varies across the income distribution in the UK is a vital question for policymakers to help deepen the

understanding of processes and how to better target interventions. Thus, this research contributes to the evidence base on nonlinearities in intergenerational income mobility.

Additionally, traditionally estimates of intergenerational income mobility have omitted women. Of the more recent studies that have included both women and men, the literature review identified mixed findings on whether and how income mobility varies across gender. Some suggest that income mobility is similar across gender (Chetty, Hendren, Kline, & Saez, 2014, Rohenkohl, 2023), while others have found higher mobility for women (Acciari et al., 2019; Eshaghnia et al., 2023). This research contributes by investigating whether intergenerational income mobility varies across gender in the UK, using the latest data available. It is important for targeting policy and may facilitate better understanding of mechanisms behind intergenerational income mobility. This is especially vital in a climate where working class boys are experiencing low educational outcomes in the UK, education being key to intergenerational mobility.

Hence, the specific research questions for the first study are as follows:

1. To what extent is there intergenerational income mobility in the UK?
2. To what extent is the association between parental income and offspring earnings nonlinear?
3. To what extent does the association between parental income and offspring earnings vary by offspring gender?

The second study examined the moderating role of educational attainment in intergenerational income mobility. Extant international research suggests that education plays a moderating role in income mobility, however no studies have tested this in the UK to the author's knowledge. A few studies have been conducted in the UK using other indicators of socioeconomic background (Vandecasteele, 2016 and for the compositional effect, Bukodi and Goldthorpe, 2016; Breen, 2010). Of these studies, Vandecasteele's study examined the moderating role of education in the association between parental occupational status and offspring earnings and occupational status. Vandecasteele's findings suggest that that there was no moderating role of educational attainment in the intergenerational association between parental occupational status and offspring earnings, which is in contention with expectations according to some international findings (Fiel, 2020; Torche, 2011). Building on their work, this study extends the scope by being amongst the first to investigate the moderating role of educational attainment in income-to-income transmission in the UK. It is vital to understand the potential moderating effect of education in the UK to understand mobility and how to improve it. Additionally, by using measures of parental household

income, the present study aims to provide new insight into the moderating role of education in income mobility. While measures of parental social class, most commonly used in the extant literature, may capture cultural, social and employment relations, parental income is meant to capture resources available growing up. Broad categories of social class can conceal disparities in income between different professions, whereas income allows analysis in more granular detail. Finally, Vandecasteele's study excludes those who were not working, misrepresenting an important part of the population. The present study aims to address these limitations, by using parental income as a measure of socioeconomic background, whilst also tackling common measurement biases such as including those not working. It is expected to bring knowledge of the moderating role of education in the UK more in line with international findings.

The specific research questions are as follows:

1. To what extent does educational attainment moderate the association between parental income and offspring earnings?
2. To what extent does this moderation effect vary by gender?

Finally, the third study examined the potential role of relationships with parents and teachers in adolescence as a moderator of intergenerational income mobility. The research on income mobility has little considered contexts and processes proximal to offspring in understanding intergenerational processes, meaning that there is a dearth of research into the potential role of relationships. However, theory and evidence from psychology and education suggest that positive offspring-parent and student-teacher relationships may play an important buffering factor in intergenerational income mobility (Hamre & Pianta, 2005; Ogg & Anthony, 2020).

While there is some evidence of parental and teacher relationships moderating the association between parental SES and academic and non-cognitive outcomes, there is no research exploring the moderating role of these relationships in intergenerational income mobility. Drawing on theory and evidence from developmental psychology literature, the present research hypothesised that positive relationships would form protective buffers against the intergenerational transmission of low income, in line with bioecological systems theory and risk and resilience perspectives. This is important to guide policy on parenting and teaching interventions to better address and target educational disadvantage and help understand underlying mechanisms. It also helps understand the relationship between parental and teacher relationships and children's outcomes in a broader sense. Finally, considering the limited research on the role of relationships in adolescence, despite some evidence suggesting highlighted that some evidence suggests the association between

relationships and future outcomes may be stronger for older children (Jeynes, 2023; Milkie et al., 2015; Roorda et al., 2011), the present research also aims to contribute to the existing evidence base by demonstrating the importance of relationships in adolescence on future outcomes.

The specific questions are as follows:

1. To what extent do child-parent relationships moderate the association between parental income and offspring earnings?
2. To what extent do child-teacher relationships moderate the association between parental income and offspring earnings?
3. To what extent do these moderating effects vary across gender?

2.8   Chapter summary

This chapter provided an overview of the existing theory and evidence on intergenerational mobility, its nonlinearity and the moderating roles of gender, education and childhood relationships, providing a background and rationale for the current research and outlining its contributions. It defined key concepts of intergenerational mobility, offspring-parent and student-teacher relationships, and outlined the policy context for social mobility interventions. It then provided an overview of theory and evidence of intergenerational mobility and its moderators, and summarised existing gaps in the literature. It concluded with an outline of the research aims in relation to the literature. The next chapter discusses methodology.

3. Methods

3.1   Aim of chapter

This chapter provides an overview of the methodology underlying the current research, offering a detailed account of each step in the research process. It begins with a description of the dataset used, the motivations for the use of the dataset, and how the data was collected. Following this, the chapter discusses the sample construction, detailing inclusion and exclusion criteria and adjustments made for the sample's representativeness. The next section explains the measures used in the analysis, including how they were coded, rationale for inclusion and a brief description. Then the missing data strategy is elaborated on, discussing methods for handling missing data points for key variables. Finally, the chapter provides an overview of the analysis procedure, detailing the statistical techniques employed to analyse the data and address the research questions, concluding with a description of the robustness checks.

3.2   Data

To address the research questions of the present thesis, secondary data analysis was used. The dataset used is a UK longitudinal household survey, known as Understanding Society. The dataset is made up of different household samples that began at different times. 5,500 households joined the British Household Panel Survey (BHPS) in 1991, forming BHPS Wave 1. Booster samples of 5,000 households were added between 1999-2001 for better representation from Scotland, Wales and Northern Ireland. BHPS data was collected annually across 18 waves. In 2009, the UK Household Longitudinal Study (UKHLS) began, which continued from the BHPS, with a new sample of 30,000 households, forming UKHLS Wave 1. The following wave, households from the BHPS were asked to join the UKHLS and almost 6,700 of just over 8,000 households did. Again, data was collected annually in waves. Since then, more boosters have been added to better represent ethnic minority and migrant households (see Figure 3.1 for an illustration of these samples). The latest data collected as of 2023 was UKHLS Wave 14, collected in 2022 (University of Essex, 2022).
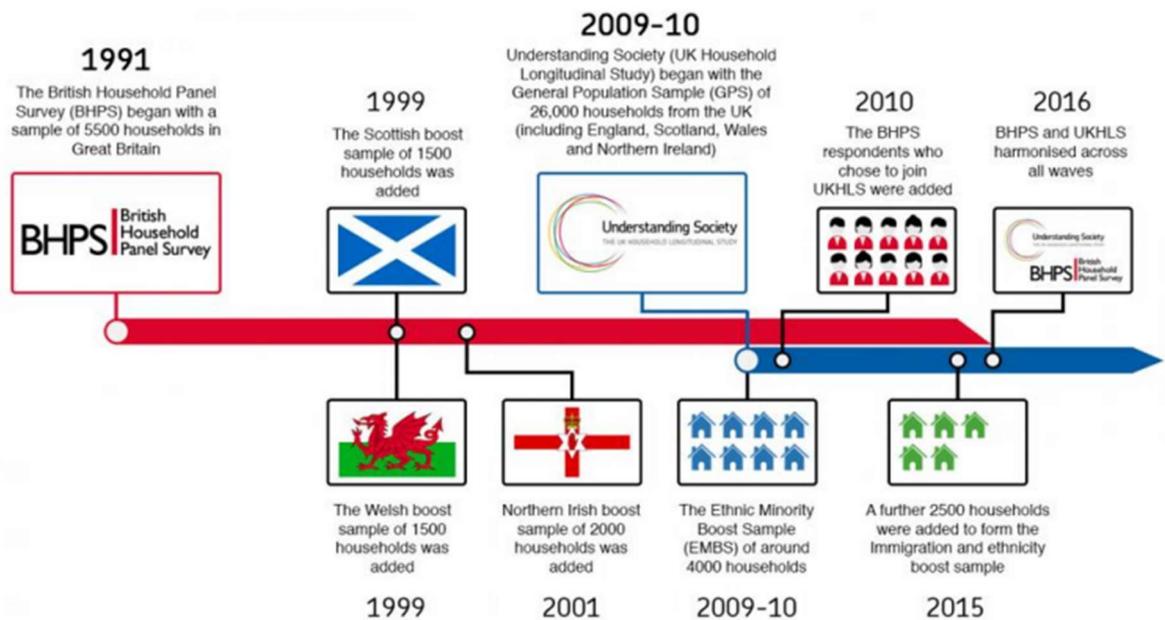
Figure 3.1 Structure of the data. Source: University of Essex, 2022

UKHLS was chosen to analyse intergenerational income mobility for several reasons. There are several longitudinal datasets based in the UK that collect rich socioeconomic and educational data, however, UKHLS was one of the only ones to collect prospective data on parental income. Prospective data on parental income can reduce recall bias associated with recalling parents' income retrospectively, providing a more accurate measure (Song & Mare, 2015). Most previous research on income mobility in the UK have relied on two longitudinal datasets, the National Childhood Development Study (NCDS) which follows people born in one week in March 1958, and the British Cohort Study (BCS) which follows people born in one week in April 1970. However, they are limited in that the NCDS only has one observation of banded parental income at age 16, and the BCS has only two observations of banded parental income at ages 10 and 16. It has been shown that using only one or two income observations can lead to downward bias for estimations of income mobility (Chetty, Hendren, Kline, Saez, et al., 2014; Deutscher & Mazumder, 2021). Other surveys have rich information on educational attainment, such as the Longitudinal Education Outcomes dataset, however, they do not have information on parental income. Another later cohort study is also available for individuals born in 2000, but the respondents are not old enough for intergenerational analysis yet as in the latest wave they are 23 years old. As most previous estimates have relied on either retrospective data on parental social class, or one or two banded income observations, the present research builds on the existing evidence base by using detailed, prospective data on parental income, addressing common measurement

biases (Chetty, Hendren, Kline, Saez, et al., 2014; Gregg, Macmillan, et al., 2017; Mazumder, 2005).

3.3   Data collection

Due to the data structure, unlike cohort studies, the number of individuals in each wave changes as it follows people coming in and out of households. A household is defined as people living in the same postal address, and the survey followed households of the original sample members only. All those in the household at the time of the original sample interview were considered original sample members. People that moved into and out of households are considered temporary sample members and were interviewed only if they lived with an original sample member.

Children in households when a wave of data was collected were interviewed as children with shorter self-completion questionnaires with the permission of their parent or guardian until the age of 16, when they were then interviewed as an adult. If the children moved out of the household, they continued to be asked questions as part of the survey, and the people that moved in with them as temporary sample members. Many children are matched to their parents through the use of a cross-wave identifier within the survey from the household-level data. This linkage is what makes intergenerational research possible using this dataset.

The sample design is clustered for cost effectiveness, and stratified by region, social class and population density to enhance the representativeness. For more detail the sample selection and design, see Taylor (2018). Given the multi-stage sampling design, throughout the thesis, the *svyset* suite of commands in Stata are used in the analysis to take account of clustering and stratification as per survey guidelines.

3.4   Sample construction

To construct the sample for the present research, the following restrictions were applied:

1. Offspring born between 1977-1992 and aged 0-17 in the first 22 waves from the original BHPS sample, and the Scotland, Wales and Northern Ireland samples.
2. Matched to their parents through cross-wave identifiers.
3. At least one parental income observation during childhood (while offspring was aged 0-17).
4. Offspring have at least one income observation during adulthood (aged 25 +) while not a full-time student.
5. One child per household.

79

The sample was restricted to offspring from the original sample in 1991 and the Scotland, Wales and Northern Ireland booster samples in 2009 and 2011. This was to maximise the size of the sample while balancing with the need for observations of offspring during childhood (0-17) and adulthood (25+). Selected offspring are born between 1977-1992 so that all have at least three waves observed during childhood and adulthood. This means that effectively, in the first wave (1991), offspring in the analytical sample are aged 0-14 and in the final wave (2021/2022) offspring are aged 28-44. This information was taken from individual-level files across the first 22 waves. There are 5,885 offspring that met these criteria. See Figure 3.3 below for a diagram of the sample timeline and Figure 3.3 for the sample construction process.

For intergenerational analysis, children were linked to parents within the same household using cross-wave identifiers. This information was taken from household-level data across the first 22 waves, while the offspring were aged 0-17. The way children and parents are matched within households allows for parents to be natural, adoptive, foster, step or grandparents if other parents are not present. A broad conception of parents was chosen to represent diverse family structures, not just biological parents and children. 5,564 children were matched to at least one parent in this way.

Then, the sample was restricted to those parents who had at least one income observation while their child was aged 0-17. This was to represent resources during childhood. This step reduced the sample size to 5,443 offspring.

Next, the sample was restricted to offspring with at least one income observation during adulthood (aged 25+) and while not a full-time student, to represent their economic activity during adulthood. This reduced the sample size to 1,680 offspring. 99% of this sample reduction was due to the attrition of offspring dropping out of the survey before age 25, with 3,717 excluded as they did not have observations past the age of 25, and 46 individuals excluded for not having income observations or being in full time studies.

Finally, the sample was restricted to one observation per household. Siblings share a common environment growing up meaning that they are more similar to each other than individuals from different groups. This correlation or dependency of observations violates the assumptions of independence for regression analysis which can lead to biased standard errors of parameter estimates (Ntani et al., 2021). While the survey allows analysis to take geographical clustering into account, it does not take account of clustering at the household level. Therefore, to deal with this dependency due to nested data, the sample could either be restricted to one child per household or use analytic strategies that consider dependency such

as multilevel analysis or clustered standard errors (Huang, 2016). The first option would result in only one individual per cluster, which can then be assumed independent whereas the second option may not totally address these issues (Lai & Kwok, 2015). Hence, the former option was chosen, with the caveat of reducing the sample size. This restriction left a sample size of 1,165 offspring-parent pairs, with the youngest eligible sibling's data kept in each household.

The final analytical sample size was 1,165. The sample size is slightly smaller than other samples used in comparable studies. For example, Rohenkohl (2023) used a sample of 2,102 using the BHPS and UKHLS to estimate intergenerational income mobility. Vandecasteele (2016) had a sample size of 2,705 using the BHPS to estimate the moderating role of education on intergenerational mobility offspring earnings, however this was based on parental occupational status. Other studies measuring intergenerational income mobility using the BHPS used a smaller sample size of only 962 (Parolin et al., 2023). Using other surveys in the UK, sample sizes range from 3,453-4,312 (Gregg, Macmillan, et al., 2017). The present study aimed to maximise the sample size to include as many relevant offspring-parent pairs as possible while balancing this with avoiding bias.
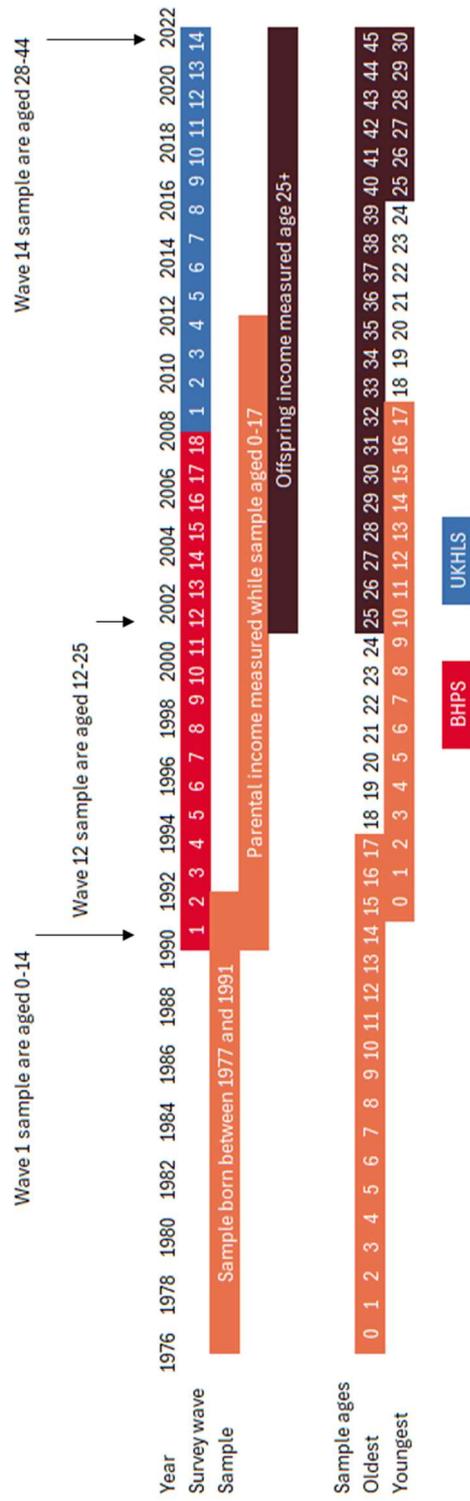
Figure 3.2 Survey Timeline

```
                    ┌─────────────────────────────────┐
                    │ Offspring born between 1977-1992 and aged │
                    │  0-17 in the first 22 waves, from the original │
                    │       and booster samples.          │
                    │                                     │
                    │       Offspring: N= 5,885           │
                    └─────────────────────────────────┘
                                     │
┌──────────────────────────┐        │
│    Not matched to parents │ ◄──────┤
│                           │        │
│      N = 321 offspring    │        │         ┌──────────────────────────────┐
└──────────────────────────┘        ├────────►│ Remaining offspring N = 5,564 │
                                     │         └──────────────────────────────┘
┌──────────────────────────┐        │
│ No parental income observations │◄┤
│           aged 0-17       │        │
│                           │        │         ┌──────────────────────────────┐
│      N = 121 offspring    │        ├────────►│ Remaining offspring N = 5,443 │
└──────────────────────────┘        │         └──────────────────────────────┘
┌──────────────────────────┐        │
│ No offspring income observations │◄┤
│   aged 25+ & not a student │       │
│                           │        │         ┌──────────────────────────────┐
│      N = 3,763 offspring  │        ├────────►│ Remaining offspring N = 1,680 │
└──────────────────────────┘        │         └──────────────────────────────┘
┌──────────────────────────┐        │
│  Older siblings within the same │ ◄┤
│         household         │        │
│                           │        │
│      N =515 offspring     │        │
└──────────────────────────┘        │
                    ┌─────────────────────────────────┐
                    │         Final sample size          │
                    │                                     │
                    │       Offspring: N= 1,165           │
                    └─────────────────────────────────┘
```

Figure 3.3 Sample construction

3.4.1   Sample representativeness

The original sample of the BHPS was found to be broadly representative of the population
according to the 1991 census. An analysis found that levels of attrition were relatively low
considering the span of years, with around 70% of the initial sample participating after 12

years and around 40% participating after 24 years. Attrition was shown to be greater amongst younger age groups, men, Black people, people on lower income and people in the West Midlands (Lynn & Borkowska, 2018). Attrition is higher in the current sample, especially as it follows children of original members. As can be seen from the sample construction, one of the largest sources of attrition occurs when restricting the sample to those with income observations over the age of 25, dropping almost 68% of the sample. However, attrition occurs before then as well, the amount of which is difficult to estimate. Ideally, the present sample should include any parent, present or future, from the first wave, however it is impossible to tell whether those that dropped out in the early waves went on to become parents or not.

Attrition is a common limitation to longitudinal studies and may result in biased estimates if left uncorrected for (Lynn, 2018). A common way to deal with attrition in longitudinal surveys is to use weights. The survey provides weights, constructed by combining design weights which adjust for unequal selection or sampling and non-response weights which adjust for differential non-response and attrition. The non-response weights take account of representation from Northern Ireland, Scotland and Wales, ethnicity, migrant status and households' size and people who responded in wave 1 and people who continued to respond in later waves. However, the predetermined weights provided by the survey can only deal with either cross-sectional samples or longitudinal samples and are not designed for intergenerational analysis. Longitudinal weights only include individuals who answered at every previous wave, which would unnecessarily reduce the sample size for the present sample. Therefore, custom weights were needed.

To create the custom weights, the enumeration weights from wave 2 of people coming from the BHPS sample to the UKHLS sample was used as a base weight. This was chosen to represent offspring in adulthood. The enumeration weight was used to adjust for unequal selection or sampling. Next, a conditional weighted model of response was fitted to the sample. Predictors tested included sex, region, race, migrant status, income quintile, highest educational qualification, year of birth and country born. These were selected as they were similar to the predictors used in the survey weights, with the addition of socioeconomic variables relevant to the analysis. All were found to be significant excluding race and birth year. These were used to generate predicted probabilities of response or non-response, and then finally inverse probability weighting was used to generate the inverse of the predicted probabilities, assigning a weight to each individual. These steps followed the official survey guidelines on creating tailored weights (University of Essex, 2022).

While these custom weights may deal with attrition to a certain extent, there are several limitations to using them. Firstly, it does not perfectly deal with attrition, particularly for intergenerational analysis as it is not designed with that in mind. Also, it reduces the statistical power as some individuals are assigned an enumeration weight of zero for sampling reasons. Additionally, the inclusion of non-response weights leads to increased standard errors. Often in the literature, attrition is ignored, and non-response weights are not included in the spirit of simplicity and general usability (Vandecasteele & Debels, 2007). For example, several previous estimates of income mobility have not adjusted for attrition (e.g., Parolin et al., 2023; Rohenkohl, 2023). However, this is not recommended, as mentioned above, it can contribute to biased estimates and is not generalisable to the wider population (Lynn, 2018; Vandecasteele & Debels, 2007). The present research addresses this bias by applying non-response weights with the aim of making estimations generalisable to the wider population, to a certain extent.

The aim of including weights was to make the sample representative. Ideally, it would be representative of adults in the UK who were born between 1977 and 1992. In order to check the representativeness of the sample, Table 3.1 below presents some key socio-demographic characteristics for the unweighted analytical sample, the weighted sample and a general sample from the UKHLS in 2022. The general sample is a cross-section of people born between 1977 and 1992, which represent the latest wave the analytical sample were observed, using cross-sectional weights. Ideally, the characteristics would be compared to administrative data such as Census or LFS as they are closer to being truly representative of the general population, however this was not within the scope of the thesis.

Table 3.1 Weighted and unweighted sociodemographic characteristics

	Analytical sample, unweighted	Analytical sample, weighted	Whole sample, weighted
Female (%)	56.82%	49.94%	53.29%
White (%)	95.28%	92.08%	84.71%
Born in UK	98.29%	98.14%	85.01%
Degree holder (%)	34.51%	27.10%	41.64%
N	1,165	1,010	5,775

Overall, the unweighted sample overrepresented women, white people, non-migrants and non-degree holders. As for gender, there are small differences across the weighted analytical sample, and the whole sample.

For ethnicity, the weights partially deal with the overrepresentation of white individuals. It likely only partially works as the original sample was taken before the booster sample of ethnic minorities. Additionally, the analytical sample should technically be representative of those whose parents were in the UK from 1992, meaning that the sample should only represent those who were in the UK from childhood, which may impact ethnicity. This is confirmed by the overrepresentation of those born in the UK. The underrepresentation of migrants and ethnic minorities are considered in the interpretation and discussion of the analysis.

Finally, the analytical sample underrepresents degree holders, and the weights in fact underrepresent degree holders even more. There are a few potential reasons for this. On average, the analytical sample have their education measured at a younger age than the whole sample. This does not represent lifelong education, so the interpretation is limited to estimating education at a younger age rather than lifelong educational attainment. The underrepresentation of degree holders may also happen as attrition is more likely with those who move away, which often happens for people moving away for university. Overall, the weights are only partially successful at making the sample more representative. There is a lack of research and guidance on intergenerational weights, and much of the existing literature does not address attrition or weights at all, demonstrating a need for greater attention to this issue in future research.

3.4.2   Sample limitations

There are also some broader limitations to the sample. Firstly, the sample are still quite young, having started data collection in 1991. Gregg, Macmillan, et al. (2017) shows that estimates of income mobility can be biased based on the age that income is measured in adulthood up until age 40. Additionally, being born over a 14-year period may risk cohort effect bias, for example as some reached adulthood during the recession and others afterwards which may have an impact on income mobility. To attempt to deal with these limitations, age is controlled for in the analysis, and robustness checks are carried out with an older sample although it is also acknowledged in the discussion that the estimates are still potentially downward biased. Furthermore, the individuals with enough information are members of the first samples from 1991 and 1999 as detailed above, meaning that there is poor representation of ethnic minority and analysis was unable to examine race as a moderator. Finally, the small sample size overall means low statistical power limiting some of the analyses.

It is also worth noting the limitations of survey data overall. Survey data is known to not adequately capture the full income distribution, whether the top of the income distribution where individuals tend not to disclose very high income, or through the high attrition rate of people on lower income (Burkhauser et al., 2018). Attrition is a key issue in virtually all large surveys and can impact the generalisability of the data by potentially introducing bias, as the characteristics of participants who drop out may differ from those who remain in the study. It can also lead to smaller sample sizes and smaller subpopulation sample sizes. Some studies of intergenerational mobility have overcome these issues by using administrative data (e.g., Acciari et al., 2019; Chetty, Hendren, Kline, Saez, et al., 2014; Deutscher & Mazumder, 2021). For more accurate measures of income mobility, administrative data needs to be available. Furthermore, a limitation of using secondary data is that it may not adequately capture the concepts that the researcher is measuring, leading to the use of proxies. The finances of surveys are limited, meaning they have to prioritise certain questions, limiting secondary data analysis to the questions asked.

3.5   Measures

The dependent variable in this thesis is offspring earnings measured in adulthood. The independent variable is parental household income during childhood. The moderating variables are gender, educational attainment, family relationships and teacher relationships. The covariates used were age, number of income observations, birth year, gender, ethnicity, migration background and family structure.

3.5.1   Offspring income

The outcome offspring earnings was measured as percentile rank of individual monthly labour earnings, averaged over a multi-year period (of up to 19 years) between ages 25-50 while not in full-time education. Therefore, the range was 1 to 100, with a mean of 50. All offspring earnings variables refer to monthly earnings, measured as the earnings received the month before the interview.

Earnings were only measured past the age of 25 while not a full-time student to capture permanent lifetime earnings, balancing the need to deal with life-cycle bias and the need for a larger sample. A common issue identified in the income mobility literature is life-cycle bias, which arises from measuring income at different stages of life, as income changes over the life-cycle period. In general, findings have shown the younger the offspring income is measured, the lower the income persistence, suggesting that measuring income mobility with a younger offspring generation can lead to underestimation (Gregg, Macmillan, et al., 2017).

Ideally, the present sample would measure earnings at an older age, however, due to the length of the survey, there were not many individuals with income observations past the age of 35, or even 30. Thus, in the main analysis, age when income is measured was retained and controlled for, and a robustness check was carried out measuring earnings from 30 plus. The main analysis is taken with the caveat that income mobility may be underestimated to a certain extent.

The use of multi-year averages addresses another common issue of attenuation bias, which arises from measurement issues or transitory shocks that may affect single-year income observations, especially monthly income observations. Research has shown that using single-year income observations leads to considerable downward bias in estimation of intergenerational income elasticity (Gregg, Macmillan, et al., 2017; Mazumder, 2005; Nybom & Stuhler, 2017; Solon, 1992). Another study showed that attenuation bias affected those with lower education disproportionately, who may have more fluctuating earnings (Fiel, 2020). The limitation of multi-year averages is that some individuals will have more income observations than others, and some have income observations at different ages, which is why age and number of income observations are controlled for in the analysis. In the present sample, up to 19 waves of income could be observed, although due to entering in different waves, at different ages, and different years participating in full-time education, the actual range of income observations spans 1-19 waves.

Earnings were chosen as opposed to individual income to reflect theoretical mechanisms of mobility such as the association between educational attainment and the labour market, and because the thesis does not aim to analyse the effect of benefits or investment. Earnings are derived from the sum of gross usual monthly pay; self-employment pay, and second job pay. While income is not investigated in the present work, previous research has suggested that including tax and benefits in income measurements would result in a small increase in income mobility due to the progressive nature of tax and benefits (Belfield et al., 2017). Furthermore, individual earnings were chosen as opposed to household income as household income would capture other effects such as assortative mating, housemates or parental income for those living with their parents. The limitation of using individual earnings is the amount of people on zero earnings, which can cause statistical issues (Gregg, Macmillan, et al., 2017). Plus, earnings may underestimate life-time income for women due to greater childcare responsibilities. To examine this further, the analysis is stratified by gender to understand differences in sons' and daughters' income mobility.

As earnings were taken from across different months and years, all earnings variables were adjusted using consumer price inflation (CPI) from the Office for National Statistics in accordance with their monthly CPI indices. Earnings were adjusted to Great British Pound value of July 2015 for which month CPI is equal to 100 (Office for National Statistics, 2022). Each observation was multiplied by the corresponding CPI value for the month they were interviewed.

Monthly earnings were used as annual measures were unavailable in UKHLS waves 1-18. The limitation of using monthly income is that it is more sensitive to transitory shocks, although using multi-year averages attempts to partially correct for this. Earnings were top coded to £8,333 in the UKHLS to prevent disclosure of respondents. There is a set of flag variables indicating whether the variable included top-coded components, and less than 1% of the sample were top-coded.

Once earnings were adjusted for inflation and averaged over the relevant waves they were converted into rank percentile. This is in line with the contemporary literature, as it minimises measurement issues while maintaining detailed information on relative income (see section 3.8 for more information). This also has the benefit of normalising the distribution, which otherwise would be strongly skewed.

3.5.2 Parental income

Parental monthly household income was measured as percentile rank of parental household income, averaged over a multi-year period (of up to 18 waves) while the offspring was aged 0-17. Income was adjusted using CPI to July 2015 Great British Pounds, like offspring earnings. Again, the range was 1 to 100 with a mean of 50.

Like the offspring earnings, multi-year averages were used for observations of parental household income while the offspring was aged 0-17. Household income was used to capture resources available during childhood. Traditionally the literature has focused on father to son transmission, but by using family income, the thesis examines parent to child transmission.

Household income can be adjusted for comparing households of different sizes and consumption using an equivalence scale. Household income was equivalised to provide a better representation of resources available during childhood using the OECD-modified equivalence scale. This scale assigns a weight of 1 to the first adult in the household (aged 14+), a weight of 0.5 to each additional adult and a weight of 0.3 to each child (aged 0-13). There is less than 0.5% missing equivalence scale information, of which was omitted so as to only include equivalised household income observations.

Household income was derived from the sum of gross monthly incomes from all household members. The available individual income data is measured as gross income for an individual, derived from gross labour earnings, miscellaneous income, private benefit income, investment income, pension income and social benefit income. Once the observations were adjusted for inflation, equivalised and averaged over the relevant waves, they were converted to percentile rank.

3.5.3 Educational attainment

Offspring educational attainment was measured as the highest qualification recorded. Some analyses used a five-category measure of education, see Table 3.1 for more detail. Across the five-category variable, 124 (11%) had a postgraduate degree, 278 (24%) had a bachelor's degree, 411 (35%) had an upper secondary qualification, 230 (20%) had a lower secondary qualification and 122 (10%) had other or no qualification.

In other analyses, a binary indicator of whether an individual had a degree or not was used, based on the five-category variable. When measured as a covariate, the binary indicator was used, to improve statistical power and ease of interpretation. In the sample, 763 (65%) were not degree educated, and 402 (35%) were.

Table 3.2 Education variable

5-category education variable	Examples
Postgraduate degree	University higher degree (e.g., MSc, PhD)
Bachelor's degree	First degree level qualification including foundation degrees, graduate membership of a professional Institute, PGCE
Upper secondary	A-Level, Welsh baccalaureate, international baccalaureate, higher grade/ advanced higher, BTEC or other higher degree such as diploma in higher education; teaching qualification (excl. PGCSE), nursing or other medical qualification, HNC/HND
Lower secondary	GCSE; Ordinary/ Standard grade
Other or no qualification	CSE, other school leaving exam certificate or matriculation, no qualification mentioned.

The original highest educational qualification variable from the survey was recorded as six categories, including no qualification; other qualification; GCSE etc.; A-level etc.; Other

Higher degree and Degree. This variable was recoded into the above five categories, combining other and no qualification due to low numbers, and differentiating between first degrees and postgraduate degrees, as this differentiation has been shown to be important in the literature. The category was distinguished into first degrees and postgraduate degrees using a more detailed variable available in the survey.

3.5.4 Family relationships

There are a few measures related tp family relationships throughout different waves of the UKHLS. Some are asked in only a few waves, so they were not considered, in order to provide the largest sample possible. In waves 4-18, there were six relevant questions. See table 3.2 below.

Table 3.3 Family relationships questions

Variable	Question	Answer
Family	How do you feel about your family?	1-7, 1 being completely happy, 7 being not at all happy.
Talk to mother	How often do you talk to your mother, about things that matter to you?	1-5, 1 being most days, 4 being hardly ever, 5 being don't have mother
Talk to father	How often do you talk to your mother, about things that matter to you?	1-5, 1 being most days, 4 being hardly ever, 5 being don't have mother
Meals	In the past 7 days how many times have you eaten an evening meal together with your family?	1-4, 1 being none, 4 being 6-7 times. Reverse coded.
Quarrel with mother	Most children have occasional quarrels with their parents. How often do you quarrel with your mother?	1-5, 1 being most days, 4 being hardly ever, 5 being don't have mother. Reverse coded.
Quarrel with father	How often do you quarrel with your father?	1-5, 1 being most days, 4 being hardly ever, 5 being

Using the six questions, confirmatory factor analysis was conducted to test whether there
was a latent variable measuring this concept of family closeness, that could also help correct
for measurement bias on individual questions. Firstly, all six items were considered together
with a single factor, with negative questions reverse coded (α=.59). Itt has been suggested in
the literature that maternal and paternal relationships should be considered separately, plus
two questions pertain to the family rather than specific parents, so the variables could be
considered with three factors: maternal (α=.33); paternal (α=.60) and family (α=.18). Finally,
some literature suggests that positive and negative relationships should be considered
separately, so talking with mum and dad (α=.55) and arguing with mum and dad (α=.44)
were considered too. As can be seen, none had a Cronbach's alpha higher than 0.65,
indicating low internal consistency. Furthermore, having only two variables for a factor can
cause issues with creating latent variables. Nonetheless, confirmatory factor analysis was
used to test a one-factor model, a two-factor model, and a three-factor model, however all
models suffered from lack of identification. Thus, it was concluded that these variables were
not suitable to create a latent variable and should be analysed individually. As the research
question pertains to general family relationships, it focussed on the measures of how many
times eating with family and feel about family.

Offspring relationships with their family were measured using their perspectives on aspects
of their relationships at age 14. Self-completion questionnaires were administered to 10–15-
year-olds. Variables were negative coded, meaning that the lower numbers represent more
positive relationships. Feel about family was measured from 1-7, 1 being completely
unhappy and 7 being completely happy and were accompanied with a sad face next to 1, and
a happy face next to 7. The mean answer was 2, indicating that in general adolescents felt
happy about their families. The measure represents offspring perceived positive feelings
about their relationship with their family. Eat with family was measured from 1 to 4 in
intervals, from none, to 1-2 times, to 3-5 times up to 6-7 times a week. The mean answer was
3-5 times. The measure represents time spent with family during the week. The two variables
were not highly correlated (0.10), so they were treated separately.

Answers were taken at age 14 to avoid measuring relationships at different ages which may
lead to biased estimates as relationships tend to vary with age. The focus of the present
research was on early adolescence, an important developmental period when adolescents

form their identities and social relationships and make consequential decisions. Accordingly, the literature on early adolescence also suggests that the impact of parent relationships tended to be stronger during adolescence as opposed to early childhood (Pinquart, 2017b). See Chapter 2 Literature Review for more information on the importance of adolescence in the present research.

Quality of relationships are a subjective, unobserved variable. Ideally, latent constructs based on multiple questions would have been used to measure relationship quality, as they have the benefit of better reliability and are able to measure internal validity. Unfortunately, there were not enough correlated variables relating to family relationships in the data.

Scales such as these are strictly ordinal variables. However, there is much debate in the literature on whether ordinal scales can be treated as continuous, categorical, or in some circumstances whether they should be dichotomised, and whether parametric tests can be used. It has been argued that if Likert scales reach certain conditions, they may be treated as continuous, for example if there are at least seven items, data is not skewed, and there are equal thresholds across items (Lubke & Muthén, 2004). Both family relationship variable distributions were visually strongly skewed to the left, meaning that individuals tended to report feeling happier about their families and eating more often with their families (see Figure 3.4). However, upon further analysis, skewness and kurtosis were within acceptable ranges meaning that the variables could be considered as normally distributed, and thus treated as continuous (Feel about family, *Skewness*= 1.67, *Kurtosis*= 5.96; Eat with family, *Skewness*= 0.40, *Kurtosis*= 1.93). Kline (2023) suggests that values between -3 and 3 for skewness and -10 and 10 for kurtosis can be considered a normal distribution. Additionally, treating Likert scales as continuous can improve statistical power and interpretability. This decision is in line with other papers that have also argued that ordinal scales can be treated as continuous and still lead to robust results (Norman, 2010; Robitzsch, 2020).
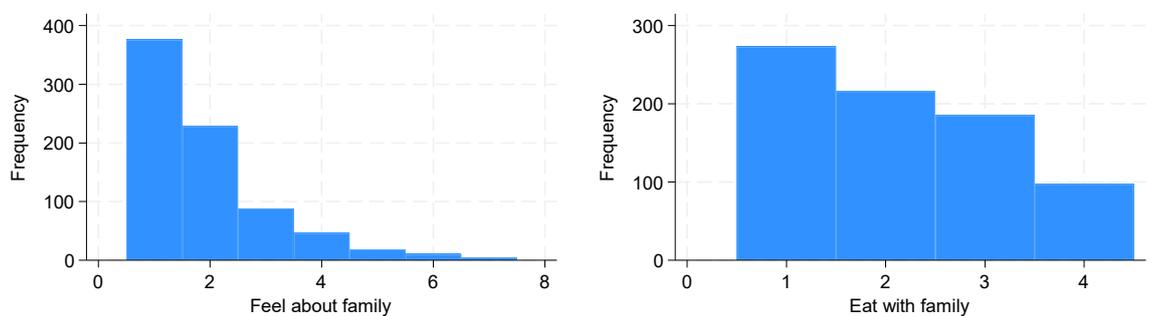
Figure 3.4 Parent relationship variables distributions.

Therefore, how offspring felt about their family met conditions to be treated as continuous. However, eat with family only has four responses and does not have equal intervals between items so was treated as categorical.

3.5.1 Teacher relationships

Similarly, offspring relationships with their teachers were measured using their perspectives on aspects of their relationships at age 14, using data from self-completion questionnaires administered to 10–15-year-olds. Teacher relationships were measured as the sum of two variables, asking young people how much they agreed with the statements 'I like most of my teachers' and 'Teachers are always getting at me' in waves 7-18. Answers used a four-point Likert scale from strongly disagree to agree. Both questions were skewed meaning that most rated their relationships more positively. Variables were reverse coded when appropriate so that lower scores indicated better relationships. Both teacher relationship variables were moderately correlated (0.45). So, the two variables were summed together for an overall teacher relationships score, with a range of 2-8.

Teacher relationships were also measured at age 14 as the research was focused on early adolescence. Like parental relationships, some evidence suggests that the impact of teacher relationships on young people's future outcomes tended to be stronger during adolescence as opposed to early childhood (Roorda et al., 2011).

Again, ideally, latent constructs based on multiple questions would have been used to measure relationship quality, for reliability and internal validity. While the two teacher variables were correlated enough to measure as a summed variable (0.45), at least three variables are needed to create a latent construct and measure internal validity.

The summed teacher relationship measure had at least seven items, was not skewed and had equal thresholds across items, meeting Lubke and Muthén's (2004) criteria to treat Likert scales as continuous (see Figure 3.4).
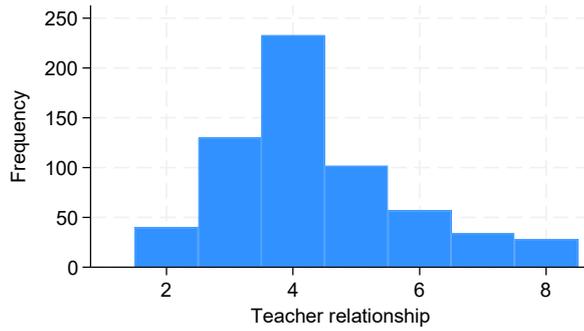
Figure 3.5 Teacher relationship variable distributions.

3.5.2 Covariates

Drawing on existing income mobility literature, certain controls were included to achieve less biased estimates. These included age of offspring and parents when income was measured. As income was measured over several waves, the age was an average of those years and was included to control for life-cycle bias. Other controls included year of birth for both parents and offspring to deal with cohort effects, and number of income observations for both parents and offspring. As some of these variables measure similar things, multicollinearity was tested for (see Table 3.4). Parental age and parental year of birth were highly correlated (-0.90) and so were number of offspring income observations and offspring age (0.86) indicating potential multicollinearity issues. Upon further examination, multicollinearity was found to be a concern (Parental age, *Tolerance*= 0.06, *Variance inflation factor [VIF]*= 16.04; Parental year of birth, *Tolerance*= 0.05, *VIF*= 20.67; Offspring income observations, *Tolerance*= 0.262; *VIF*= 3.82; Offspring age, *Tolerance*= 0.27, *VIF*= 3.89). Tolerance closer to 0.1 and VIF above five indicate a problem with multicollinearity (Kline, 2023). As both parental age and parental year of birth measure similar things, parental year of birth was omitted, particularly as life-cycle bias was expected to be stronger than cohort effect. When omitting parental age, both VIF and tolerance scores reduced to acceptable levels.

Table 3.4 Bivariate correlations between basic controls

	Birth year (offspring)	Birth year (parents)	Income obs. (offspring)	Income obs. (parents)	Age (offspring)
Birth year (parents)	0.59***				
Income obs. (offspring)	-0.41***	-0.30***			

Income obs. (parents)	0.58***	0.27***	-0.20***		
Age (offspring)	-0.43***	-0.31***	**0.86***	-0.19***	
Age (parents)	-0.37***	**-0.90***	0.21***	-0.38***	0.20***

Note: Correlations over 0.8 in bold to highlight concerns about multicollinearity. *p<0.05 **p<0.01 ***p<0.001.

Furthermore, while in traditional economic income mobility literature a minimal number of covariates are included so as to measure the general descriptive level of income mobility, or the 'total effect' of parental income, following sociological literature on socioeconomic outcomes, other demographic factors were also included that are commonly known to be associated with income and education (Bukodi & Goldthorpe, 2018; Fiel, 2020; Bernardi & Ballarino, 2016). The aim was to understand the association net of these factors. This includes sex, ethnicity, parental migrant status and family structure while growing up, all measured as dummy indicators. Including these extra demographic covariates also allowed the present research to build on the existing evidence base, as most previous estimates have been limited to minimal covariates.

Sex was measured by asking the individual their sex. Research shows that there are gender differences in income, with men in the UK generally earning higher than women, and women more likely to progress to higher education, amongst a plethora of other differences (Social Mobility Commission, 2023a). Women also tend to have different earnings trajectories due to caring responsibilities. While some analyses were stratified by sex in line with the previous literature, pooled analyses controlled for sex. There were 503 (43%) men in the sample and 662 women (57%). While the analysis focuses solely on men and women, as the survey data used in this research only recorded responses based on these two categories, it is important to acknowledge that this binary approach does not fully reflect the full diversity of gender identities.

Ethnicity was measured by asking the individual their ethnic group. Due to less than 5% of the sample being an ethnic minority, ethnicity was coded as either white or ethnic minority. This is a limitation, as research indicates important differences between different ethnicities in socioeconomic and educational outcomes, which is why ethnicity was not used more prominently in analysis as a moderator. In the analytic sample, 1110 (95%) were white, and 55 (5%) were ethnic minority.

Parental migrant status was measured by asking an individual whether they were born in the UK or not. Ideally, offspring migrant status would have been used, however there was a lot

of missing information for offspring migration status. Note that also some offspring did not have both parents' information in the survey, meaning parental migrant status is sometimes based on only one parent. Socioeconomic status (SES) and education have been found to vary with migrant generation (Cribb et al., 2022; Lenkeit et al., 2015). 1059 (91%) individuals in the analytical sample were recorded with no migrant parent, and 221 (9%) were recorded as having at least one migrant parent.

Family structure refers to either two-parent household or a one-parent household, and it was measured as the most frequent occurring family structure during childhood. Single parent families are more likely to have lower SES and lower educational outcomes amongst other differences (Cribb et al., 2022). Family structure also impacts family relationships. Thus, family structure was controlled for. 944 (81%) of the sample grew up in a predominantly two-parent household, while 221 (19%) grew up in a predominantly one-parent household.

Finally, educational attainment and relationship variables were also included in complete models as controls. Education was measured as a binary indicator, indicating whether the individual had a bachelor's degree or not in the most recent wave. Education is known to be a significant mediator of income mobility, and the study of social mobility net of education is sometimes referred to as the direct effect of social origin (see literature review). As mentioned, 763 (65%) of the sample did not have a degree and 402 (35%) did. Relationship variables were included as described above. There is mixed evidence on whether SES and educational attainment varies with family and teacher relationships during adolescence as described in the literature review, so the present research aimed to contribute to this gap by including these as covariates.

Despite aiming to control for relevant demographic factors, the analysis is descriptive in nature, and it is to be expected that there remains unobserved confounding variables that are not included in the analysis. Ideally, other controls would also be included such as cognitive skills, non-cognitive skills and genetic factors, however it was beyond the scope of the thesis to include these.

3.6   *Missing data strategy*

As mentioned, missing data can be problematic and introduce bias (Enders, 2022). In section 3.4.1, the strategy for handling missing data due to attrition was described, using non-response weights. However, in addition to attrition, there are also other types of missing data. While attrition refers to individuals who have dropped out the survey, there is also sometimes missing data as people have not answered certain questions. In UKHLS, some

data such as income measures are already subject to missing data strategies, with much unit non-response dealt with through imputation by the survey. This section looks at missing data strategies for different variables.

A handful of variables used in the analyses had missing data. See Table 3.5 for an overview. The missing data strategy used depended on the amount of missing.

Table 3.5 Missing data

Variable	N missing	% missing	N valid
Educational attainment	11	0.94	1154
Feel about family	394	33.82	771
Eat with family	394	33.82	771
Teacher relationship	541	46.44	624
Ethnicity	34	2.92	1131
Migrant background	4	0.34	1161

For variables missing less than 3%, substitution was used for simplicity as research has shown that it can be as effective as more advanced methods for low levels of missing data (Parent, 2012). Offspring educational attainment was missing less than 1%. These missing values were substituted with lower secondary as it was the minimum amount of compulsory education, and those who did not answer were less likely to have higher education. There was also a small amount of missing on some covariates, including ethnicity and migrant background. For ethnicity, missing values were substituted for white as the vast majority of the sample were white, and migrant background missing were substituted for both parents born in the UK, like the majority of the sample. As there is not a high non-response rate, there is not a major concern.

However, there was a higher non-response rate for self-rated relationships. Most of the non-response was due to adolescents not being asked the questions due to being too young or too old in Waves 4-18 when the relevant questions were asked, so can be considered structurally missing (25.92%). However, a substantial portion were missing for other reasons, in other words, item non-response (7.90%). Due to the higher proportion of missing, more complex missing data strategies were applied to deal with the missingness.

Missing data can either be missing at random (MAR), missing completely at random (MCAR) or missing not at random (MNAR). MAR refers to missingness that may depend on the observed data but is independent of the unobserved data. MCAR refers to missingness

that is independent of both the observed and unobserved data. MNAR refers to missingness that depends on the unobserved data itself. While MCAR is considered ignorable, there are ways to deal with data that is MAR or MCAR, but data that is MNAR is the most problematic to deal with. Little's (1988) MCAR test was run on the data. It tests whether significant differences exist between the means of different missing value patterns. In the relationships data, there were three prominent missing value patterns – 53% were not missing on any relationship variable, 34% were missing all three relationship variables and 13% were missing only a teacher relationship variable. This pattern is problematic for missing data analysis, as the observations missing on all three variables are omitted from Little's test, meaning that the test only compares the means of those not missing on any and those missing teacher observations. Nevertheless, the test was found to be insignificant ($\chi2[40]$, 772 = 16.902, p 0.999), meaning it can be assumed that the data is MCAR and thus ignorable. Note that the test was ran with all key variables and covariates except those related to age.

As an alternative test, differences between the means of key variables for those with observed family relationships at 14, those whose family relationship at 14 variable was structurally missing, and those whose family relationship at 14 was missing due to item non-response. See Table 3.6.

Table 3.6 Means of key variables by missingness of family relationship at age 14

	Feel about family age 14 variable missingness		
Variable	Valid	Structurally missing	Item non-response
Individual earnings rank	51.212	51.384	35.967
Parental income	51.937	51.402	49.739
Offspring education	0.367	0.307	0.282
Gender	0.555	0.569	0.673
N	771	302	92

Offspring earnings were similar across those with valid observations and structurally missing observations; however, it was significantly lower for those with item non-response. Those with item non-response were also significantly more likely to be female. This shows that while the structurally missing observations may be considered MCAR, the data missing

through item non-response are not MCAR. Therefore, ignoring the missingness could bias the estimates, so missing data methods were applied.

There are several common ways to address missing data. One of the most common ways is to use list-wise deletion. It is the simplest strategy, however depending on the missing data mechanisms, can bias the estimates. It could be used for the structurally missing relationships data; however, this would drastically reduce the sample size. Instead, multiple imputation was implemented.

Multiple imputation is a common approach to dealing with missing data. It involves creating multiple imputed datasets that reflect the uncertainty of the missing data. The imputation model must reflect the analytical model, including any moderators. For categorical moderators with no missing data, the best way to account for these variables is to impute the data separately at the different levels (Mitani et al., 2015; Tilling et al., 2016; Von Hippel, 2009). This is carried out for analysis considering the moderating role of gender and of education.

However, for continuous moderators, or moderators with missing data such as the variables on family relationships, including interactions can be problematic for multiple imputation as it violates its linear assumptions (Graham, 2009). There are two common approaches for multiple imputation to deal with interactions. First, there is *passive imputation*, or impute-then-transform which involves only including the lower-order terms (before interaction) in the first stage of the imputation. Then the interaction is computed after the imputation and prior to the analysis. However, this approach is known to bias estimates as it ignores the nonlinear effects (Enders, 2022; Von Hippel, 2009). The second approach is known as *active imputation* or transform-then-impute. It involves computing the product term, and including it in the imputation, just like any other variable. Von Hippel (2009) recommended this method as it works across a variety of circumstances. Therefore, this thesis uses multiple imputation for treating missing relationships data, using the transform-then-impute approach to handle interactions. There are some limitations to this approach, including the violated assumption of normality for the product term, and some findings suggest that estimates are biased if data is not MCAR (Enders, 2022). However, more complicated methods to deal with this are not readily available across statistical software suites. This thesis takes these caveats into account and uses the imputed results in the main analysis.

Stata 18 was used to conduct multiple imputation, using chained equations as categorical and continuous variables needed to be imputed. Chained equations allow variables to be imputed under different distributions, rather than assuming a joint multivariate normal distribution.

Relationship variables were imputed using predictive mean matching distributions, which draws real values sampled from the data. 50 datasets were imputed, based on the amount of Fraction of Missing Information (FMI) and convergence. The rule of thumb goes that number of imputed datasets should be higher than the largest FMI, which was 0.42 for teacher relationships, and more recent research also support the conclusion that 50 imputed datasets is efficient for a maximum FMI of 0.42 (Graham et al., 2007; Rubin, 2004). All variables included in the substantive analyses were included in the imputation model, including parental household income, parental social class at age 14, offspring earnings, year of birth for offspring, gender, migrant status, family structure growing up and ethnicity, covering a range of socioeconomic and demographic factors.

Convergence of the model was also assessed for the teacher relationship variable using trace plots, which plot estimated parameters against iteration numbers. See Figure 3.6 for results. As can be seen, there is no long-term trend, indicating acceptable convergence. All key variables from the analysis were used in the imputation model.
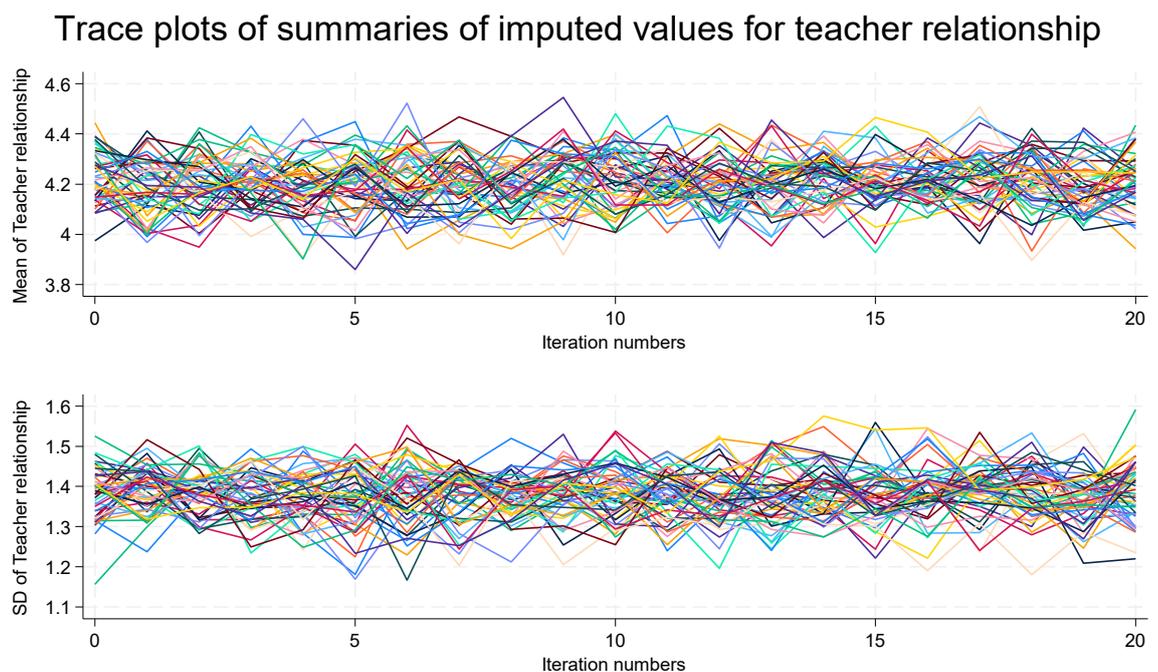
Figure 3.6 Multiple imputation trace plots

Finally, analyses using multiply imputed datasets on Stata do not provide R-squared. Instead, the R-squared statistic was calculated manually by pooling the points estimates and calculating the mean. These statistics should be taken with caution as it does not take account of complex survey data or how the values are distributed.

3.6.1 Missing income data

Due to the sample construction, there was no missing data per se for income. Every individual had at least one income observation for themselves aged 25 or over, and at least one parental income observation. If they only had one income observation they were included, and if they had more than one income observation, for either parent or offspring, they were averaged over the observations to proxy a more permanent income (see section 3.5). However, within that, there was a high amount of non-response, either due to unit non-response in a certain wave, or item non-response on the income question or due to not being counted as they were in full-time education. For example, depending on the year of birth, for each individual there are 3-18 possible parental income observations during ages 0-17. However, in the sample around 2.2% have only one income observation, and the modal number of observations is 6. Furthermore, around 16.4% of offspring only have one income observation, with modal number of observations 1. Overall, there is 26.3% item non-response for parental income, and 44.03% item non-response for offspring income observations.

This item non-response may bias the analysis in two ways. Firstly, in general, non-response can bias estimates, for example if certain characteristics are associated with item non-response. For example, people on especially high or low income may be less likely to answer a question about their earnings (Bollinger et al., 2014). Secondly, in income mobility literature it is recognised that the amount of income observations can impact estimates due to attenuation bias. For example, due to fluctuations in income, research has suggested that using less income observations over a time period can underestimate the intergenerational income mobility (Chetty, Hendren, Kline, Saez, et al., 2014; Mazumder, 2005). However, previous estimates of income mobility in the UK have largely relied on one or at most two observations of parental income. Considering this, the fact that some individuals have singular income observations of parental and offspring income, and some have three or more may lead to underestimation of income mobility. To account for this, number of income observations are controlled for in the main analysis, and robustness checks were carried out on a sample of those with at least three income observations.

3.7   Data preparation

Finally, all variables were subjected to tests for outliers, multicollinearity and normality.

All variables were visually checked for outliers. Income and earnings are a common source of outliers; however, outliers were less of an issue as income and earnings were averaged over multiple waves and transformed into a rank percentile.

All variables were also tested for multicollinearity. Firstly, bivariate correlations were run between the key variables; offspring earnings, parental education, offspring education, and relationships at age 14. See Table 3.7 which shows that no correlations were above 0.8, meaning low concern for multicollinearity. Multicollinearity was also assessed on the main model using VIF and tolerance. Again, Tolerance closer to 0.1 and VIF above 5 indicate a problem with multicollinearity (Kline, 2023). Results presented in Table 3.8 show that there is low concern for multicollinearity in the model.

Table 3.7 Bivariate correlations between offspring earnings, parental income, education, and relationships at age 14

	Offspring earnings	Parental income	Offspring education	Feel about family	Eat with family
Parental income	0.36***				
Offspring education	0.40***	0.33***			
Feel about family	0.00	0.01	0.06		
Eat with family	-0.09*	-0.13***	-0.15***	0.08*	
Teacher relationship	-0.15***	-0.10**	-0.17***	0.27***	0.14***

Note: Correlations over 0.8 in bold to highlight concerns about multicollinearity. *p<0.05 **p<0.01 ***p<0.001. Binary indicator of offspring education.

Table 3.8 Collinearity statistics VIF and Tolerance

Variable	VIF	Tolerance
Parental income	1.28	0.78
Birth year (offspring)	1.35	0.74
Income obs. (offspring)	2.39	0.42
Income obs. (parents)	1.28	0.78
Age (offspring)	2.58	0.39
Age (parents)	1.27	0.78

Female	1.08	0.92
Ethnicity	1.43	0.70
Migrant background	1.4	0.71
Family structure	1.15	0.87
Education (offspring)	1.21	0.83
Feel about family	1.15	0.87
Eat with family		
3-5 times a week	1.37	0.73
1-2 times a week	1.35	0.74
0 times a week	1.26	0.79
Teacher relationship	1.2	0.83

The normal distribution of the data was also assessed, as some statistical tests and models are sensitive to data normality. All key variables were within acceptable ranges of skewness and kurtosis.

3.8   Analysis methods

Firstly, descriptive statistics were presented for the sample on demographics and in more detail on the income data. Then, bivariate correlations were presented between key variables and sample characteristics, to provide context and understanding of the background characteristics associated with some of the variables of interest. Then, bivariate linear regression analysis was undertaken between offspring individual earnings and the other key variables to better understand their relationships.

For the purposes of this study, a 95% level of significance was used to consider results to be statistically significant based on p-values, confidence intervals and effect sizes. The p-value indicates the probability of obtaining a result at least as extreme than what was actually observed, under the assumption of the null hypothesis of no correlation or difference. Or in other words, it indicates the extent to which the observed result can be attributed to chance, not the probability that the hypothesis is correct, contrary to common assumptions (Greenland et al., 2016). The misuse and misunderstanding surrounding p-values has met

great controversy in research. The *p*<0.05 rule is an arbitrary cut off, that has led to an over-emphasis on whether a model is statistically significant or not, and an overreliance on how informative a *p*-value really is (Nuzzo, 2014). In response, many journals including the American Statistical Association guidelines, have recommended a move away from *p*-values. Supplemental approaches to *p*-values for understanding hypotheses include confidence intervals and effect sizes. Confidence intervals are a range of values indicating the probability that the value of a parameter lies within it, in other words it refers to the coverage probability (Greenland et al., 2016). It is also important to keep in mind the effect size when interpreting the importance of a statistic. Statistical significance can also be affected by sample size. Accordingly, the present study uses a mix of *p*-values, confidence intervals and effect sizes to interpret results. Even when a result has a *p*-value >0.05, the directions of the coefficient may still be considered, to avoid bias and following an arbitrary cut off.

3.8.1   Estimating income mobility

Once descriptive statistics were presented, the first research question was addressed by measuring intergenerational income mobility. There are two common strategies for estimating intergenerational income mobility. Traditionally, intergenerational elasticity (IGE) is used to estimate the association between the log of averaged parental income and the log of averaged offspring earnings using Ordinary Least Squares (OLS) linear regression. The resulting figure is a number between zero and one and represents the fraction of every additional 1% of parental income (dis)advantage that will be passed onto their children. For example, an IGE of 0.4 would imply that an additional 10% in parental income during childhood would give their children a 4% income advantage as adults. This measure reflects both re-ranking between the two generations and changes in the income distribution. However, the method is limited in that it has been shown to be sensitive to common measurement issues such as attenuation bias, life-cycle bias and selection bias. It also cannot account for those with zero income, meaning that traditional estimates omitted those with zero income or earnings.

With these limitations in mind, rank-rank slopes are the preferred approach in more recent literature, and is the approach employed in the current research (Chetty, Hendren, Kline, Saez, et al., 2014; Mazumder, 2005). Rank-rank slopes are estimated by analysing the association between parental income percentile rank and offspring income percentile rank using OLS regression. The benefit of this measure of income mobility is that it is less sensitive to measurement biases than IGE. It also differs to IGE as it only reflects re-ranking across generations. Furthermore, research has found that rank-rank slopes for Italy and the

US were more linear than the IGE, meaning that a single summary statistic is more appropriate, although this is not always the case (Acciari et al., 2019; Chetty, Hendren, Kline, Saez, et al., 2014). Furthermore, rank-rank slopes can be used for subgroup analysis as it can explore income mobility within a subgroup and compare it to national ranks, which is more difficult to achieve with IGE. Rank-rank slopes can be interpreted as for every additional parental percentile rank, offspring can expect that fraction of earnings advantage. For example, a rank-rank slope of 0.4 would mean that for an additional ten parental percentile income ranks, an offspring could expect to be four percentile ranks higher themselves. Strictly speaking, these measures are measures of persistence rather than mobility, however the measure of mobility is calculated by subtracting the measure from one. A caveat of the rank-rank approach is that it is still sensitive to age when income measured, although generally it is considered robust (Engzell & Mood, 2023). The basic model is illustrated in Equation 1.

Equation 1 Rank-rank slope

$$rank(Y_i^c) = \alpha + \beta\, rank(Y_i^p) + X_i + \varepsilon_i$$

Where Y_i^c is a multi-year average of offspring i earnings past the age of 25 and while not a full-time student and Y_i^p is a multi-year average of parental household income during the offspring's childhood (aged 0-17). β is the rank-rank slope, X_i a vector of control variables and ε_i is the error term.

Three models were used in the analysis. The baseline model only included basic controls, meaning offspring year of birth, number of income observations for both offspring and parents, and age when income measured for both offspring and parents and the model represents the 'total effect' of parental household income on offspring earnings. The second model added in demographic covariates including sex, ethnicity, migrant background and family structure. The third model included education and relationship variables in a complete model.

Survey weights and multiply imputed results were used across all analyses, and all analyses took account of clustering and stratification in the survey using the *svyset* suite of commands. Stata 18 was used to run the analysis.

Income mobility was tested in a pooled gender sample, and then for men and women separately. The difference between the rank-rank slope coefficients was tested using Wald tests.

Finally, rank-rank slopes for the pooled sample were tested for non-linearity. First, the data was examined visually for a pattern of non-linearity using locally weighted scatterplot smoothing, then to formally check, polynomial terms were included in the model.

3.8.2   Moderation analysis

In the second and third study, educational attainment and relationships were examined as moderators. A moderator refers to a variable that affects the strength or direction of the relationship between the dependent and independent variable (Baron & Kenny, 1986). Therefore, moderation can account for heterogeneity in the data. See Figure 3.6 for a moderation model. The solid lines represent direct effects, and the dashed line represents a moderation effect. This is not to be confused with mediation, which also involves a third variable, however a mediator explains the process through which an independent variable and a dependent variable are related.

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                    ┌─────────────────────┐
                    │                     │
                    │      Moderator      │
                    │                     │
                    └──────────┬──────────┘
                               ┊
                               ┊
                               ▼
┌─────────────────────┐              ┌─────────────────────┐
│                     │              │                     │
│ Parental income rank├─────────────▶│ Offspring income rank│
│                     │              │                     │
└─────────────────────┘              └─────────────────────┘
```
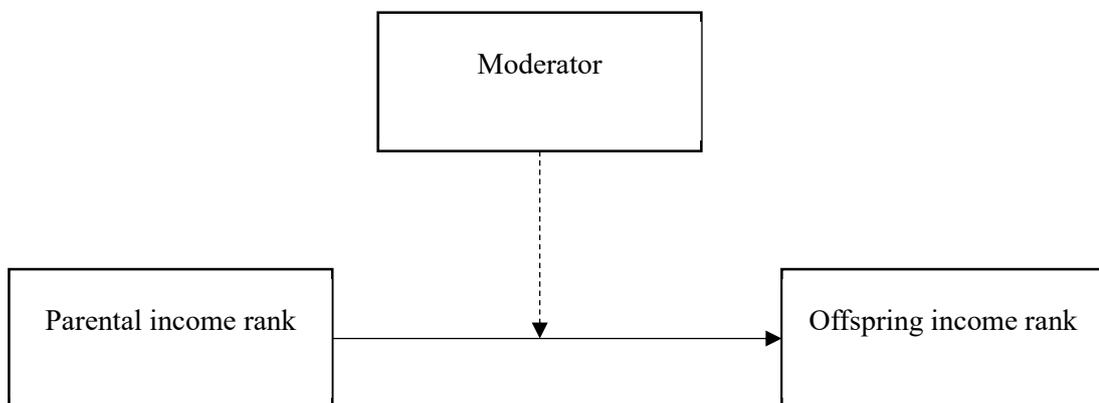
Figure 3.7 Moderation path.

There are a few approaches to estimating a moderation effect. Two of the most common approaches are multigroup analysis and interactions. Multigroup analysis involves splitting the sample by the moderator and doing separate analysis for the two (or more) groups. It is useful for when hypothesising that all model relationships change dependent on the moderator, or when the moderator is a categorical variable (Fritz & Arthur, 2017). Significance tests are then used to test the equality of the coefficients of interest, or in multigroup analysis with latent variables, the model fit is assessed.

On the other hand, interaction analysis is used to calculate the moderation effect using the product of the independent variables and the moderator, known as the product term, or the interaction term. Including this term in the model produces a moderation effect coefficient that represents how the association between the independent and dependent variable changes when the moderator increases or decreases by one standard deviation unit. If the interaction

term is significant, it means there is a moderation effect (Hair et al., 2021). The interpretation of the main effect also changes in a model that includes moderation, signifying the relationship between the independent variable and the dependent variable when the moderating variable takes the value of 0 (Busenbark et al., 2021). Interaction terms are often used when only one relationship is hypothesised to change dependent on the moderator and can be used for continuous moderators whereas multigroup analysis cannot be. The main difference between multigroup analysis and interaction analysis is that the former tests all model relationships change, and interaction tests only one variable of interest change.

One limitation when it comes to interaction terms is their interpretability, especially when there are multiple interaction terms, which can become complicated. A useful way to present them uses average marginal effects (Busenbark et al., 2021). An average marginal effect indicates the effect of that variable conditional on the other variables in that model, averaged over the values of the explanatory variable. For example, when looking at the interaction between education and parental income on offspring earnings, it would refer to the effect of parental income at different levels of educational attainment. The average marginal effects were calculated using the *margins* package in Stata, and both interaction terms and visualised average marginal effects are presented for interpretability.

However, recently it has been argued that using only single interactions may lead to misspecification, as interaction terms can pick up the effect of un-modelled interaction terms (Beiser-McGrath & Beiser-McGrath, 2020). A fully moderated model means using an interaction term for the main coefficient of interest, and for every covariate, and is more equivalent to multigroup analysis. However, there are several drawbacks to using fully interacted models, including loss of efficiency, parsimony, increased standard errors, and overfitting. It also becomes complicated to interpret coefficients with so many interactions, as mentioned. When many covariates are used, or when more than one moderator is being tested, fully moderated models become too complicated or inefficient to use.

Based on this, a combination of methods was used for the moderation analyses. Firstly, to test moderation by gender, multigroup analysis was used as gender is a categorical variable. Next, to test educational attainment as a moderator, multigroup analysis was also used, again as education is a categorical variable. Next, educational attainment as a moderator was tested across gender. To test this three-way moderation, multigroup analysis was used for gender, and a single interaction model used with education, meaning that the sample was split by gender, and then analysis was conducted including interactions between education and parental household income.

Finally, for relationship variables as moderators, as they had missing values, and feel about family and teacher relationships were continuous, they were tested using single interactions. However, as suggested in the literature, single interactions models may be misspecified, so some additional interactions were included, with gender and education (Beiser-McGrath & Beiser-McGrath, 2020). Gender was selected as an additional interaction as relationships are shown to vary across gender, and this might have heterogeneous effects on income mobility, and better relationships with parents or teachers may have heterogeneous effects depending on what level of education offspring attains. For example, those who have more positive relationships may excel even further once in higher education. Lastly, the moderation role of relationships was tested separately for men and women using single interaction models.

Moderation analysis needs to be considered in the multiple imputation stage too, as if there is heterogeneity, the multiple imputation model should be imputed with the heterogeneity modelled. Therefore, for each moderation analysis, moderators were taken account of. See section 3.6 for more details on how multiple imputation was carried out. Furthermore, there is not a command available on Stata to perform Wald tests on two different groups when using multiply imputed complex survey data, meaning that significance tests were unavailable for multigroup analysis using multiply imputed data with survey weights applied. In these cases, the confidence intervals were assessed visually, following the advice of Cumming (2009), which states that when 95% confidence intervals (CI) do not overlap, there is generally a statistically significant difference, however this is at a much smaller p level than 0.05. The author finds that if two 95% CIs just touch, p is roughly 0.01, and intervals can overlap by as much as about half the length of one CI arm before p becomes as large as 0.05.

Again, the moderation analysis uses three models, first a baseline model including controls such as number of income observations, age and year of birth for both offspring and parents; the second model includes extra demographic controls including sex, ethnicity, migrant background and family structure and finally a third model which includes educational attainment and relationships.

3.8.3   Robustness checks

Finally, robustness checks were carried out on the main analyses. The sample were relatively young when their income was measured, and were born across a 14-year span which may lead to cohort effect bias, so robustness checks using an older sample measuring income from the age of 30 onwards were used to estimate income mobility to ensure the main analysis was not affected by life-cycle bias. The sample was much smaller for these people

(N=559) meaning further checks with moderation on this sample were not carried out. Income mobility was also estimated for a sample of individuals with at least 3 income observations during adulthood, as previous work has suggested that less income observations may lead to bias due to fluctuations in income. Again, the sample was much smaller (N=857) meaning further checks with moderation were not carried out.

Robustness checks were also performed for analysis concerning the moderation effect of family and teacher relationships. Interaction models were used with single interactions and interactions with gender and education too. Moderation models including single interactions are not equivalent to subgroup analysis where every relationship is allowed to vary by the moderator, which may lead to misspecification (Beiser-McGrath & Beiser-McGrath, 2020). Hence, fully moderated models were conducted, using one moderator in each model. These models come with the caveat that the extra number of covariates may lead to inefficiency and overfitting.

3.9   Chapter summary

This chapter presented the methodology for the thesis, firstly giving an overview of the data, sample and measures, followed by a discussion of data preparation and analytic procedure. In the following chapter, results are presented.

4. Results

4.1   Aim of chapter

The aim of this chapter is to present an overview of the results. In the first section, descriptive statistics are presented. The second section looks at estimating income mobility and testing that for non-linearity across parental income distribution and separately for men and women. The next section presents the results for the analysis of education as a moderator of income mobility. Finally, the fourth section presents the results for the analysis of childhood relationships as moderators of income mobility.

4.2   Descriptive Statistics

Table 4.1 presents descriptive statistics for the sample. Family structure was calculated by taking the most frequent family structure during childhood. As income was observed across multiple waves, age is calculated from the mean age of the waves when income was recorded. Both the unweighted and the weighted mean or percentage are presented. More information on income is provided in Table 4.2. The final sample were made up of 94% natural parents, 2% stepparents, 2% grandparents, with the remaining adopted, foster or living with partner's children.

Table 4.1 Descriptive statistics for demographic variables

	Obs.	Unweighted mean/%	Weighted mean/%	Range
Offspring earnings percentile rank	1165	50.12	46.40	1-100
Parental income percentile rank	1165	50.46	46.12	1-100
Year of birth	1165	1985.23	1984.42	1977-1992
Age when earnings measured	1165	28.26	28.59	25-40
Parents' mean year of birth	1165	1955.99	1954.94	1928-1986
Parental age when parental income measured	1165	42.74	42.57	19-70
Sex	1165			
Male	503	43%	50%	

Female	662	57%	50%	
Education	1165			
Higher degree	124	11%	8%	
Degree	278	24%	19%	
A Level etc.	411	35%	39%	
GCSE etc.	230	20%	22%	
Other qual etc./ No qual	122	10%	12%	
Ethnicity	1165			
White	1110	95%	92%	
Other	55	5%	8%	
Family type age 0-16	1165			
Two-parent household	944	81%	80%	
Single parent household	221	19%	20%	
Parent migration background	1165			
No migrant parent	1059	91%	89%	
At least one migrant parent	106	9%	11%	
Feel about family	771	1.90	1.88	1-7
Eat with family	771			
6-7 times	273	35%	33%	
3-5 times	216	28%	27%	
1-2 times	185	24%	26%	
0 times	97	13%	14%	
Teacher relationship	624	4.35	4.51	2-8

Table 4.2 presents information on the multi-year averaged income variables, before they were transformed to percentile rank. As can be seen, offspring earnings are observed between the ages 25 to 40, while there is a much broader range for parents from 19 to 70 as it can include grandparents as guardians too.

Table 4.2 Descriptive statistics for income variables

	Obs.	Mean	Median	Min.	Max.	SD
Offspring 25+						
Average individual earnings	1165		1490.73	0.00	9953.30	1095.39
No. income observations	1165	5.85		1.00	19.00	4.37
Avg. age when earnings observed	1165	28.26		25.00	39.89	2.53
Household 0-17						
Average income equivalised	1165		1437.65	167.12	14541.82	936.58
No. income observations	1165	8.32		1.00	18.00	4.60
Avg. age when income observed (parents)	1165	42.74		18.71	70.06	6.35

Note: All income deflated to 2015 Great British Pound. Median is used rather than mean for skewed variables.

Each individual has income or earnings observations from multiple years, as shown in Table 4.2. Table 4.3 presents descriptive statistics for each income observation, showing that overall, there are over 10,000 observations of parental household income during childhood, and over 6,000 observations of offspring earnings during adulthood.

Table 4.3 Descriptive statistics for each income observation

	Obs.	Mean	Median	Min.	Max.	SD
Offspring earnings observations	6812		1582.86	0.00	17899.76	1338.89
Age when earnings observed	6812	29.89		25.00	44.00	4.25
Household income observations	10743		1392.92	0.00	50785.14	1290.31
Parents age when income observed	10707	41.07		16.00	79.00	6.90
Age when parental income observed	10743	11.52		0.00	17.00	4.29

Note: All income deflated to 2015 Great British Pound. Median used rather than mean for skewed variables.

Finally, Table 4.4 presents a correlation matrix between key variables and background characteristics, to provide context and background understanding to the analysis. Note that relationship variables are negative coded, meaning that the lower numbers represent more positive relationships.

Table 4.4 Bivariate correlations between key variables and background characteristics

	Offspring earnings	Parental income	Education (offspring)	Feel about family	Eat with family	Teacher relationship
Parental income	0.36***					
Education (offspring)	0.40***	0.33***				
Feel about family	0.00	0.01	0.06			
Eat with family	-0.09*	-0.13***	-0.15***	0.08*		
Teacher relationship	-0.15***	-0.10**	-0.17***	0.27***	0.14***	
Sex	-0.15***	-0.04	0.07	0.08*	0.00	-0.10*
Ethnicity	-0.01	-0.04	0.06	0.10*	-0.04	0.03
Migration background	0.00	0.02	0.05	0.08	-0.08*	-0.02
Household structure	-0.08*	-0.31***	-0.14***	0.11**	0.14***	0.09*

*p<0.05 **p<0.01 ***p<0.001. Binary indicator of offspring education.

Higher offspring earnings had a low correlation with parental income and educational attainment, a low correlation being considered between 0.29 and 0.49. It had no correlation with other variables. Parental income rank had a low correlation with educational attainment, and household structure, meaning that growing up in a predominantly single parent household had a low correlation with lower parental income. Parental income had no correlation with any other variables. Higher educational attainment, how offspring felt about their family, how often they ate with their family, and how they rated their relationship with their teacher all had no meaningful correlation with other measures.

4.2.1   Bivariate analysis of key variables and offspring earnings rank

Before creating multivariate models with controls, the analysis below explores the bivariate relationships of key variables with the dependent variable. It includes examining the association between adult offspring earnings with parental household income, year of birth, number of income observations, average age when measured, sex, ethnicity, having at least one migrant parent, family structure, whether degree educated or not, how the offspring felt about their family at age 14, how often they ate with their family at age 14 and their perception of teacher relationship at age 14. Bivariate models allow a deeper understanding of the individual relationship between the key variables and offspring earnings. Results are shown in Table 4.5.

Table 4.5 Bivariate associations with offspring earnings rank

	Coefficient	95% CI	
Parental household income	0.38***	0.30	0.45
Year of birth	-0.87***	-1.42	-0.32
Number of income obs.	1.37***	0.83	1.90
Number of parental income obs.	-0.49*	-1.00	0.02
Age when income measured	1.86***	0.91	2.82
Parent's age when parental income measured	0.43*	-0.04	0.91
Gender (ref: male)			
Female	-11.51***	-16.63	-6.39
Ethnicity (ref: white)			
Other	-1.18	-13.35	10.99
Migrant background (ref: no migrant parent)			
At least one migrant parent	-3.38	-12.80	6.04
Family structure (ref: single parent household)			

Single parent household	-4.88	-12.08	2.31
Offspring education (ref: no degree			
Degree or higher	21.21***	15.24	27.18
Feel about family	1.09	-1.40	3.57
Eat with family (ref: 6-7 times)			
3-5 times a week	2.86	-5.02	10.74
1-2 times a week	-0.99	-8.63	6.66
0 times a week	-1.32	-10.43	7.79
Teacher relationship	-3.03***	-5.29	-0.78

Note: *p<0.05, **p<0.01, ***p<0.001. Weighted analysis.

The bivariate analysis shows that all variables except ethnicity, migrant background, family structure, feel about family and eat with family were significantly associated with offspring earnings rank. Having higher parental household income rank was associated with a higher offspring earnings rank, as is expected (B=0.38; Confidence interval [CI]=0.30; 0.45). Older offspring were more likely to have higher earnings, which is likely an artefact of lifecycle bias, which is why controls for year of birth and age were included. The number of earnings observations was also associated with higher offspring earnings rank, which may also be an artefact of lifecycle bias as individuals with more income observations tend to have income observations when they're older. Women can expect to have a lower earnings rank than men. The largest coefficient occurs between offspring education and offspring earnings rank (B=21.21), which is also to be expected as education is a prominent mechanism. Finally, family relationship variables do not have a significant association with offspring earnings rank, but more positive teacher relationships were associated with a higher earnings rank.

4.3   Association between parental household income and offspring earnings

In this section, rank-rank slopes are used to estimate intergenerational income mobility. Then, whether income mobility was linear across parental income and whether it varied across gender are investigated.

4.3.1   Rank-rank slopes

Rank-rank slopes were calculated by regressing offspring percentile rank earnings on parental percentile rank household income. Table 4.6 presents the results of this analysis. Model A uses basic controls including birth year, age and number of income observations, Model B uses extra demographic controls including gender, ethnicity, migration background and family structure, and Model C also controls for education and relationships. All models use survey weights.

Table 4.6 Association between parental household income and offspring earnings

	Model A	Model B	Model C
Parental household income	0.381***	0.388***	0.321***
	[0.303;0.459]	[0.308;0.469]	[0.243;0.399]
Year of birth	-0.930**	-0.937**	-1.102***
	[-1.555; -0.306]	[-1.621; -0.253]	[-1.701; -0.502]
Number of income obs.	1.608*	1.732**	1.828**
	[0.377;2.838]	[0.617;2.848]	[0.666;2.990]
Number of parental income obs.	0.362	0.356	0.346
	[-0.223;0.947]	[-0.263;0.975]	[-0.209;0.901]
Age when income measured	-1.268	-0.654	-1.787
	[-3.651;1.115]	[-2.754;1.446]	[-3.984;0.411]
Parents' age when parental income measured	-0.368	-0.646**	-0.680***
	[-0.810;0.073]	[-1.103; -0.189]	[-1.076;-0.284]
Female (ref: male)		-7.338**	-14.750***
		[-11.850; -2.826]	[-19.248;-10.252]
Ethnic minority (ref: white)		8.292	4.173
		[-3.473;20.058]	[-7.786;16.133]

	(1)	(2)	(3)
Migrant background (ref: UK born)		-6.197	-8.399
		[-15.459;3.066]	[-17.661;0.864]
Single parent household (ref: two parent household)		5.380	2.427
		[-1.044;11.805]	[-4.426;9.279]
Degree (ref: no degree)			16.573***
			[11.256;21.889]
Feel about family			1.154
			[-0.908;3.215]
Eat with family (ref: 6-7 times)			
3-5 times			2.308
			[-4.450;9.066]
1-2 times			0.163
			[-6.400;6.726]
0 times			2.125
			[-5.418;9.668]
Teacher relationship			-2.023*
			[-3.837;-0.210]
Constant	1912.692**	1922.239**	2291.543***
N	1165.000	1165.000	1165.000
r2	0.177	0.200	0.298

Note: *p<0.05, **p<0.01, ***p<0.001. Weighted analysis. 95% Confidence intervals in square brackets.

In Model A using basic controls, the results show that parental household income rank was significantly associated with offspring earnings rank, meaning an income mobility of 0.381 was estimated (CI=.303; .459). This finding suggests that for every additional percentile of parental income, offspring earnings are expected an increase of .381 of a percentile. The only significant controls were offspring year of birth and income observations.

Once demographic variables were included, the association between parental household income rank and offspring earnings rank remained significant, and in fact increased very slightly (B=.388, CI=.308;.469). Again, offspring year of birth and income observations were significant, and so was parents age when parental income observed. Out of the additional demographic factors, sex was significant and suggests that women had lower earnings rank compared to men, holding all else equal.

Finally in Model C, the association between parental household income rank and offspring earnings rank decreased but remained significant once including education and relationships (B=.321, CI=.243;.399). This means that the additional controls account for some of the intergenerational association. Offspring education was significant and suggests that on average those with a degree experience an additional 16.573 of an earnings percentile rank compared to those who don't have a degree holding all else equal. While the family relationships variables did not have a significant association, teacher relationships had a significant negative association, meaning more positive teacher relationships were associated with higher earnings rank holding all else equal. As expected, these additional variables added to the explanatory power of the model as can be seen through the increase in r-squared, with the model explaining approximately 0.3 of the variance in offspring earnings.

4.3.2   Testing non-linearity in the intergenerational income association

Next, the linearity of the rank-rank slopes was tested, in other words whether the intergenerational income association varied by parental household income. Firstly, non-linearities were checked visually. Figure 4.1 plots a linear fit across the percentile rank data. In order to make the graphs more interpretable, points have been grouped into percentiles, so that each dot represents that percentile of income. In Figure 4.2, a Locally Weighted Scatter-plot Smoother (Lowess) curve was fitted to the data.
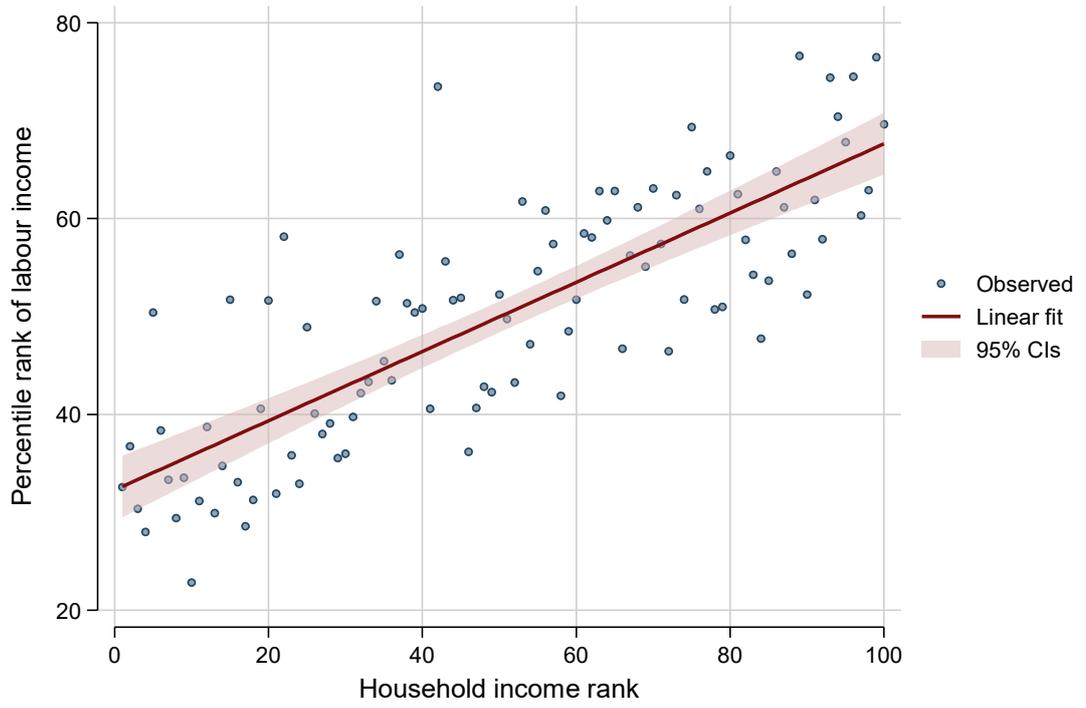
Figure 4.1 Offspring earnings rank and parental income rank with linear fit
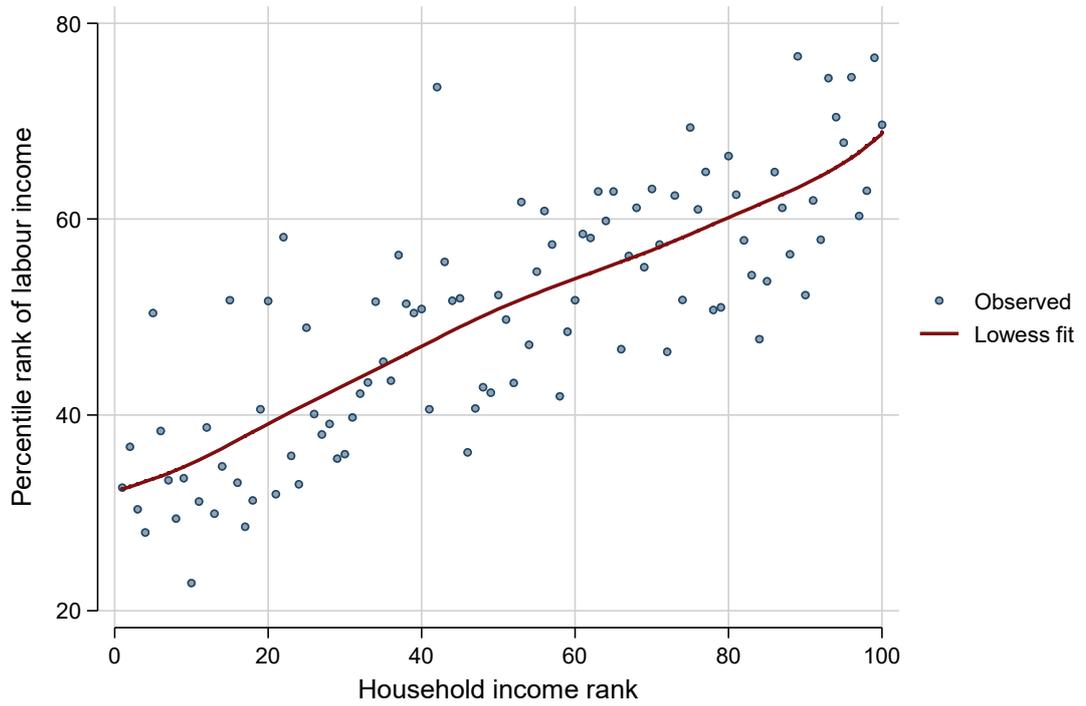
Figure 4.2 Offspring earnings rank and parental income rank with Lowess fit

A general linear pattern can be distinguished in Figure 4.1. This is also backed up in Figure 4.2. To test this formally, in Table 4.7 the results are shown for the test for whether there is a cubic relationship between household income and offspring earnings, which would be an S-shaped curve. Model A uses basic controls, Model B includes extra demographic controls and Model C includes education, family relationships and teacher relationships.

Table 4.7 3rd order polynomial regression of household income rank on offspring earnings rank

	Model A	Model B	Model C
Parental household income	0.352***	0.425***	0.368***
	[0.168;0.536]	[0.248;0.602]	[0.190;0.546]
Parental household income cubed	0.000	-0.000	-0.000
	[-0.000;0.000]	[-0.000;0.000]	[-0.000;0.000]
Year of birth	-0.933**	-0.886**	-1.099***
	[-1.557;-0.309]	[-1.525;-0.247]	[-1.699;-0.500]
Number of income obs.	1.617*	1.747**	1.815**
	[0.382;2.851]	[0.600;2.894]	[0.650;2.981]
Number of parental income obs.	0.366	0.370	0.340
	[-0.218;0.950]	[-0.211;0.952]	[-0.217;0.896]
Age when income measured	-1.277	-1.203	-1.776
	[-3.663;1.109]	[-3.371;0.965]	[-3.980;0.428]
Parents' age when parental income measured	-0.368	-0.476*	-0.682***
	[-0.809;0.074]	[-0.898;-0.055]	[-1.078;-0.286]
Female (ref: male)		-13.017***	-14.806***
		[-17.492;-8.542]	[-19.285;-10.326]
Ethnic minority (ref: white)		6.251	4.298
		[-5.710;18.213]	[-7.657;16.253]

At least one migrant parent (ref: no migrant parent)		-6.268	-8.370
		[-16.202;3.665]	[-17.631;0.892]
Single parent household (ref: two-parent household)		3.531	2.624
		[-3.057;10.120]	[-4.107;9.355]
Degree (ref: no degree)			16.709***
			[11.454;21.963]
Feel about family			1.141
			[-0.914;3.196]
Eat with family (ref: 6-7 times)			
3-5 times			2.314
			[-4.442;9.070]
1-2 times			0.264
			[-6.305;6.834]
0 times			2.192
			[-5.381;9.765]
Teacher relationship			-1.994*
			[-3.811;-0.178]
Constant	1918.913**	1830.911**	2285.295***
N	1165.000	1165.000	1165.000
r2	0.177	0.229	0.298

Note: *p<0.05, **p<0.01, ***p<0.001. Weighted analysis. 95% Confidence intervals in square brackets.

As Table 4.7 shows, the cubed household income rank had a non-significant coefficient (B=0.000, CI=0.000;0.000) in each model meaning that it can be assumed that the association is linear.

In conclusion, the results show that the association between parental household income and offspring earnings is generally linear.

4.3.3 Intergenerational income association by gender

Next, multigroup analysis was performed to understand whether income mobility varied by gender. First, the results for men and women are presented below in Table 4.8.

Table 4.8 Association between parental household income and offspring earnings by gender

	Model A (men)	Model B (men)	Model C (men)	Model A (women)	Model B (women)	Model C (women)
Parental household income	0.385***	0.394***	0.339***	0.392***	0.391***	0.276***
	[0.266;0.505]	[0.277;0.512]	[0.220;0.458]	[0.286;0.497]	[0.281;0.502]	[0.159;0.393]
Year of birth	-1.132*	-1.242*	-1.356*	-0.559	-0.547	-0.904*
	[-2.094;-0.169]	[-2.294;-0.190]	[-2.420;-0.291]	[-1.328;0.211]	[-1.348;0.253]	[-1.610;-0.198]
Number of income obs.	1.524	1.643*	1.451	1.745*	1.721*	2.164**
	[-0.096;3.144]	[0.089;3.198]	[-0.111;3.013]	[0.218;3.271]	[0.202;3.241]	[0.569;3.758]
Number of income obs.	0.019	0.146	0.128	0.485	0.467	0.471
	[-0.848;0.886]	[-0.774;1.066]	[-0.803;1.060]	[-0.208;1.177]	[-0.256;1.189]	[-0.203;1.146]
Age when income measured	0.487	0.267	0.143	-2.627	-2.583	-3.720*
	[-2.700;3.673]	[-2.666;3.200]	[-2.772;3.058]	[-5.578;0.324]	[-5.532;0.365]	[-6.708;-0.732]
Parents' age when income measured	-1.035***	-0.960**	-1.088***	0.094	0.09	-0.226
	[-1.640;-0.430]	[-1.544;-0.375]	[-1.629;-0.547]	[-0.386;0.575]	[-0.403;0.583]	[-0.710;0.257]

Ethnic minority (ref: white)	10.936	10.887	-1.378	-6.239
	[-4.397;26.269]	[-3.810;25.584]	[-16.086;13.330]	[-20.485;8.007]
At least one migrant parent (ref: no migrant parent)	-14.238	-17.057*	2.686	1.842
	[-29.263;0.787]	[-31.464;-2.650]	[-10.464;15.836]	[-8.041;11.726]
Single parent household (ref: two-parent household)	4.841	3.699	0.315	-0.65
	[-4.891;14.573]	[-6.442;13.841]	[-9.038;9.668]	[-10.412;9.111]
Degree (ref: no degree)		9.909*		21.659***
		[1.526;18.292]		[15.425;27.893]
Feel about family		0.884		1.25
		[-2.333;4.102]		[-0.949;3.450]
Eat with family (ref: 6-7 times)				
3-5 times		1.976		3.938

	(1)	(2)	(3)	(4)	(5)	(6)
			[-8.157;12.109]			[-4.231;12.107]
1-2 times			-0.749			2.29
			[-11.074;9.576]			[-6.566;11.147]
0 times			2.85			2.256
			[-9.885;15.584]			[-7.796;12.307]
Teacher relationship			-2.288			-2.259
			[-5.365;0.790]			[-4.620;0.102]
Constant	2301.500*	2520.476*	2765.217*	1186.307	1162.956	1917.413**
N	499	499	499	662	662	662
r2	0.26	0.28	0.314	0.179	0.179	0.303

Note: *p<0.05, **p<0.01, ***p<0.001. Weighted analysis. 95% Confidence intervals in square brackets.

Significance tests were used to examine whether the association between parental income and offspring earnings varied across gender in each of the models. In Model A, with basic controls, men had a slightly lower estimate of income mobility (B=.385, CI=.266;.505) than women (B=.392, CI=.286;.497), but Wald tests were insignificant (χ^2=0.01, df=362; p=0.938) meaning that income mobility did not vary across gender, remaining roughly similar. In Model B, which incorporated additional demographic controls of ethnicity, migrant background and household structure, intergenerational income mobility was even more similar for men and women and Wald tests revealed that they did not statistically significantly differ across gender (χ^2=0.00, df=362; p=0.962). Finally, for Model C, which additionally controls for education, family and teacher relationships, significance tests weren't available as there is not a command available on Stata to perform Wald tests on two different groups when using multiply imputed complex survey data. Instead, confidence intervals were assessed visually, following the advice of Cumming (2009). Income mobility was estimated at B=.339 (CI=.220;.458) for men and slightly lower at B=.276 (CI=.159;.313) for women. While a slightly wider disparity, the coefficients remained well within each other's 95% confidence intervals, suggesting no statistically significant difference.

Overall, this section has provided income mobility estimates, investigated the linearity of the intergenerational association, and whether it varied across gender. Finding that the association is linear and did not vary across gender, next the moderating role of education was examined.

4.4　　Offspring education as a moderator of intergenerational income mobility

Next, the extent to which intergenerational income mobility is moderated by education was examined. The intergenerational income mobility was estimated separately for those without a degree and those with a degree, and then the models were compared. Below are the results.

Table 4.9 Association between parental income and offspring earnings by education

	No degree			Degree		
	Model A	Model B	Model C	Model A	Model B	Model C
Parental household income	0.340***	0.388***	0.372***	0.264*	0.177*	0.150
	[0.254;0.427]	[0.300;0.475]	[0.282;0.463]	[0.057;0.471]	[0.008;0.346]	[-0.014;0.315]
Year of birth	-1.349***	-1.434***	-1.418***	-0.416	-0.603	-0.729
	[-2.098;-0.599]	[-2.177;-0.692]	[-2.165;-0.670]	[-1.635;0.802]	[-1.789;0.583]	[-1.942;0.484]
Number of income obs.	1.081	1.326	1.307	2.917**	2.529*	2.633**
	[-0.530;2.691]	[-0.161;2.813]	[-0.158;2.772]	[0.872;4.963]	[0.563;4.495]	[0.755;4.512]
Number of parental income obs.	0.669	0.784*	0.757*	-0.657	-0.623	-0.573
	[-0.016;1.354]	[0.091;1.476]	[0.070;1.444]	[-1.646;0.331]	[-1.582;0.336]	[-1.543;0.397]
Age when income measured	-0.967	-0.996	-1.138	-3.168	-3.012	-3.552
	[-4.143;2.209]	[-3.757;1.766]	[-3.864;1.589]	[-7.085;0.748]	[-6.983;0.960]	[-7.351;0.247]
Parents' age when parental income measured	-0.389	-0.515*	-0.619**	-0.748	-0.803*	-0.740*
	[-0.897;0.120]	[-0.998;-0.032]	[-1.083;-0.155]	[-1.514;0.018]	[-1.506;-0.100]	[-1.451;-0.030]
Female (ref: male)		-16.695***	-17.377***		-7.212	-8.11

	(1)	(2)	(3)	(4)
	[-22.056;-11.335]	[-22.925;-11.830]	[-16.151;1.728]	[-17.155;0.934]
Ethnic minority (ref: white)	10.329	10.556	-18.449	-22.342*
	[-3.662;24.319]	[-2.995;24.107]	[-38.726;1.829]	[-42.972;-1.713]
At least one migrant parent (ref: no migrant parent)	-12.973*	-13.191*	7.901	9.548
	[-24.681;-1.264]	[-24.418;-1.964]	[-5.079;20.882]	[-3.637;22.733]
Single parent household (ref: two-parent household)	8.101*	8.449*	-13.032	-15.248*
	[0.315;15.887]	[0.517;16.380]	[-27.203;1.140]	[-29.830;-0.667]
Feel about family		-0.297		3.176
		[-2.803;2.210]		[-0.488;6.841]
Eat with family (ref: 6-7 times)				
3-5 times		2.951		3.978
		[-5.275;11.176]		[-7.185;15.142]
1-2 times		-0.237		-0.680
		[-7.848;7.375]		[-13.247;11.887]
0 times		1.829		3.385
		[-7.816;11.475]		[-10.876;17.646]
Teacher relationship		-2.581*		1.403

			[-4.785;-0.376]			[-2.798;5.605]
Constant	2733.484***	2911.956***	2900.659***	983.343	1365.852	1616.906
N	763	763	763	400	400	400
r2	0.142	0.255	0.272	0.175	0.232	0.262

Note: *p<0.05, **p<0.01, ***p<0.001. Weighted analysis. 95% Confidence intervals in square brackets.

The results of Model A using only basic controls shows that the intergenerational income association was significant at B=.340 (CI=.254; .427) for those without a degree. The association was still significant albeit only at the 95% level for those with a degree, and lower at B=.264 (CI=.057; .471). However, Wald tests reveal that it cannot be concluded that the two coefficients are statistically different from each other (χ^2=.59, df=362; p=0.442).

Model B incorporated some demographic characteristics of gender, ethnicity, migrant background and household structure. Once these were included, the intergenerational income association remained significant at B=.388 (CI=.300; .475) for those without a degree. For those with a degree, there was a lower association (B=.177, CI= .008; .365) which was significant at the 95% level. Wald tests revealed that these were statistically significantly different to each other at the 95% level, confirming that those with a degree experienced lower intergenerational income association than those without a degree in a more robust model accounting for demographic covariates (χ^2=5.99, df=362; p=0.015).

Finally, in the complete model once educational attainment, family relationships and teacher relationships were included, the intergenerational income association was estimated at B=.372 (CI=.282; .463) for those without a degree. For those with a degree, the estimate was lower and statistically insignificant at B=.150 (CI=-.014; .315). Again, Wald tests were unavailable for results including weights and multiple imputation. However, following the approach of Cumming (2009), the little overlap of the confidence intervals suggested again that those with a degree experienced a lower intergenerational income association than those without a degree, confirming once more educational attainment as a moderator of the intergenerational income association.

4.4.1 Five-category offspring education as a moderator of intergenerational income mobility

A binary indicator of education can hide a lot of heterogeneity within it, for example differences between those with an undergraduate degree and those with a postgraduate degree. So next, education as a five-category variable was used as a moderator to understand whether income mobility varied across five categories of education. Again, this was achieved by conducting analysis across five groups. Below are the results for all five groups using basic controls.

Table 4.10 Association between parental household income and offspring earnings by five-category education (basic controls)

	Higher degree	Degree	Upper secondary	Lower secondary	Other/No qual.
Parental household income	0.241**	0.149	0.170***	0.359***	0.290*
	[0.078;0.404]	[-0.020;0.317]	[0.079;0.260]	[0.186;0.532]	[0.022;0.557]
Year of birth	0.094	-0.812	-1.653***	-1.557*	-0.833
	[-2.556;2.745]	[-1.801;0.178]	[-2.507;-0.800]	[-2.738;-0.375]	[-2.506;0.841]
Number of income obs.	1.736	2.400*	0.136	1.785*	-1.818
	[-1.672;5.143]	[0.471;4.329]	[-1.356;1.629]	[0.121;3.450]	[-4.999;1.363]
Number of parental income obs.	-1.316	0.405	1.123**	0.519	-0.002
	[-3.041;0.409]	[-0.592;1.402]	[0.438;1.808]	[-0.623;1.662]	[-1.629;1.625]
Age when income measured	-0.861	-3.370	-0.650	-2.186	1.466
	[-7.692;5.969]	[-7.027;0.286]	[-3.356;2.056]	[-4.679;0.307]	[-3.713;6.645]
Parents' age when parental income measured	-0.170	-0.423	0.208	-0.116	-0.214
	[-1.474;1.134]	[-1.216;0.371]	[-0.310;0.727]	[-0.875;0.643]	[-1.081;0.654]
Constant	-99.136	1761.824	3321.664***	3167.881**	1643.322
N	124.000	278.000	411.000	230.000	122.000

	Higher degree	Degree	Upper secondary	Lower secondary	Other/No qual.
r2	0.180	0.086	0.097	0.171	0.136

Note: *p<0.05, **p<0.01, ***p<0.001. Weighted analysis. *95% Confidence intervals in square brackets.*

Below are the results for the multigroup analysis including demographic controls of gender, ethnicity, migrant background and household structure.

Table 4.11 Association between parental household income and offspring earnings by five category education (demographic controls)

	Higher degree	Degree	Upper secondary	Lower secondary	Other/No qual.
Parental household income	0.147	0.135	0.235***	0.327***	0.306*
	[-0.095;0.389]	[-0.029;0.300]	[0.139;0.331]	[0.163;0.490]	[0.059;0.552]
Year of birth	-0.091	-0.707	-1.527***	-1.683**	-1.009
	[-2.419;2.237]	[-1.686;0.272]	[-2.347;-0.708]	[-2.891;-0.475]	[-2.592;0.575]
Number of income obs.	1.659	2.202*	0.391	1.640	-1.349
	[-1.707;5.024]	[0.304;4.100]	[-1.018;1.800]	[-0.005;3.285]	[-5.021;2.324]
Number of parental income obs.	-1.294	0.345	1.122**	0.530	0.022
	[-2.941;0.352]	[-0.618;1.307]	[0.418;1.826]	[-0.482;1.543]	[-1.490;1.535]
Age when income measured	-1.097	-3.019	-0.500	-1.851	1.412
	[-7.736;5.542]	[-6.679;0.642]	[-2.992;1.993]	[-4.412;0.710]	[-5.198;8.023]

133

Parents' age when income measured	-0.080	-0.473	0.122	-0.373	-0.266
	[-1.264;1.103]	[-1.223;0.277]	[-0.355;0.599]	[-1.075;0.328]	[-1.033;0.501]
Female (ref: male)	-1.980	-7.896*	-16.475***	-19.372***	-13.816*
	[-11.694;7.735]	[-15.613;-0.179]	[-21.490;-11.460]	[-28.903;-9.841]	[-24.262;-3.370]
Ethnic minority (ref: white)	-11.470	-6.478	1.216	-0.851	28.052**
	[-35.385;12.444]	[-27.268;14.311]	[-15.613;18.045]	[-13.881;12.178]	[7.671;48.434]
At least one migrant parent (ref: no migrant parent)	3.513	8.036	0.591	-15.784	-31.158***
	[-15.566;22.592]	[-4.578;20.650]	[-10.620;11.802]	[-35.931;4.363]	[-41.261;-21.055]
Single parent household (ref: two-parent household)	-17.697	-4.841	13.527***	1.123	2.680
	[-41.871;6.476]	[-15.826;6.144]	[6.694;20.360]	[-8.355;10.601]	[-9.666;15.027]
Constant	281.683	1553.782	3072.231***	3432.670**	2000.651
N	124.000	278.000	411.000	230.000	122.000
r2	0.225	0.121	0.219	0.290	0.230

Note: *p<0.05, **p<0.01, ***p<0.001. Weighted analysis. 95% Confidence intervals in square brackets.

Finally, below are the results for the multigroup analysis with additional controls of education, family and teacher relationships.

Table 4.12 Association between parental household income and offspring earnings by five category education (extra controls)

	Higher degree	Degree	Upper secondary	Lower secondary	Other/No qual.
Parental household income	0.134	0.191	0.267***	0.283**	0.454*
	[-0.186;0.454]	[-0.063;0.445]	[0.146;0.387]	[0.105;0.461]	[0.100;0.808]
Year of birth	0.121	-1.403	-1.472**	-1.960**	-1.813
	[-3.149;3.392]	[-2.810;0.005]	[-2.435;-0.510]	[-3.196;-0.723]	[-3.977;0.351]
Number of income obs.	2.342	3.264*	1.660	0.366	-1.416
	[-1.641;6.326]	[0.702;5.825]	[-0.214;3.533]	[-1.559;2.290]	[-5.042;2.211]
Number of parental income obs.	-1.663	0.000	1.173**	0.439	0.737
	[-4.066;0.740]	[-1.038;1.039]	[0.296;2.051]	[-0.931;1.809]	[-1.039;2.514]
Age when income measured	-1.413	-5.183	-2.041	0.697	0.545
	[-10.230;7.404]	[-10.511;0.145]	[-5.344;1.262]	[-2.805;4.200]	[-8.223;9.313]
Parents' age when parental income measured	0.014	-1.016*	-0.048	-0.951*	-1.220*
	[-1.818;1.847]	[-1.844;-0.187]	[-0.742;0.647]	[-1.898;-0.003]	[-2.314;-0.126]
Female (ref: male)	-7.408	-8.049	-16.779***	-22.379***	-10.405
	[-24.491;9.674]	[-18.255;2.157]	[-23.847;-9.711]	[-32.535;-12.223]	[-21.450;0.641]

Ethnic minority (ref: white)	-14.480	-28.803	15.060	-3.550	10.712
	[-59.528;30.567]	[-57.880;0.274]	[-2.735;32.855]	[-21.907;14.808]	[-20.256;41.680]
At least one migrant parent (ref: no migrant parent)	5.459	11.861	-9.694	-10.722	-24.032*
	[-27.750;38.668]	[-3.932;27.654]	[-22.334;2.945]	[-32.588;11.145]	[-44.431;-3.632]
Single parent household (ref: two-parent household)	-30.566*	-9.322	16.806***	5.468	-6.602
	[-59.370;-1.763]	[-28.917;10.273]	[7.561;26.052]	[-7.286;18.221]	[-25.587;12.383]
Feel about family	3.325	2.481	-0.604	0.125	-1.194
	[-4.397;11.048]	[-2.464;7.426]	[-3.439;2.232]	[-4.990;5.240]	[-7.213;4.824]
Eat with family (ref: 6-7 times)					
3-5 times	-4.958	7.311	-1.820	12.674	3.301
	[-33.110;23.194]	[-5.798;20.421]	[-12.239;8.598]	[-2.938;28.285]	[-14.262;20.864]
1-2 times	-12.852	0.553	0.416	5.364	1.452
	[-35.307;9.604]	[-14.897;16.003]	[-10.238;11.071]	[-9.549;20.277]	[-14.530;17.433]
0 times	6.432	0.773	3.030	6.856	2.795

	[-21.307;34.172]	[-19.280;20.826]	[-9.142;15.202]	[-10.463;24.176]	[-15.371;20.962]
Teacher relationship	1.520	2.761	-2.133	-3.111	-0.337
	[-7.636;10.675]	[-3.209;8.732]	[-4.914;0.649]	[-7.111;0.889]	[-4.875;4.201]
Constant	-142.887	2993.967*	3010.801**	3948.868**	3652.470
N	119.000	276.000	408.000	226.000	115.000
r2	0.372	0.320	0.313	0.327	0.410

Note: *p<0.05, **p<0.01, ***p<0.001. Weighted analysis. 95% Confidence intervals in square brackets.

The first model using basic controls found a statistically significant association between parental income and offspring earnings for all but those with a bachelor's degree. Wald tests were conducted to test differences between the coefficients. They indicated a statistically significant difference between the association for those with degrees and those with a lower secondary qualification (χ^2=4.63, df=363; p=0.032) and for those with upper secondary and lower secondary qualifications (χ^2=6.12, df=363; p=0.014). These results demonstrated that those with a degree had lower intergenerational income association than those with lower secondary education, and those with higher secondary education had lower intergenerational income association than those with lower secondary education too.

Once demographic variables were controlled for in the second model, only those with upper secondary qualifications or below showed a significant association between parental income and offspring earnings holding all else equal. Wald tests revealed that once including demographic covariates. the only statistically significant difference was found between degree and lower secondary (χ^2=4.04, df=363; p=0.045) meaning that those with a degree experienced lower intergenerational income persistence than those with a lower secondary qualification. Statistically significant variation was not found among any other educational qualification levels.

Finally, similarly for the complete model once including relationship variables, results showed a statistically significant intergenerational association for those with upper secondary qualifications, lower secondary qualification and those with other or no qualification. Wald tests were unavailable for multiply imputed complex survey data, but confidence intervals were overlapping enough to be considered not statistically significantly different at the 0.05 level according to guidance from Cumming (2009).

A visual representation of the differences found in the second model are shown in Figure 4.3 below, plotting the relevant coefficients and confidence intervals.
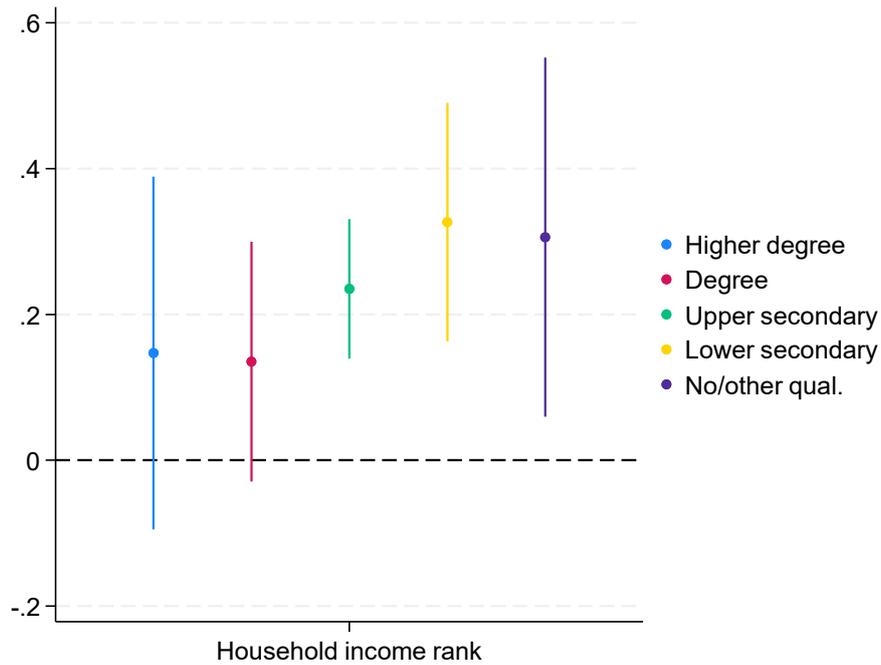
Figure 4.3 Intergenerational income association by education

Finally, the moderation effect of education may vary across gender. To test this, multigroup analysis was carried out for men and women fully moderated by education, including an interaction between education and every covariate. Below are the results.

Table 4.13 Education as a moderator by gender

	Men			Women		
	Model A	Model B	Model C	Model A	Model B	Model C
Parental household income	0.394***	0.408***	0.405***	0.291***	0.330***	0.308***
	[0.261;0.527]	[0.277;0.539]	[0.270;0.540]	[0.165;0.416]	[0.205;0.456]	[0.174;0.443]
Year of birth	-1.588**	-1.707**	-1.671**	-0.944*	-1.110*	-1.149*
	[-2.709;-0.467]	[-2.921;-0.493]	[-2.882;-0.460]	[-1.766;-0.122]	[-2.007;-0.213]	[-2.089;-0.209]
Number of income obs.	1.141	1.254	1.080	1.425	1.263	1.399
	[-0.919;3.202]	[-0.638;3.147]	[-0.771;2.932]	[-0.427;3.278]	[-0.538;3.064]	[-0.419;3.216]
Number of parental income obs.	0.420	0.593	0.558	0.673	0.826	0.835
	[-0.602;1.443]	[-0.517;1.704]	[-0.541;1.657]	[-0.131;1.477]	[-0.026;1.677]	[-0.009;1.678]
Age when income measured	0.233	-0.074	0.007	-2.112	-1.867	-2.310
	[-3.930;4.396]	[-3.687;3.539]	[-3.430;3.445]	[-5.722;1.497]	[-5.414;1.679]	[-5.881;1.261]
Parents' age when parental income measured	-1.099**	-0.972**	-1.073***	0.086	0.051	-0.053
	[-1.786;-0.412]	[-1.627;-0.317]	[-1.690;-0.456]	[-0.507;0.679]	[-0.533;0.635]	[-0.632;0.526]
Degree (ref: no degree)	-3529.912	-3098.438	-2448.308	-175.514	-230.938	-358.385
	[-7729.62;669.79]	[-7343.38;1146.51]	[-6926.78;2030.17]	[-3470.47;3119.44]	[-3449.28;2987.41]	[-3701.80;2985.03]
× Parental HH income	-0.159	-0.308*	-0.311*	0.036	-0.073	-0.094
	[-0.543;0.225]	[-0.590;-0.025]	[-0.588;-0.033]	[-0.197;0.270]	[-0.304;0.158]	[-0.333;0.145]
× Year of birth	1.794	1.590	1.257	0.157	0.188	0.235

	(1)	(2)	(3)	(4)	(5)	(6)
	[-0.306;3.894]	[-0.534;3.713]	[-0.982;3.497]	[-1.481;1.795]	[-1.410;1.786]	[-1.429;1.900]
× No. of income obs.	1.349	1.282	1.650	1.353	1.037	0.881
	[-1.630;4.328]	[-1.619;4.183]	[-1.429;4.729]	[-1.659;4.365]	[-1.883;3.957]	[-1.993;3.755]
× No. of parental income obs.	-1.810	-1.777	-1.606	-0.833	-0.999	-0.959
	[-3.625;0.004]	[-3.574;0.020]	[-3.553;0.341]	[-2.140;0.475]	[-2.341;0.343]	[-2.315;0.397]
× Age when income measured	-0.391	-0.621	-1.756	-2.966	-2.742	-2.362
	[-6.409;5.627]	[-6.127;4.886]	[-7.633;4.121]	[-9.093;3.160]	[-8.909;3.425]	[-8.365;3.641]
× Parents' age when parental income measured	0.170	0.096	0.349	-0.738	-0.754	-0.624
	[-1.178;1.518]	[-1.169;1.361]	[-0.936;1.634]	[-1.764;0.288]	[-1.702;0.194]	[-1.538;0.291]
Ethnic minority (ref: white)		13.861	14.599		2.764	1.875
		[-3.608;31.331]	[-2.566;31.764]		[-16.214;21.741]	[-16.758;20.507]
× Degree		-17.080	-21.205		-26.278*	-30.386*
		[-50.223;16.063]	[-53.927;11.516]		[-51.911;-0.645]	[-57.781;-2.991]
At least one migrant parent (ref: no migrant parent)		-15.725	-17.168		-7.155	-6.216
		[-33.857;2.408]	[-34.499;0.162]		[-18.470;4.160]	[-17.284;4.852]
× Degree		2.444	6.341		24.808**	25.409**
		[-22.883;27.771]	[-19.092;31.773]		[7.325;42.291]	[7.556;43.262]
Single parent household (ref: two-parent household)		7.420	8.016		6.265	6.402

	(1)	(2)	(3)	(4)
	[-3.776;18.615]	[-3.638;19.671]	[-3.506;16.036]	[-3.914;16.717]
× Degree	-19.054	-22.274*	-20.093*	-21.861*
	[-39.802;1.693]	[-42.840;-1.708]	[-39.330;-0.857]	[-41.558;-2.164]
Feel about family		-0.982		0.404
		[-4.840;2.876]		[-2.811;3.619]
× Degree		4.638		2.010
		[-3.229;12.506]		[-2.870;6.891]
Eat with family (ref: 6-7 times)				
3-5 times		2.460		4.464
		[-9.524;14.444]		[-5.862;14.791]
× Degree		1.959		-0.632
		[-19.242;23.159]		[-15.472;14.208]
1-2 times		-1.293		1.100
		[-12.321;9.736]		[-10.421;12.621]
× Degree		1.993		-0.541
		[-18.108;22.094]		[-17.155;16.072]
0 times		-0.211		3.575
		[-14.338;13.915]		[-10.331;17.480]
× Degree		10.353		-4.131
		[-14.759;35.465]		[-25.261;16.999]
Teacher relationship		-2.788		-2.506

	(1)	(2)	(3)	(4)	(5)	(6)
			[-6.070;0.494]			[-5.175;0.162]
× Degree			3.866			3.886
			[-3.335;11.067]			[-1.164;8.935]
Constant	3213.179**	3447.270**	3394.263**	1935.200*	2255.443*	2359.015*
	[960.935;5465.422]	[1017.360;5877.180]	[973.986;5814.540]	[282.816;3587.584]	[453.938;4056.949]	[471.372;4246.658]
N	499.000	499.000	499.000	662.000	662.000	662.000
r2	0.292	0.331	.362	0.296	0.320	.345

Note: *p<0.05, **p<0.01, ***p<0.001. Weighted analysis. 95% Confidence intervals in square brackets.

The results of Model A do not show a moderation effect of education for men, with the interaction coefficient negative and statistically insignificant. For women, the result is similar, with no moderation detected. Thus, there is no difference detected in the moderation effect of education in the first model. Wald tests confirmed the lack of difference too.

In Model B, a moderation effect of education on income to earnings association was found, with a negative statistically significant interaction (B=-.308, CI= -.590; -.025). This suggests that men with higher education can expect a lower level of intergenerational income persistence. For women, there was no statistically significant interaction (B=-.073, CI= -.304; -.158). However, Wald tests could not confirm that the interactions were statistically significantly different to each other for men and women, thus it cannot be concluded that education moderates for men and women differently.

Similarly, once relationship variables were included in the models, a moderation effect of education on income was found for men (B=-.311, CI= .-588; -.033), and there was no statistically significant interaction for women (B=-.094, CI=-.333; .145). With Wald tests unavailable, confidence intervals were assessed visually according to Cumming (2009). As they were substantially overlapping, it was concluded that the moderation effects did not differ statistically significantly across gender.

4.5   Offspring relationships as a moderator of intergenerational income mobility

Finally, in this section the moderation effect of offspring relationships with family and teachers at age 14 was investigated using interactions. In the table below, the results for the complete model with extra controls are shown. Model A only includes interactions with family relationships, Model B only includes interactions with teacher relationships, and the final model includes interactions with all three relationship variables.

Table 4.14 Association between parental household income and offspring earnings by relationships

	Model A	Model B	Model C
Parental household income	0.181	0.059	0.025
	[-0.003;0.365]	[-0.194;0.312]	[-0.234;0.283]
Year of birth	-1.008***	-1.023***	-0.932**
	[-1.602;-0.415]	[-1.619;-0.427]	[-1.529;-0.334]
Number of income obs.	1.766**	1.716**	1.675**
	[0.631;2.901]	[0.582;2.851]	[0.552;2.798]
Number of parental income obs.	0.171	0.320	0.182

	[-0.381;0.723]	[-0.224;0.865]	[-0.371;0.735]
Age when income measured	-1.558	-1.535	-1.452
	[-3.752;0.637]	[-3.687;0.617]	[-3.614;0.710]
Parents' age when parental income measured	-0.623**	-0.694***	-0.702***
	[-0.997;-0.248]	[-1.089;-0.299]	[-1.077;-0.327]
Female (ref: male)	-13.607***	-14.239***	-14.240***
	[-18.078;-9.136]	[-18.583;-9.895]	[-18.692;-9.788]
Ethnic minority (ref: white)	4.457	4.036	4.052
	[-7.632;16.546]	[-8.347;16.419]	[-7.750;15.854]
At least one migrant parent (ref: no migrant parent)	-7.871	-9.026	-8.240
	[-17.601;1.860]	[-18.581;0.528]	[-17.791;1.310]
Single parent household (ref: two-parent household)	2.670	3.411	2.787
	[-3.942;9.282]	[-3.097;9.919]	[-3.698;9.273]
Degree (ref: no degree)	17.705***	17.040***	17.119***
	[12.540;22.870]	[11.748;22.332]	[11.804;22.435]
Feel about family	-1.643		-0.165
	[-5.298;2.012]		[-3.936;3.607]
× Household income	0.029		0.017
	[-0.028;0.086]		[-0.042;0.077]
Eat with family (ref: 6-7 times)			
3-5 times	1.039		2.242
	[-14.388;16.466]		[-12.825;17.308]

× Household income	0.035		0.028
	[-0.216;0.286]		[-0.218;0.274]
1-2 times	-11.581		-10.009
	[-24.722;1.560]		[-23.051;3.033]
× Household income	0.265*		0.253*
	[0.051;0.480]		[0.036;0.470]
0 times	-1.303		0.890
	[-16.221;13.615]		[-14.015;15.794]
× Household income	0.037		0.017
	[-0.209;0.283]		[-0.232;0.265]
Teacher relationship		-4.355**	-3.988*
		[-7.273;-1.438]	[-7.163;-0.813]
× Household income		0.056*	0.038
		[0.008;0.103]	[-0.015;0.091]
Constant	2098.754***	2143.754***	1963.311**
N	1165.000	1165.000	1165.000
r2	.203	.199	.218

Note: *p<0.05, **p<0.01, ***p<0.001. Weighted analysis. 95% Confidence intervals in square brackets.

The first model considering family relationships suggests that the parental income to offspring earnings association was moderated by frequency of evening meals with family, but not how offspring felt about family at age 14. Compared to those eating with their family 5-7 times a week, those who ate with their families 1-2 times a week experienced a higher intergenerational income association (*B*=.265, CI=.051; .480). The interaction term was statistically insignificant for feel about family at the 95% level. The results also show there were no main effects associated with how offspring felt about their family or how often they ate with their families at 14 on earnings holding all else equal, although the interpretation of main effects is limited in that it represents the association between the family relationships and offspring earnings when parental income is zero, which is not very informative in of itself. The same limitations apply to interpreting the coefficient for the association between parental income and offspring earnings- they represent the association for when the

relationship variables take the value of zero, which does not occur in the data. The main effects are better understood in the form of average marginal effects, which are expanded on below for the second and third models.

In the second model, teacher relationships were included. The results show that income to earnings transmission was moderated by teacher relationships. Those with more positive teacher relationships experienced higher income mobility, as the interaction was positive and statistically significant (B=0.056, CI=.008; .103). See Figure 4.4 for a visual representation of this moderation effect using average marginal effects. The blue line represents those with a teacher relationship one standard deviation above the mean, the red line represents those with teacher relationships at the mean level, and the green line represents those with teacher relationships one standard deviation below the mean. The corresponding slopes are an income mobility of 0.227 (CI= .102; .352) for those with teacher relationships one standard deviation above the mean, 0.282 (CI= .190; .375) for those with mean teacher relationships, and 0.294 (CI= .306; .483) for those who reported a teacher relationships one standard deviation below the mean.
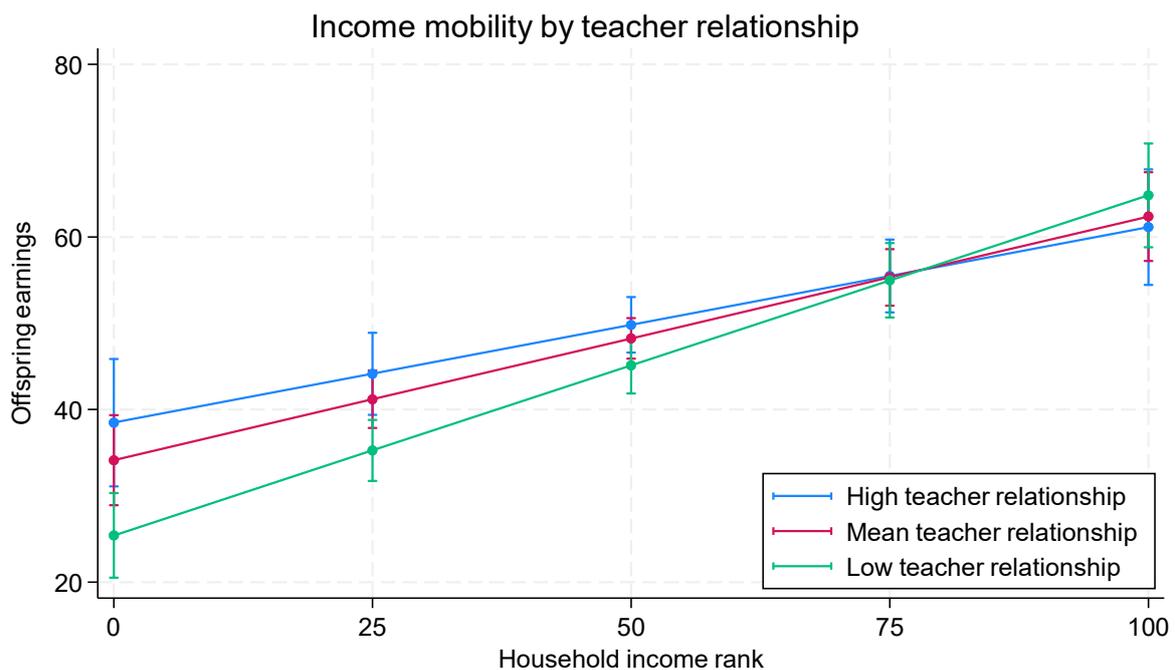
Figure 4.4 Income mobility by teacher relationship

Finally, once both family and teacher relationships were included in the model, eating with family remained a moderator of the intergenerational income association, but teacher relationships became insignificant. The interaction term between eating with family 1-2 times a week compared to those eating with their family eating 6-7 times a week remained significant (B=.253, CI=.036; .470). The results suggest that those who ate more often with their families experienced lower intergenerational income association. The significant interaction is visualised in Figure 4.5 below using average

147

marginal effects. The red line represents those who ate 1-2 times a week with their families, and the blue line represents those who ate 6-7 times a week with their family. The corresponding slopes are 0.193 (CI= .033; .352) for those who ate 6-7 times a week compared to 0.495 (CI= .356; .637) for those who ate 1-2 times a week with their family, which is roughly 2.5 times the association. Interactions with teacher relationships and how they felt about their families both were statistically insignificant. Figure 4.5 shows that while eating more frequently with family was effective as a protective factor on future for those from lower income families, the opposite was true for those from higher income backgrounds.
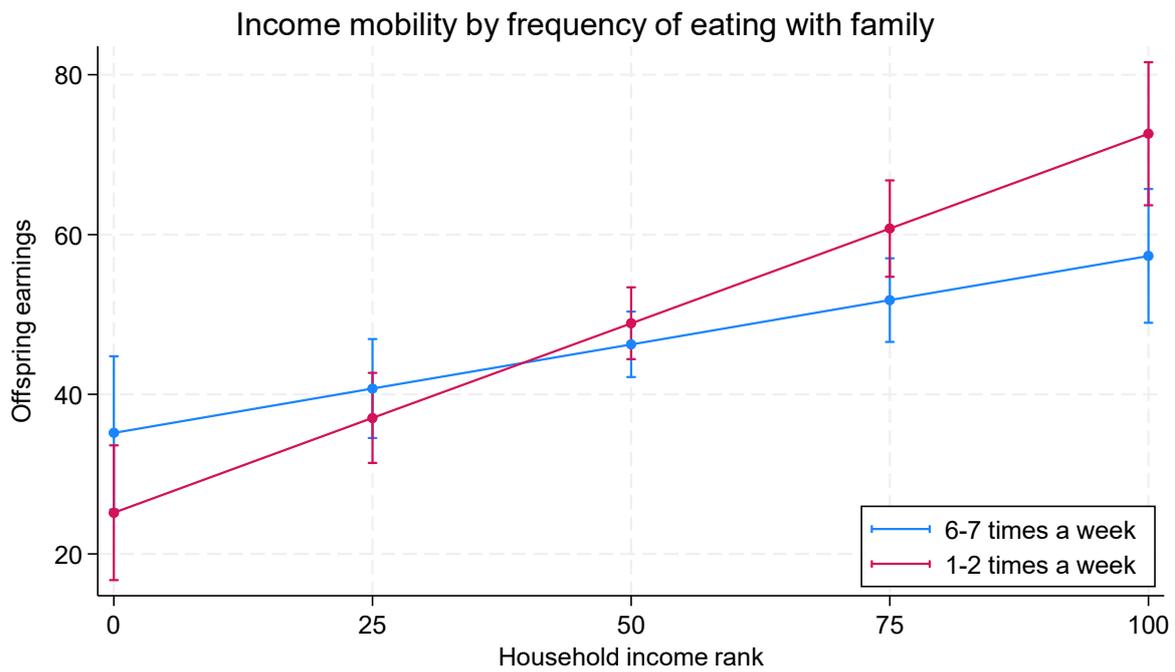
Figure 4.5 Income mobility by frequency of eating with family

There is also a hypothesised gendered element to relationships, and an interaction with education, so the results are presented below including an interaction with gender and education too.

Table 4.15 Association between parental household income and offspring earnings by relationships (extra interactions)

	Family relationships	Teacher relationships	Both
Parental household income	0.169	0.068	0.019
	[-0.021;0.359]	[-0.187;0.322]	[-0.241;0.278]
Year of birth	-1.022**	-1.030***	-0.951**
	[-1.628;-0.415]	[-1.625;-0.434]	[-1.559;-0.343]

Number of income obs.	1.765**	1.705**	1.659**
	[0.619;2.910]	[0.568;2.843]	[0.522;2.797]
Number of parental income obs.	0.175	0.327	0.186
	[-0.395;0.744]	[-0.216;0.870]	[-0.382;0.754]
Age when income measured	-1.555	-1.528	-1.442
	[-3.748;0.638]	[-3.682;0.627]	[-3.611;0.727]
Parents' age when parental income measured	-0.613**	-0.694***	-0.694***
	[-0.988;-0.238]	[-1.087;-0.302]	[-1.068;-0.320]
Female (ref: male)	-13.865**	-17.182*	-17.043*
	[-23.454;-4.275]	[-30.601;-3.764]	[-30.686;-3.400]
Ethnic minority (ref: white)	4.440	3.955	3.973
	[-7.647;16.526]	[-8.541;16.451]	[-7.826;15.771]
At least one migrant parent (ref: no migrant parent)	-8.141	-9.055	-8.524
	[-17.830;1.549]	[-18.675;0.566]	[-18.062;1.014]
Single parent household (ref: two-parent household)	2.882	3.350	2.935
	[-3.887;9.651]	[-3.146;9.846]	[-3.671;9.541]
Degree (ref: no degree)	18.780***	14.470*	16.004*
	[9.253;28.308]	[0.210;28.730]	[2.148;29.861]
Feel about family	-1.948		-0.324
	[-6.267;2.372]		[-4.878;4.230]
× Household income	0.022		0.010
	[-0.038;0.083]		[-0.054;0.075]
× Female	0.305		0.020

	[-3.341;3.950]	[-3.863;3.904]
× Degree	1.519	1.451
	[-2.541;5.579]	[-2.872;5.775]
Eat with family (ref: 6-7 times)		
3-5 times	1.232	2.964
	[-15.946;18.410]	[-13.651;19.580]
× Household income	0.066	0.062
	[-0.181;0.314]	[-0.183;0.307]
× Female	0.162	-0.832
	[-11.933;12.258]	[-13.026;11.362]
× Degree	-5.652	-6.115
	[-17.581;6.277]	[-18.512;6.281]
1-2 times	-11.239	-9.148
	[-25.919;3.442]	[-23.647;5.352]
× Household income	0.315**	0.307*
	[0.082;0.549]	[0.065;0.549]
× Female	0.452	-0.466
	[-11.690;12.595]	[-12.736;11.803]
× Degree	-11.324	-12.181
	[-26.813;4.164]	[-28.906;4.543]
0 times	0.173	2.243
	[-18.369;18.715]	[-16.146;20.632]
× Household income	0.065	0.052
	[-0.187;0.316]	[-0.203;0.306]

	A	B	C
× Female	-2.679		-3.088
	[-18.158;12.800]		[-18.442;12.266]
× Degree	-3.388		-3.563
	[-19.260;12.484]		[-19.853;12.727]
Teacher relationship		-4.744**	-4.472*
		[-8.194;-1.294]	[-8.258;-0.687]
× Household income		0.054*	0.036
		[0.006;0.102]	[-0.019;0.090]
× Female		0.678	0.829
		[-2.138;3.493]	[-2.247;3.905]
× Degree		0.639	0.655
		[-2.617;3.895]	[-3.177;4.488]
Constant	2125.421***	2158.460***	2003.524**
N	1165.000	1165.000	1165.000
r2	.320	.304	.325

Note: *p<0.05, **p<0.01, ***p<0.001. Weighted analysis. 95% Confidence intervals in square brackets.

Similar to the previous results, model A finds a moderation effect of frequency of family meals, but no moderation effect for how offspring felt about their family at age 14. Results suggest that those who ate 5-7 times a week with their family compared to those who ate 1-2 times a week with their families had lower intergenerational income association (*B*=.315, CI=.082; .549).

Model B including interactions with teacher relationships finds a moderation effect of teacher relationships on the intergenerational income association. A positive statistically significant interaction was detected, meaning there was stronger intergenerational income association for those who had less positive relationships with their teachers (*B*=.054, CI=.006; .102).

Finally, in model C once including the moderation effect of family and teacher relationships, only eating with family was found to be a statistically significant moderator.

Finally, the interaction was tested across genders. Below are the results for the interaction with family relationships, teacher relationships and both for men and women separately.

The results show for men and women that there were no significant interactions between relationship variables and household income. Significance tests weren't available for the multiply imputed complex survey data, however all had broadly overlapping broad 95% confidence intervals suggesting that the moderating role of family and teacher relationships did not vary between men and women.

Table 4.16 Association between parental income and offspring earnings by relationships by gender

	Men			Women		
	Model A	Model B	Model C	Model A	Model B	Model C
Parental household income	0.238	0.017	-0.009	0.186	0.246	0.156
	[-0.074;0.550]	[-0.393;0.428]	[-0.449;0.431]	[-0.051;0.423]	[-0.115;0.607]	[-0.223;0.536]
Year of birth	-1.358*	-1.217*	-1.254*	-0.834*	-0.882*	-0.786*
	[-2.403;-0.313]	[-2.266;-0.167]	[-2.303;-0.205]	[-1.562;-0.105]	[-1.592;-0.172]	[-1.530;-0.042]
Number of income obs.	1.480*	1.27	1.191	2.033*	2.103*	2.075**
	[0.013;2.946]	[-0.204;2.745]	[-0.256;2.639]	[0.447;3.619]	[0.502;3.704]	[0.501;3.649]
Parental number of income obs.	0.055	0.13	0.082	0.442	0.446	0.446
	[-0.898;1.007]	[-0.758;1.017]	[-0.866;1.029]	[-0.236;1.121]	[-0.229;1.122]	[-0.237;1.128]
Age when income measured	0.156	0.568	0.587	-3.396*	-3.523*	-3.490*
	[-2.668;2.980]	[-2.184;3.319]	[-2.125;3.299]	[-6.370;-0.422]	[-6.509;-0.537]	[-6.457;-0.524]
Parents' age when parental income measured	-1.037***	-1.102***	-1.135***	-0.149	-0.214	-0.208
	[-1.545;-0.528]	[-1.645;-0.559]	[-1.637;-0.632]	[-0.622;0.324]	[-0.707;0.279]	[-0.694;0.279]
Ethnic minority (ref: white)	9.773	10.383	10.097	-5.419	-5.417	-6.169
	[-5.243;24.788]	[-5.260;26.026]	[-4.748;24.942]	[-20.657;9.819]	[-19.127;8.293]	[-20.978;8.640]
At least one migrant parent (ref: no migrant parent)	-16.375*	-18.769*	-18.663*	2.401	1.241	2.648
	[-31.906;-0.843]	[-33.587;-3.950]	[-33.785;-3.540]	[-7.829;12.631]	[-8.995;11.478]	[-7.481;12.776]

	(1)	(2)	(3)	(4)	(5)	(6)
Single parent household (ref: two parent household)	4.21	4.63	3.743	-0.557	0.073	-0.109
	[-5.834;14.254]	[-4.657;13.916]	[-5.946;13.432]	[-10.516;9.401]	[-9.440;9.585]	[-9.921;9.702]
Degree (ref: no degree)	11.965**	10.476*	11.238**	21.457***	21.840***	20.860***
	[4.074;19.855]	[2.169;18.784]	[3.322;19.155]	[15.089;27.824]	[15.476;28.205]	[14.369;27.351]
Feel about family	-0.049		1.738	-1.158		-0.483
	[-6.997;6.900]		[-5.191;8.668]	[-6.096;3.780]		[-5.266;4.300]
× Household income	-0.014		-0.03	0.039		0.036
	[-0.134;0.106]		[-0.149;0.089]	[-0.036;0.115]		[-0.038;0.110]
Eat with family (ref: 6-7 times)						
3-5 times	-3.644		-2.141	6.931		7.273
	[-26.485;19.196]		[-23.450;19.168]	[-10.874;24.735]		[-10.386;24.931]
× Household income	0.127		0.123	-0.057		-0.057
	[-0.243;0.496]		[-0.227;0.474]	[-0.360;0.246]		[-0.359;0.245]
1-2 times	-13.1		-11.253	-7.5		-7.582
	[-34.105;7.905]		[-31.251;8.746]	[-22.179;7.180]		[-22.069;6.906]
× Household income	0.27		0.254	0.202		0.206
	[-0.063;0.603]		[-0.070;0.578]	[-0.056;0.460]		[-0.047;0.459]
0 times	-6.587		-5.071	4.328		5.946
	[-33.379;20.205]		[-30.268;20.125]	[-13.350;22.007]		[-11.639;23.532]
× Household income	0.175		0.166	-0.063		-0.09
	[-0.254;0.603]		[-0.241;0.573]	[-0.367;0.241]		[-0.396;0.216]
Teacher relationship		-5.582*	-5.476*		-2.014	-2.37

		[-10.683;-0.480]	[-10.942;-0.010]		[-5.584;1.555]	[-5.923;1.184]
× Household income		0.069	0.058		0.009	0.006
		[-0.012;0.149]	[-0.029;0.144]		[-0.067;0.086]	[-0.069;0.082]
Constant	2765.369**	2496.843*	2573.960*	1763.023*	1871.990**	1682.860*
N	499	499	499	662	662	662
r2	.315	.324	.339	.311	.297	.322

Note: *p<0.05, **p<0.01, ***p<0.001. Weighted analysis. 95% Confidence intervals in square brackets.

4.6   Robustness checks

To check the robustness of the results, further analyses were conducted modifying some of the decisions on sample, and analytical approach. Firstly, income mobility was tested on an older sample, from the age of 30 plus to address life-cycle and cohort effect bias. Results, displayed in Appendix Table A1, were generally similar to the sample aged 25 and over, albeit slightly higher, although all estimates were within the same 95% confidence intervals suggesting that the estimates are robust to life-cycle bias, if potentially slightly underestimated. Robustness checks were also used to test rank-rank slopes on a sample of offspring with at least three earnings observations in adulthood to further check against biases associated with using single year snapshots of earnings. Results shown in Appendix Table A2 were similar, with slightly higher estimates of the association between parental household income and offspring earnings, but all within the same 95% confidence intervals.

Next, robustness checks were conducted on the analysis investigating the moderating role of family and teacher relationships. Analysis was conducted with full moderation models. The results shown in Appendix Table A3 confirmed no moderation effect of how offspring felt about their family at age 14, and a moderation effect of frequency of evening meals with family and of teacher relationships, confirming that those who are more frequently with their families and those who reported more positive relationships with teachers had lower intergenerational income persistence.

4.7   Chapter summary

This chapter presented the results for estimating income mobility in the UK and investigating the linearity of the association and whether it varied by gender, education, family relationships and teacher relationships. Overall, results revealed that income mobility was a linear association and did not vary across gender. However, the findings showed that income mobility did vary across education, with degree holders experiencing higher intergenerational income mobility compared to those without a degree. Finally, results showed that income mobility did not vary by quality of family relationships, however there were mixed results on whether they varied by teacher relationships. Results did not indicate that this moderation effect varied across gender. Robustness checks were carried out in the appendix to back up these results. In the next chapter, these results are discussed.

5. Discussion

This chapter will discuss and interpret the key findings and implications of the research. The first section discusses the first research question, to what extent is there income mobility in the UK. Then it examines whether it is moderated by gender or whether it varied by parental income. The second section explores the results of the second research question, to what extent does educational attainment play a moderating role in income mobility, and how it varies by gender. Finally, the third section focuses on the results of the third research question, to what extent do relationships with parents and teachers play a moderating role in income mobility, and how it varies by gender.

In each section, this thesis considers the key findings, putting these results into context of the existing literature, and existing theoretical frameworks followed by exploring limitations and finally theoretical, methodological, and potential policy implications. Substantive findings are discussed in a broader context, with its wider implications and limitations, as well as potential avenues for future research.

5.1 Intergenerational income mobility

An overview of the findings for the first research question is presented in this section. The first aim of the thesis was to estimate the intergenerational income association between individuals and their parents, and whether that association was linear across the parental income distribution and whether it varied by gender. In each section, key findings and their substantive meanings are discussed in relation to the existing literature and theoretical framework, outlining the contributions of the present research and presenting potential alternative explanations.

Overall income association

To address the first research question, the thesis employed OLS linear regression to estimate the intergenerational income association between individuals and their parents. It found a significant association between 0.321-0.381, inferring that for every additional percentile of parental income, an individual can expect roughly a third of additional earnings. For an overall association, not controlling for demographic factors and often referred to as the 'total effect', it found an association of 0.381. In the full model, when accounting for several demographic factors including gender, ethnicity, household structure and education among other factors, it was lower at approximately 0.321. In other words, education and other demographic factors including gender, ethnicity, household structure and relationships explain part of the intergenerational income association, but not much.

The study found an overall association of 0.381 between parental income and offspring earnings. This means that for every additional 10% of parental household income an individual had as a child, they can expect roughly 3.8% additional earnings themselves in adulthood. The fact that there was a significant intergenerational persistence of income is in line with previous findings, in the UK (e.g.,

Belfield et al., 2017; Björklund et al., 2017; Blanden, 2013; Gregg, Macmillan, et al., 2017; Rohenkohl, 2023). In fact, in virtually all countries, and across time, a significant association between parental income and offspring income has been found (OECD, 2018; Narayan et al., 2018). This total effect can encompass a wide range of mechanisms, some of which are explored below. The results are broadly in line with existing estimates which range from 0.27 to 0.43 in the literature and previous evidence of intergenerational mobility in the UK, although it is somewhat on the higher end of the range (Belfield et al., 2017; Björklund et al., 2017; Blanden, 2013; Gregg, Macmillan, et al., 2017; Rohenkohl, 2023). This thesis contributes to the evidence of intergenerational mobility in the UK, further confirming the existence of an intergenerational association. Additionally, it contributes by providing estimates for a more recent cohort of people in the UK, as most previous estimates have been made for those born in 1958 and 1970. Methodologically, it has also addressed some of the challenges of this previous literature by utilising multiple observations of parental income, which has been shown to provide less biased estimates (Chetty, Hendren, Kline, Saez, et al., 2014; Mazumder, 2005). These findings demonstrate that intergenerational mobility remains a key issue in the UK today, where individual's income is explained partially by their parental income.

As mentioned, the magnitude of 0.381 found in this thesis is somewhat at the higher end of the range of previous findings. Many of the previous studies estimated intergenerational mobility for older generations, for instance those born in 1958 and 1970 using cohort studies, which may account for some of the difference. However, one study estimated income mobility in the UK for a similar cohort using the same dataset. Rohenkohl (2023) similarly found an intergenerational association of income, albeit finding a smaller association at 0.274. The present thesis findings corroborate and build on this previous finding, confirming that parental income influences offspring income in the UK. It also suggests that the association may be stronger than previously thought. While the difference in magnitude may seem small, it is important to explore potential reasons for this discrepancy between these findings. Intergenerational income mobility is notoriously difficult to measure and is extremely sensitive to model decisions. In fact, using a multiverse approach, Engzell & Mood (2023) found that different model decisions in estimating income mobility led to results ranging from -.19 to .41, all based on the same data. Thus, difference in magnitude based on different methodological decisions was expected, but it can give insight into the study to explore these differences. There are a few key methodological differences between the present thesis and that of Rohenkohl's study. For example, Rohenkohl's analysis did not adjust for attrition. Attrition disproportionately affected people from lower socioeconomic background, which likely lowered the estimates. Accordingly, through running the estimates without survey weights, the current study found that estimates did reduce somewhat to 0.338. Other smaller differences included who was included in the analytical sample. For instance, the current research had a smaller sample due to omitting siblings from the same household, whereas Rohenkohl used clustered standard errors to deal with sibling data. Finally, the present research did

not record the earnings of anyone still in full-time education unlike Rohenkohl's study, the inclusion of whom would also likely downward bias the intergenerational income association. Together, these details likely contributed to the discrepancy in findings and provide further evidence of how sensitive measures of intergenerational income mobility are to design decisions. The present research contributes to the existing evidence by providing a more representative description of income mobility through the use of survey weights, building on Rohenkohl's previous study which is likely a lower bound estimate of the true figure. The results of the present study are also likely downwardly biased due to low number of income observations and the limitations of survey data, discussed below.

In the context of the existing literature, this finding tentatively suggests that income mobility has not changed significantly across time, as it falls within a similar range of estimates for those born in 1970 (Belfield et al., 2017; Björklund et al., 2017; Blanden, 2013; Gregg, Macmillan, et al., 2017). There are many drawbacks of making direct comparisons between different studies due to the methodological challenges outlined above with how sensitive estimates are to design decisions, which has led to a lot of contention over long-term trends in income mobility in the UK. However, some have used direct comparisons to argue that mobility has not changed significantly since the cohort born in 1970, which is also in line with the findings of this thesis (Social Mobility Commission, 2023a; Van der Erve et al., 2024). Despite the limitations, it is one of the only ways available to measure historic changes in intergenerational mobility. A relatively stable intergenerational income persistence is in line with findings on trends of income mobility in the US using administrative data (Chetty, Hendren, Kline, Saez, et al., 2014), although it is in contrast to theoretical expectations based on modernisation theories which posit that over time, modern societies should see a declining intergenerational income association, as society becomes more of an 'education-based meritocracy' (Gugushvili et al., 2017; Bukodi & Goldthorpe, 2018). Rather, it suggests a persistent influence of parental income, suggesting that despite the efforts in increasing intergenerational mobility and equality of opportunity, avenues of intergenerational transmission have adapted in other ways to maintain persistence, more in line with theories of maximally and effectively maintained inequality. It is also in line with the findings of Bukodi and Goldthorpe for social class mobility (2018). The authors note a 'trendless fluctuation' in social class mobility since the 1940s in Britain, despite the expansion of higher education. The next section explores the role of education in mobility in more detail. Overall, it was not the aim of the present study to analyse trends in income mobility, but to provide an estimate for a more recent generation of individuals. These comparisons should not be over-interpreted and warrant careful consideration.

It is also important to consider the economic context in which this sample came of age in. While the 1990s to the 2000s were an era of massification of education, particularly under New Labour, this general expansion of higher education may not have been accompanied by a societal-level rise in income mobility, again in line with the findings of Bukodi and Goldthorpe for social class mobility

(2018). For the expansion of higher education to bring a rise in income mobility, it would need to be accompanied by a weakening of the link between socioeconomic background and educational attainment, a strengthening of the link between educational attainment and socioeconomic outcomes, and a stability or weakening of the link between socioeconomic background and outcomes outside the pathway of education too, conditions of which were not necessarily met in this period. The sample also generally began their working lives during the recession, aged 16-31 in 2009. A decade of austerity measures followed the financial crash, a period seeing rising levels of child poverty, cuts to public services, growing inequality and fewer graduate and professional and managerial jobs (Atkinson, Roberts & Savage, 2013). Some research has argued that the financial crash and following period of austerity had a detrimental effect on intergenerational mobility (Blanden, Eyles & Machin, 2018; MacLeavy, 2024). Hence, different forces likely worked against each other in their impact on societal level income mobility.

International comparisons should be viewed critically for the same reasons as comparisons across time, and evidence demonstrates that different design decisions can bias international comparisons (Strömberg & Engzell, 2023). Keeping these limitations in mind, it can be helpful to present international estimates as context for the present findings. Despite the drawbacks of direct comparisons, they have been made through combining estimates from different countries and ranking them. For example, one review combined estimates from studies of twelve countries, ranking UK as the third highest intergenerational association of income at 0.37, while the US was second highest at 0.41, and Denmark was the lowest at 0.14 (Blanden, 2013). This follows a common pattern ranking UK relatively high for high-income countries in line with that of the US, and Nordic countries tending to rank amongst the lowest (e.g., Corak, 2006). However, cross-country comparisons have largely relied on estimates of intergenerational elasticity. To provide some international context, the rank-rank association has been estimated at 0.34- 0.4 for the US using administrative data (Chetty, Hendren, Kline, & Saez, 2014; Mazumder, 2016). This would imply a similar level to the UK, in line with existing cross-national comparisons.

Direct income association

The current study also estimated income mobility while controlling for demographic controls such as sex, ethnicity and migrant status, relationships and most importantly, educational attainment. Findings demonstrated there was still a significant intergenerational income association even once controlling for educational attainment, which is referred to in the literature as the 'direct effect of social origin' (DESO). This implies that even when holding degree attainment and other characteristics equal, there remains a significant influence of parental income on offspring earnings.

Once educational attainment and demographic characteristics were taken into account, the direct association between parent income and offspring earnings decreased from 0.381 to 0.321, roughly a

16% decrease. A decrease in the association is expected along the lines of existing evidence and theory, albeit, this decrease is on a smaller scale than that of previous findings, for example Gregg et al. (2017) who found that education and cognitive skills accounted for 35% of the intergenerational transmission of income in the UK, however this study used more detailed measures of education meaning a greater decrease is expected to an extent. Most existing evidence that considers DESO uses social class or occupational measures though. One cross-national study of DESO in the intergenerational transmission of occupational status found that across most country studies including the UK estimated a decrease of around 50-75% when controlling for educational attainment (Bernardi & Ballarino, 2016). For example, Vandecasteele's UK study found that the intergenerational association of occupational status decreased from 0.313 to 0.140 for men when controlling for education, and women from 0.232 to 0.127, decreases of roughly 45% and 55%. However, these studies used more detailed education variables and again, were measuring occupational status rather than income. If the present study used a more detailed educational attainment measure, a larger decrease would be expected. This implies that further stratification within the different levels of education is key to intergenerational income mobility.

While the intergenerational income association decreased, the findings demonstrated that there remained a significant association once education and other factors were accounted for. The remaining direct association of 0.321 implies that even amongst graduates, or amongst non-graduates, those from lower income backgrounds obtain lower earnings than their more advantaged peers. These findings are also consistent with broader findings in the UK of an earnings premium for graduates of higher socioeconomic background which is persistent even when controlling for subject studied and educational institution attended (Laurison & Friedman, 2016). On the other hand, these findings contradict those of Vandecasteele, whose study showed that once accounting for education, there was no significant association between parental occupational status and offspring earnings. However, this study used different indicators of socioeconomic background and broader measures of educational attainment, likely leading to differing results.

There are a few theoretical mechanisms that can explain why a significant intergenerational income association remains after accounting for degree attainment. For example, differences in cognitive and non-cognitive skills that aren't captured by formal education; the financial support more advantaged offspring may receive from their parents to pay off debts or to take on unpaid work experience; access to social networks and discriminatory hiring practices may all contribute to intergenerational income persistence amongst graduates (or amongst non-graduates) (Bernardi & Gil-Hernández, 2021). In a similar vein, Bukodi and Goldthorpe (2018) also argue that there remains a strong DESO after accounting for education in social class mobility in Britain, attributing this to resources such as economic capital, social networks, cultural capital and employers' recruitment practices. Furthermore, theories of maximally maintained and effectively maintained inequality can offer explanation of how

161

those from higher socioeconomic backgrounds can maintain their advantage even amongst graduates. Effecively maintained inequality theory posits that with an expansion of access to higher education, more advantaged individuals will maintain their edge through differences in the quality of educational institutions and programmes (Lucas, 2001). In other words, qualitative differences between degrees can explain why simply earning a degree does not wholly explain the intergenerational transmission of income. Evidence suggests large differences in earnings potential across institusions, and programmes. For example, more selective institutions tend to produce higher earning graduates, but also tend to have more advantaged intake of students (Social Mobility Commission, 2023). Different programmes too have broadly different earnings potentials, with arts graduates broadly earning less, while subjects such as business, law or medicine tend to have higher earnings, with intakes of these subjects again shown to be socioeconomically stratified (Social Mobility Commission, 2023). Finally, in line with maximally maintained inequality, earnings and the intergenerational transmission of earnings may also be stratified somewhat by postgraduate degrees (Raferty & Hout, 1993). Masters degrees can lead to higher earnings, and help individuals get a foot in the door, however also represent a large cost which can lock some individuals out of acces, especially with postgraduate loans not covering living expenses in England (Wakeling & Laurison, 2017). Overall, it is expected for there to still be a significant intergenerational income association even once controlling for degree attainnment. These findings suggest that net of whether an individual has a degree or not, parental income is still a significant predictor of offspring income, which is in line with existing evidence. This finding also has implications for the next research question on the moderating role of educational attainment in the intergenerational transmission of income.

The findings also confirmed that intergenerational persistence remained at roughly 0.321 regardless of factors such as gender, family structure, ethnicity, family relationships and teacher relationships. While most previous estimates focus on the direct association thus include no demographic controls or only factor in education (e.g., Rohenkohl, 2023; Gregg et al., 2017; Vandecasteele, 2016), these findings are broadly in line with expectations. While there is some contention on whether there are differences in intergenerational income mobility across gender (Rohenkohl, 2023; van der Erve et al., 2024), ethnicity (Pfeffer & Killewald, 2019), migrant status (Bididsha, 2009) and family structure (Bloome, 2018), all groups experience to some extent intergenerational persistence, or in other words, these factors are not proposed to totally explain intergenerational mobility. However, this thesis contributes by including family and teacher relationships, a lesser explored factor in intergenerational income mobility literature. Again, the findings suggest that there is intergenerational mobility regardless of these relationships, which is also in line with the expectations of this thesis, as it proposed that intergenerational mobility may vary across relationships, not that it is explained by it. Some theory and evidence suggest that family relationships may partially mediate the link between family SES and offspring socioeconomic outcomes (Hango, 2007; Moullin et al., 2017). The

moderating roles of gender, family relationships and teacher relationships are explored more in the sections below.

Overall, the present study contributed to the existing evidence base by providing an estimate of intergenerational mobility for a recent generation, those born between 1977 and 1992. It builds on previous work using the same data by adjusting for attrition and for offspring in full-time education, suggesting that previous estimates may be a lower bound estimate. It also provides methodological contribution in general to estimates of income mobility in the UK by addressing attenuation bias in measures of parental income to a certain extent, which is shown to downwardly bias estimates. It does this through relying on rich prospective data on parental income. It also provides estimates of the association of parental income and offspring earnings for a recent generation net of educational attainment and key demographic factors, building on the existing evidence base by confirming the existence of DESO when it comes to income transmission. While it has made these important contributions, including methodological and data contributions, its most significant contributions were through its study of moderators, as discussed below.

Limitations and future research

It is important to keep in mind the limitations of this study. While this descriptive association is an important indicator of fluidity within the UK, one that should continue to be measured and used as an indicator of progress, it should be noted that this general summary measure may not be generalisable to everyone. The rest of this thesis focuses on potential moderators and ways that income mobility varies within the UK, but wider evidence also demonstrates that it varies by region and ethnicity amongst other characteristics (Bididsha, 2009; Social Mobility Commission, 2024). Additionally, this estimate is historic and cannot necessarily be generalised to younger generations. Intergenerational income mobility can only be measured once individuals are in adulthood, in their twenties or thirties. So, while the estimates should only be generalised to those born between 1977 and 1992, they represent some of the most recent estimates possible when measuring labour market outcomes prospectively. In this respect, it is not the most responsive measure, especially for capturing the effect of shorter-term changes and policies. In 2023, the Labour Party proposed using relative intergenerational income mobility as a measure to monitor how well their education policies were doing in terms of equality of opportunity, however for these reasons it is not the most effective measure to capture policy changes in the short-term. Instead, it remains of utmost importance as an indicator of more general, long-term progress, especially as the measure captures a wide range of mechanisms. Despite this, the lessons and implications are likely still be applicable to an extent to younger generations.

Secondly, this descriptive association does not reflect causality or effect (despite the terminology of total and direct effect used in the intergenerational mobility literature). There are many potential

confounding variables that have been left out of the analysis, for example cognitive and non-cognitive skills. This is not necessarily a limitation, but rather a factor to consider when drawing conclusions from the results.

Thirdly, the analysis is affected by several data limitations. Income data from surveys is well-known for being unreliable through underreporting of informal income and very high incomes (Atkinson & Piketty, 2007). Hence, the data used may not be true to the population. In fact, when using administrative data as opposed to survey data, several studies have found higher estimates of intergenerational income persistence compared to when using survey data (Acciari et al., 2019; Chetty, Hendren, Kline, Saez, et al., 2014). Furthermore, around 10.4% of female offspring had zero labour earnings observed compared to 6.6% of male offspring, suggesting that women's earnings may be underestimated. Zero earnings may be observed during maternity leave or other childcare related breaks, meaning that their lifetime income is not accurately estimated. Women have been excluded from many previous estimates of income mobility on these grounds, which is why the present research also carried out separate analyses on men and women which is discussed below. For future research, the UK needs administrative data to be available for more robust estimates of income mobility, that also allows for further analysis of how income mobility varies over time and within the UK. While some research has made use of administrative data on offspring earnings in the UK, the data lacks detailed information on parental income (Van der Erve et al., 2024). More robust, long-term measures of income mobility can facilitate a better understanding of the mechanisms behind income mobility, and in turn how to improve it. While administrative data is still subject to certain measurement biases, it can bring estimates of UK mobility more in line with the quality of international estimates.

Finally, intergenerational income mobility is but one facet of a broad multidimensional concept of social mobility and equality of opportunity. It needs other measures and context to be understood, and importantly, how to improve it. For example, while this research reflects parental income to offspring earnings transmission, it does not look at wealth, an increasingly important dimension of socioeconomic status (Hällsten & Thaning, 2022). The measures employed of gross income and earnings also do not represent the effect of taxation, and the impact of unearned income such as benefits or investments. Overall, it does not capture a full picture of socioeconomic status or finances available, but one part of it. This is important to keep in mind when interpreting and generalising these findings. Future research would benefit from understanding intergenerational mobility using indicators of wealth, social class, and varied measures of income.

Implications and recommendations

These findings have important implications for policy. Firstly, the findings show that intergenerational income mobility remains a key issue in the UK, with one percentile of parental income associated

with an additional .3 of a percentile of offspring earnings. This provides important information for policymakers who wish to monitor the progress of intergenerational mobility, an explicit goal of the Social Mobility Commission, and tying into the Government's Opportunity Mission. It is particularly important considering the generation in question. As mentioned in the literature review, the offspring in the sample mostly finished secondary education under the government of New Labour, an era which was associated with significant change in educational policy, much aimed at improving equality of opportunity. It is clear however that this generation continued to experience a significant amount of intergenerational persistence. In order to design interventions for improving intergenerational mobility, it is first paramount to understand how much intergenerational mobility there is. This was recognised by the Government's Opportunities Mission which proposed to use intergenerational income mobility as a measure of equality of opportunities and a benchmark goal (Labour Party, 2023). While the measure is historical in nature, in that it describes intergenerational income mobility for those aged 25 and above rather than for younger people today who are to be affected by policy, it is a broad signal of progress in the UK on intergenerational mobility. However, the total association of income between parents and their offspring is a broad process that captures many different mechanisms, making it difficult to pinpoint exact interventions that can improve mobility without further investigation, which is done in the rest of the thesis. Overall, it highlights that intergenerational mobility remains a salient issue in the UK and has not necessarily improved over time and also suggests that the UK remains a low mobility country in comparison to international estimates.

Secondly, the findings also showed that there is a substantial amount of intergenerational income association even when controlling for degree attainment. These findings imply that degrees alone are not enough to disrupt intergenerational persistence of income. This may be due to differences in quality and earnings potential between different institutions, programmes and levels of qualifications, or wider sources of inequality. In the past, there has been a narrative that 'a degree could do it', with regards to disrupting intergenerational cycles of disadvantage (Hout, 1988). These findings demonstrate that this narrative, coupled with the contentious notion of meritocracy, is not applicable to more recent generations in the UK with regards to higher education. In other words, even if young people from disadvantaged backgrounds complete a degree, they still experience significant pay gaps. This is important for young people today in the UK, especially in the context of England where students face massive debts to attend university courses, many of whom do not make their money back, which differs broadly between institutions (Russell-Jones, 2024). In this climate, many questions 'whether a degree is worth it'. While this thesis does not claim to have an answer to this question, as a university degree can have many other benefits than simply future earnings, it does put into question the role of a degree in breaking intergenerational cycles. It is vital that young people are aware of the costs and benefits of different university degrees, and address assumptions that

participation in higher education alone is enough to disrupt intergenerational cycles of disadvantage. This also implies that interventions aimed at improving intergenerational mobility need to go beyond widening participation to provide further support for example in wider participation across all institutions and programmes and help beyond education as well for example through career development support. The moderating role of education and its implications is explored in more detail in section 5.2.

Overall, it is clear that lower parental income is persistently associated with lower earnings, comparable to gender or ethnicity pay gaps. However, current policy does not treat socioeconomic background as a protected characteristic, like gender, ethnicity and disability. This evidence supports the call for more protection for potential discriminations against socioeconomic background, for companies to measure and report on the socioeconomic diversity of their employees and hiring practices, and for government to enact the socioeconomic duty. Not only would these measures help protect from discriminatory hiring practices but also raise awareness of the issue.

5.1.1   Income mobility across parental income distribution

Following on from these summary measures of income mobility, the next part of the research investigated the linearity of the association between parental income and offspring earnings. It found a linear association, meaning that income mobility was estimated to be generally consistent across parental income. This finding suggests that no matter the amount of parental income, parents pass on roughly a third of their (dis)advantage to their offspring.

According to the existing literature, this finding is not wholly unexpected. There have been mixed empirical findings regarding nonlinearity of income mobility across income distributions, with different patterns seen across different countries and according to methodological approach. According to a cross-national study, intergenerational earnings elasticity was found to be linear across paternal income in the UK and the US, however the pattern was convex in Denmark, Finland and Norway (Bratsberg et al., 2007). In other words, there was higher mobility for those from lower income families, which the authors argue is related to strong public education systems in the Scandinavian countries. Furthermore, it's been found that intergenerational elasticity is more likely to exhibit nonlinearities than rank-rank slopes (Chetty, Hendren, Kline, Saez, et al., 2014; Mazumder, 2016). In the UK, while it's been found that income mobility was non-linear across *offspring* income distribution (Gregg et al., 2019), research suggests that it is linear across *parental* income distribution (Bratsberg et al., 2007; Rohenkohl, 2023). Thus, this study's findings correspond with these conclusions.

While the finding is generally in line with the literature, it is somewhat unexpected according to theoretical considerations. For instance, according to Becker and Tomes human capital model, low-income families are expected to have lower levels of income mobility due to credit constraints on

investing in their children (Becker & Tomes, 1979). Similarly, according to mechanisms known as 'sticky floors' and 'sticky ceilings', lower levels of mobility are expected at both ends of the distribution, also characterised as a 'glass floors and ceilings' (Gugushvili et al., 2017; OECD, 2018). In the UK, glass ceilings are particularly expected considering the role of private schools and the relationships between school performance and house prices which protect those from advantaged origins from downward mobility and also create a barrier for those from disadvantaged origins to experiencing upward mobility. However, broader research investigating the credit constraints theory have repeatedly found a lack of empirical evidence to support the theory (Han & Mulligan, 2001). As for the glass floors and ceilings, these often reflect a range of socioeconomic measures, rather than solely relative income mobility, which may also explain the discrepancy in findings. Previous studies looking at the sticky ends also have tended to emphasise differences in upward mobility and downward mobility, whereas the currently employed measure of mobility does not differentiate between upward and downward mobility.

Overall, the present findings have built on the existing literature through confirming the linearity of the intergenerational association between parental income and offspring earnings.

Limitations and future research

There are a few limitations that need to be addressed. Firstly, the limitation of using survey data is that especially low and especially high incomes may be underestimated. Previous research has suggested that this is particularly important in estimating linearity across income distribution as it is in the extreme ends where the 'stickiness' may be taking place (Acciari et al., 2019; Corak & Heisz, 1999). Therefore, a pattern of linearity could be due to spurious reasons rather than substantively reflecting the economic reality. Secondly, Gregg et al. (2019) demonstrate that nonlinearities tend to appear later in life, meaning these results may be limited by the young age of the sample when earnings in adulthood are measured. However, robustness checks using earnings at a later age also confirmed linearity, meaning that it is unlikely to be biased by offspring age. Thirdly, these results are not necessarily generalisable to other countries, or even other cohorts in the UK. As cross-national studies have shown, some countries tend to have differing patterns of income mobility across parental income distribution. Thus, these likely reflect institutional differences. Instead, these results should be interpreted to reflect the income mobility of the studied generation in the UK.

It is clear that the empirical evidence of income mobility across the parental income distribution is not in line with prominent theories of intergenerational mobility. In light of this, it is important for future research to explore this inconsistency between theory and empirical evidence and explain why there may be sticky ends in other countries such as the US and Canada, but not in the UK, and whether this is a result of policies focused on promoting equality of opportunity.

Implications and recommendations

Overall, these findings imply a lack of 'sticky ends' in the UK. While around a third of (dis)advantage is passed on from an individual's parents, it is similar across the parental income distribution. Firstly, this implies that summary estimates of income mobility can be used to describe the intergenerational association across the income distribution, providing a useful summary measure of progress toward intergenerational mobility. This also validates the moderation analysis presented in the rest of the thesis. Secondly, the findings also imply that those from low-income families have as much chance of mobility as those from higher income families. This suggests that policies aimed at promoting equality of opportunity may be counteracting potential glass floors and ceilings, although there is a need for further research to fully investigate the mechanisms behind the linearity of income mobility in the UK.

While this implies that intergenerational mobility is similar across the parental income distribution, negating the hypothesis of sticky ends in this measure, it is important not to overinterpret these findings. As mentioned, this measure is but one facet of the broad multidimensional concept of social mobility, advantage and disadvantage based on parental SES. Even if those from the poorest families' earnings may be explained a similar amount by their parental income than those from the richest families, there are many other advantages and barriers that remain. For example, those from wealthy families may inherit wealth, or receive financial support in helping to buy a house, pay rent during university or unpaid or low paid internships, amongst other things. Therefore, it is important not to draw overly broad conclusions from this result in life chances across the income distribution.

5.1.2   Income mobility across gender

Key findings and contributions

Next, the present study aimed to examine whether income mobility varied across offspring gender. Findings showed that mobility did not vary meaningfully across men and women, for neither the total association nor the association net of education and other factors, meaning that differences in parental income explained roughly a third of differences in offspring earnings for both men and women.

According to the existing literature, there are some mixed findings, but the finding of equality of intergenerational income mobility between men and women is in line with some existing studies from the UK (Blanden et al., 2004; Rohenkohl, 2023). This is also in line with international findings from the US and across Europe (e.g., Bukodi & Paskov, 2020; Chetty, Hendren, Kline, & Saez, 2014; Engzell & Mood, 2023; Mazumder, 2005). While lack of gender difference is a common finding in mobility studies, it may be intuitively surprising considering factors such as the gender pay gap, and gender differences in educational attainment. However, many different processes are at play beneath these summary measures of income mobility, such as assortative mating, returns to education, employment patterns and direction of mobility, to name a few. Bukodi and Paskov (2020) look into

gender differences in social class mobility in several European countries. They argue that a lack of gender difference in mobility can be explained by a variety of factors including more equal investment into sons and daughters and higher returns to education qualifications for men than women (Raaum et al., 2008). They also argue that the glass ceiling for women has an impact, where women are kept from higher paying jobs, but also women from higher socioeconomic backgrounds choosing lower paying jobs disrupts the intergenerational income association. Their cross-country study similarly found no systematic gender differences in social class mobility across European countries.

On the other hand, some of the findings of existing literature show different patterns. For example, some studies have found lower intergenerational income persistence for women in Italy and the US (Acciari et al., 2019; Eshaghnia et al., 2023). Furthermore, in a cross-national study, findings showed that there was a stronger influence of parental occupational status on sons' occupational status than daughters, whereas there was a stronger influence of parental occupational status on daughters' income than sons (Bernardi & Ballarino, 2016). They argued that this was likely due to spurious reasons, the fact that women had smaller occupational status variation, meaning a smaller intergenerational association, and larger variation in income due to differences in number of working hours and employment in low-paid jobs, meaning a larger intergenerational association. Similarly for relative social class mobility in Britain, some research has found that women have higher mobility than men, which has been increasing over time (Bukodi et al., 2014). The authors attribute this to 'perverse fluidity' where the greater level of mobility for women is driven by higher downward mobility due to women from more advantaged origins being more likely to take lower status and lower paying jobs.

While the intergenerational association estimated in the present research was very similar for men and women for the 'total effect', once taking account of educational attainment, the 'direct effect' was slightly lower for women, although this difference was not statistically significant. This means that after accounting for education amongst other factors, women had a remaining intergenerational persistence of roughly 0.28 and men had a remaining direct intergenerational persistence of roughly 0.34, however the analysis could not confirm that these differed meaningfully. While there is a dearth of existing research in the UK looking at the intergenerational transmission of income net of educational attainment, previous research looking at the association between parental occupational status and offspring income also did not find a meaningful difference in the direct effect between men and women (Vandecasteele, 2016). The present research contributes by confirming a lack of gender difference in the direct effect of parental income on offspring earnings net of educational attainment.

While the 'direct association' between parental income and offspring earnings net of educational attainment and other factors did not differ significantly across gender, this may be obscuring important underlying gender difference, nonetheless. For example, existing evidence suggests that

educational attainment plays a stronger mediating role in intergenerational mobility for women compared to men (Bukodi et al., 2017; Bukodi & Paskov, 2020). Similarly, evidence shows that women have higher earnings return to education than men (Diprete & Buchmann, 2006). This is supported by theory suggest that in a society of increasing gender equality, women's mobility is increasingly 'meritocratic', in other words, mediated through educational attainment and a stronger link between education and destination (Bukodi & Paskov, 2020). However, this would suggest that once education is accounted for, women would expect to have a lower direct intergenerational association. This suggests other factors are likely at play. It is clear that overall similar levels of the 'direct effect' may be obscuring differences in mechanisms. This demonstrates the importance of interrogating and investigating gender differences and their mechanisms in intergenerational mobility. Differences in the role of education for men and women will be further explored in the following section.

Overall, these findings contribute to the existing base of evidence in confirming that intergenerational income mobility does not significantly vary across men and women. While many traditional mobility studies and still some mobility studies today exclude women, either as mothers or as daughters, this research contributes by analysing the mobility of both men and women and demonstrating that results are largely generalisable across gender. Additionally, it contributes by demonstrating that the intergenerational income association does not differ across gender even when accounting for educational attainment amongst other factors, although this may be concealing underlying differences in returns to education. This study builds on the existing literature by being amongst the first to estimate this for intergenerational income mobility in the UK, with most previous studies largely relying on parental social class.

Limitations and future research

These findings must be viewed in light of their limitations. While intergenerational income mobility appears to be a good measure of progress and fluidity regardless of gender thus an effective summary measure, it can conceal important gender differences in the underlying mechanisms. Intergenerational income mobility can reflect many complex mechanisms at play, and with summary measures it is difficult to attribute the differences. Hence, an understanding of gender differences should not be neglected. Furthermore, the measures may not be generalisable across men and women of different characteristics, such as region or ethnicity as mentioned previously. An intersectional approach should be considered to capture the complexity of these dynamics. Future research should explore in more depth the potential differences in underlying mechanisms of intergenerational mobility for men and women.

Secondly, there are some data limitations. These results may be limited by the fact that earnings estimates for women are more likely to be subject to measurement issues. For example, women's

earnings tend to fluctuate more through their life, especially when considering maternity leave, or reducing hours for childcare (Blau & Kahn, 2017). Therefore, if earnings were estimated for women during a period of maternity leave or childcare, they may be underestimated as a lifetime proxy. Furthermore, the binary category of educational attainment may conceal a lot of important heterogeneity, for example between bachelor's degrees, postgraduate degrees, and differences in institutions and subjects studied and the potential gender differences.

Implications and recommendations

Despite these limitations, there are still important policy implications from the findings. Intergenerational income mobility is a valuable indicator of fluidity for both men and women in the UK and provides a useful statistic for policymakers wishing to monitor progress in this area, although other contextual measures are also important to provide a deeper understanding. It also suggests that efforts to improve intergenerational mobility should be equally aimed at both men and women, both of whose earnings are influenced by their parental income. However, interventions should take account of underlying gender differences in mechanisms of mobility, for instance underlying differences in educational attainment, or returns to education. Policy implications and recommendations regarding the role of education are discussed in more detail in the following section.

5.2   *Moderating role of education*

The next aim of the thesis was to examine the question to what extent intergenerational income mobility varied by offspring educational attainment. First, the moderating role of educational attainment was considered in the intergenerational income association. Then, potential gender differences were examined. The main findings are discussed in the context of the literature and theoretical framework in this section, outlining the contributions and substantive meanings of the findings, and then finally limitations and implications are discussed.

The moderating effect of a degree

Firstly, this thesis employed multigroup analysis to examine whether the association between parental income and offspring earnings varied by degree attainment. The findings revealed a weaker association for degree-educated individuals compared to those without a degree. In fact, degree-educated individuals experienced over double the rate of intergenerational income mobility as those who were not degree-educated, confirming educational attainment as a moderator of income to earnings persistence.

The finding of a weaker intergenerational association for those with degrees compared to those without degrees, was expected to some extent, in line with much of the existing literature. Previous studies across countries and employing a range of socioeconomic measures have found evidence of a moderating role of educational attainment (Bernardi & Gil-Hernández, 2021; Breen, 2010; Hout,

1988; Torche, 2011; Vandecasteele, 2016; Witteveen & Attewell, 2020; Zhou, 2019). More specifically, one study found higher individual earnings mobility and family income mobility for men with bachelor's degrees compared to those without in the US, albeit lower again for those with postgraduate degrees (Torche, 2011). Another US-based study found that intergenerational income mobility was higher for graduates, before accounting for college selectivity (Zhou, 2019). While no UK-based studies have examined the moderating role of education in intergenerational income mobility, one study looked at the moderating role of educational attainment in the link between parental occupational status and sons' and daughter's occupational status and earnings. The study used six levels of educational attainment, from none or elementary education up to higher tertiary education and used data from the BHPS, finding differing effects across socioeconomic measures and gender. However, they found for men's occupational status mobility that men with a degree (lower or higher tertiary) experienced greater occupational status mobility compared to men without a degree (higher general or vocational level) (Vandecasteele, 2016). Similarly, Torche's study also found higher social class and occupational status mobility for men and women with degrees compared to those without. Finally, a cross-national study found higher social class mobility for men with a tertiary degree in Britain, Germany and Sweden (Breen, 2010). These findings are in line with the theorised mechanism of compensatory advantage, where those from more advantaged backgrounds may compensate for low educational attainment, for example through social network or cultural capital, meaning that non-graduates have a lower rate of intergenerational mobility overall compared to graduates (Bernardi, 2014). On the demand side of the labour market, the finding of a moderation effect is also in line with the theory of a more meritocratic graduate labour market (Hout, 1988; Torche, 2011). This theory suggests that the graduate labour market relies less on socioeconomic background and characteristics associated with socioeconomic background to select candidates and instead focuses on the skills signalled by educational attainment. It could also suggest that earning a degree fosters greater skills, allowing those from disadvantaged backgrounds to overcome their initial disadvantage, and putting them on more equal footing with their more advantaged peers (Torche, 2011). However, equally this could indicate the mechanism of selectivity, where students who are already more likely to achieve more are selected into universities, questioning whether the moderating effect of education indicates a causal effect of attending university on intergenerational mobility.

However, some previous studies have suggested that there is no moderating effect of educational attainment, sometimes depending on the measurement of SES and gender. For example, no clear moderating role of educational attainment was found in earnings or income mobility for women in the US (Torche, 2011) nor for the association between parental occupational status and sons' and daughters' earnings, or occupational status of daughters in the UK (Vandecasteele, 2016). In fact, the cross-national research in which Vandecasteele's study features found that while in the majority of countries, occupation-based mobility was higher for those with lower education, the association

172

between parental occupational status and offspring income either remained similar across education levels or was even higher for those with higher education (Bernardi & Ballarino, 2016). From these existing studies, it would seem that while a moderating effect of educational attainment is often found in social class and occupational measures of mobility, there tends to be a weaker or non-existent moderating effect for economic measures of mobility such as earnings or income, and for women, which is in contradiction to the findings of the present study. In contrast, a recent study found clear moderation effects for income mobility but found these effects to be obscured when replicating analysis using parental education or occupational status, arguing that these measures may "fail to fully capture families' economic standing, including income disparities within occupations" (Fiel, 2020, p. 367).

There are a few theories that can explain why there may be a weaker or even no moderation effect of education for earnings mobility as opposed to social class mobility, like found in the work of Vandecasteele (2016). Different dimensions of intergenerational mobility represent unique phenomena with their own distinct patterns and mechanisms, so a difference in the moderating role of education may reflect these differences. One study proposes that the influence of parental SES may be weaker for those with higher education on offspring *occupational status* but stronger for those with higher education on offspring *earnings* due to different strategies of downward mobility avoidance. Bernardi and Gil-Hernández (2021) suggest that those who come from higher socio-economic families experience *compensatory advantage* where even in cases of lower educational attainment, the consequences are avoided through mobilising social, cultural and economic resources to avoid lower status occupations (Bernardi, 2014). On the other hand, when it comes to offspring income, more of a *boosting effect* may take place, where coming from a more advantaged family can lead to higher earnings for graduates. For example, two students from different socioeconomic backgrounds may both earn law degrees that gets them a high-status occupation as a lawyer, but the student coming from a more advantaged background may be more able to get a job in a more prestigious firm, using the social or culatural captial of their parents (Bernardi & Gil-Hernández, 2021). This is also in line with the theory of effecitvely maintained inequality (EMI), where those from more advantaged backgrounds can maintain their advantage even with the same level of education as their peers from more disdavantaged backgrouds such as through pursuing degrees that have greater earnings potential (Lucas, 2001). Earnings differences between degrees are more pronounced than social class or occupational differences between degrees, especially as earnings capture more granular mobility, meaning that the moderating effect of a degree may be more obscured when looking at earnings mobility. Taking the National Statistics Socio-economic classification (NS-SEC) social class categories as an example, there is great variation in average earnings amongst the highest category of higher managerial, administrative and professional occupations. For example, early educational and childcare proprieters earn on average £24,388 compared to chief executives and senior officials

earning on average £88,056 annually (Office for National Statistics, 2024). These differences can be amplified by measuring earnings as opposed to social class. While students from lower socioeconomic backgrounds may earn degrees that lead to higher status occupations, they may choose degrees that have lower earnings returns. Overall, these effects may explain why a weaker moderation effect takes place for intergenerational income mobility compared to intergenerational social class or occupational mobility.

Alternatively, the weaker moderating effect of education on earnings outcomes may also be due to spurious reasons. Previous research has suggested no moderating effect of education on the intergenerational association between parental occupational status and offspring earnings in the UK and internationally, however the present research challenges this finding when it comes to income to income mobility (Vandecasteele, 2016; Bernardi & Gil- Hernández, 2021; Bernardi & Ballarino, 2016). One limitation outlined in Bernardi & Ballarino (2016) suggested that the difference in the moderating results between occupational status and income could boil down to the fact that "the coefficients for the independent variable tend to be larger, the larger the variance on the dependent variable" (Bernardi & Ballarino, 2016, p. 265). Measures of occupational status or education have a fixed range, and the distribution of logged income is more dispersed, especially among high earners, which may explain why most studies found a higher association for the higher educated. The present study addresses this limitation and gap in the literature by using two comparable measures of income for parents and offspring and finds that a bachelor's degree is associated with higher intergenerational income mobility and is amongst the first to do so for the UK. This finding is more in line with international findings (Breen, 2010; Hout, 1988; Torche, 2011; Zhou, 2019). It also contributes by being amongst the first studies in the UK to use detailed parental income data, which benefits from capturing differences in resources growing up that parental social class may not capture. Through this analysis, it confirmed that degree-holders experience higher income mobility, which was not captured in previous UK studies.

While the present study is amongst the first research in the UK to use detailed parental income data in the investigation of the moderating role of educational attainment, it follows the work of international studies, particularly in the US. The few studies that have investigated the moderating role of educational attainment in intergenerational income mobility have found broadly similar results, suggesting that bachelor's degree holders experience higher mobility than those without degrees, before adjusting for selectivity (Fiel, 2020; Torche, 2011; Zhou, 2019). However, most studies employed measures of intergenerational elasticity (IGE), utilising logged income and earnings with the exception of Zhou (2019). As mentioned in the methodology chapter, IGE reflects not only re-ranking but also changes in the income distribution. Furthermore, there are several limitations to IGE, including sensitivity to measurement issues such as lifecycle bias, limitations to subgroup comparison and lack of linearity. With this in mind, more recent literature on intergenerational income mobility

has preferred to use the measure of rank-rank mobility, which tends to be a more robust, less biased measure of mobility. The present research provides a methodological contribution to the international literature by using rank-rank slopes to investigate the moderating role of education in intergenerational mobility. This may be especially important when investigating the moderating role of education, as there tends to be greater income disparity amongst those with higher incomes and education, the disparities of which have changed over generations (Jenkins, 2017). By using rank-rank slopes, the pattern of mobility cannot be attributed to changes in income distribution, but solely to the re-ranking.

Finally, an alternative interpretation of these findings could suggest that there are higher returns earnings-wise to higher education for individuals from lower income backgrounds compared to those from higher income backgrounds. While getting a degree is beneficial for all, in that on average, people with a degree earned more than those without a degree, this disparity was the greatest for those from lower income backgrounds. This is demonstrated by point prediction and the visualised simple slopes model. Greater returns to a degree for those from lower income backgrounds is generally in line with existing evidence from research on the returns to education by socioeconomic background (Brand & Xie, 2010; Hout, 2012). This alternative interpretation of the moderating role of education was also pointed out by Karlson (2019). It is also in line with risk and resilience theory, where education can play a protective factor for those from lower income backgrounds on their future SES, who are at greater risk of lower future earnings and thus have more to benefit. Additionally, it could also reflect compensatory advantage theory, where those from higher income backgrounds can compensate for lower education when it comes to their income, but those from lower income backgrounds cannot, meaning education provides a crucial path to higher earnings.

Overall, these findings suggest a moderating effect of earning a degree in intergenerational income mobility, suggesting that those with a degree experience higher intergenerational mobility than those without a degree. These findings are generally in line with existing findings and theories, however the study also contributes to the existing evidence by being amongst the first to estimate the moderating role of education for intergenerational income mobility in the UK, addressing a substantive gap and potential methodological issues and suggesting a moderating role of education in contrast to previous findings of no moderating role when it comes to offspring earnings. This finding is important as it brings UK evidence more in line with international findings and also contributes to international research by using rank-rank associations, addressing methodological limitations of IGE measures, and demonstrating that findings cannot be attributed to changes in the income distribution.

Partial or total moderating effect of education

A significant association between parental income and offspring earnings remained for degree holders in two of the three models analysed, suggesting a partial moderation took place. There is some debate

in the existing literature whether earning a degree partially or fully moderates intergenerational income association, but this finding is in line with some existing evidence. For example, while some studies have asserted that a college degree erases the influence of parental social class on their offspring social class as once suggested by Hout (1988), or that intergenerational persistence "virtually disappears" for those with degrees as concluded by Torche (2011, p. 798) and corroborated by the findings of Karlson (2019), other studies have questioned these findings. Some suggest that there is still a substantial effect of socioeconomic background on socioeconomic destination for degree holders (Bernardi & Gil-Hernández, 2021; Witteveen & Attewell, 2020). There are a few potential reasons as to why only a partial moderation effect takes place. These reasons include horizontal stratification within higher education, in line with effectively maintained inequality thesis (Lucas, 2001). However, even after controlling for institution and subject studied, some research has shown that those from lower social origins still earn less than their more privileged peers (Friedman et al., 2017). Secondly, access aside, even once into the university system, low-income students can face multiple barriers to learning and engagement linked with discrimination, set-backs and social exclusion (Reay, 2018). It may also reflect the advantages that those from wealthier families may have in the graduate labour market, such as financial resources to relocate for work, take greater risks, or using social and cultural capital such as networks to get higher returns from their degrees. This mechanism is referred to as a 'boosting effect', where more privileged backgrounds can provide a boost to the outcomes of those who complete a degree, which might be working against the 'equalising' effect of the other mechanisms. Alternatively, the remaining intergenerational association may be explained simply by the inclusion of those with postgraduate degrees in the binary analysis, which as discussed, tends to raise intergenerational persistence. Overall, the present study findings suggest that a partial moderation took place for those with degrees, undermining the notion of modern societies as education-based meritocracies (Gugushvili et al., 2017; Witteveen & Attewell, 2020).

The moderating role of different levels of education

As suggested in the literature, there is substantial heterogeneity within the binary measure of degree or no degree, potentially obscuring important differences. Thus, the thesis also employed multigroup analysis to estimate intergenerational income mobility across five levels of educational attainment. The findings showed a 'J' shape, where those with a bachelor's degree experienced the lowest persistence; those with less education experienced higher persistence and those with postgraduate degrees experienced slightly higher persistence too. However, the multigroup analysis suggested the only statistically significant difference was between those with lower secondary education and those with degrees. In other words, this confirmed the previous findings that those who achieve a degree experience higher income mobility, although these results must be taken with caution due to small sample sizes.

The multigroup analysis across five levels of educational attainment found that the only statistically significant difference in intergenerational mobility was between those with a degree and those with lower secondary education when controlling for both basic and demographic controls. No statistically significant differences were found when controlling additionally for teacher and parent relationships. This can be interpreted to confirm that those with a degree experienced higher intergenerational income mobility than those with lower secondary attainment. As mentioned above, this is in line with existing evidence on the moderating role of education in intergenerational mobility. Several US-based studies also found that a degree had the highest level of mobility and is in line with the arguments of Hout (1988) and Torche (2011) that a degree is the threshold that improves intergenerational mobility. While there is a dearth of research into the moderating role of education in intergenerational income mobility in the UK, this is also broadly in line with UK evidence using other socioeconomic measures (Vandecasteele, 2016). These findings are also consistent with existing theoretical considerations. In the literature review, several mechanisms were proposed to explain why there might be higher intergenerational income mobility for those with higher levels of education. These include the theory that graduate labour markets are more 'meritocratic' than less skilled labour markets (Torche, 2011) and compensatory advantage where those from a higher socioeconomic background can compensate for low education with their family resources or connections and still go on to higher earning jobs (Bernardi, 2014). Another theory proposed that higher income mobility for degree-holders could also come down to selection effects, where individuals from lower income backgrounds are more highly selected into university based on unobserved characteristics such as ambition (Fiel, 2020; Zhou, 2019).

As mentioned, the findings were that of a J-shape, suggesting that those with postgraduate degrees had lower mobility than those with bachelor's degrees. While the difference in intergenerational mobility wasn't statistically significant, these findings would be in line with international evidence which shows that postgraduate degree holders tend to have lower intergenerational mobility than degree-holders (Bernardi & Gil-Hernández, 2021; Breen, 2010; Oh & Kim, 2020; Torche, 2011, 2015). While there is a dearth of research in the UK looking at the difference in mobility between degree holders and postgraduate degree holders, the results would align with recent research in the UK that found a strengthening of the effect of social origin on social destination for postgraduate degree holders (Wakeling & Laurison, 2017). Lower intergenerational mobility for postgraduate degree holders would challenge some of the theoretical mechanisms outlined above. For example, it would challenge the theory that universities help form skills and human capital, enabling students from lower socioeconomic backgrounds to overcome disadvantages and excel in the labour market, in other words challenging the causal effect of getting a degree in improving intergenerational mobility. It also challenges the theory that the graduate job market is more meritocratic, especially as postgraduate degrees are even more specialised and signal more skill. Additionally, it challenges the

theory of selectivity as those who go on to postgraduate degrees should theoretically be even more highly selected on positive characteristics. Instead, Torche (2011) suggested that that lower mobility at a postgraduate level may be due to greater horizontal stratification at the postgraduate level for socioeconomic outcomes. For example, a medical doctor's qualification has vastly different earnings potential than a Masters degree in a different subject. Research in the UK also suggests that lower mobility at a postgraduate level could be explained by the higher entry cost to postgraduate degrees, along with the lack of focus on widening participation at the postgraduate level (Wakeling & Laurison, 2017). Across the UK, the cost of a postgraduate degree can be prohibitive as they are not supported by loans or grants in the same way that bachelor's degrees are. Overall, these findings are suggestive of lower intergenerational mobility for postgraduate degree holders, but as it did not meet convention thresholds of statistical significance, further investigation should be undertaken.

Overall, analysis of the moderating role of education split into five categories confirmed that earning a bachelor's degree was associated with higher intergenerational mobility, in line with international findings. It contributed by being amongst the first UK-based research to investigate difference between the moderating role of education in intergenerational income mobility between bachelor's degree holders and postgraduate degree holders. In line with international findings, and national research into occupational outcomes, the present research findings are suggestive of a lower rate of intergenerational mobility for postgraduate degree holders, although these findings must be interpreted with caution due to small sample sizes. The key takeaway is that educational attainment does moderate the intergenerational transmission of income.

Potential confounders

Most previous work that has examined the moderating role of educational attainment in intergenerational mobility has used limited covariates and only investigated an interaction between education and family income. Instead, the present research employed a range of covariates to control for potential confounders, and multigroup analysis which allowed for an interaction between education and all the variables in the model, allowing the inclusion of potential confounding interactions too in line with previous work (Fiel, 2020; Zhou, 2019) and to address some limitations of using single interaction models (Beiser-McGrath & Beiser-McGrath, 2020).

While previous research has mostly employed single interactions, some papers do similarly address the issue of potential confounders. Fiel (2020) considers confounders as potential spurious reasons for the moderating role of a degree, rather than causal. For example, their study includes an interaction between ethnicity and educational attainment, as if the association between ethnicity and income is moderated by educational attainment, then this could create a spurious interaction between parental income and education on earnings. In other words, this ensures that ethnicity-based moderation of education effects is not misattributed to parental income. The results did show an interaction between

educational attainment and ethnicity, suggesting it as a potential confounder. In a similar vein, Zhou (2019) argues that family structure may be related to family income, thus confounding the 'causal effect' of education. If education moderates the association between family structure and offspring earnings, for example, acting as a protective factor, then not including the interaction could lead to the spurious observation that education moderates intergenerational income mobility. When controlling for family structure using a novel re-weighting technique, they found there was no longer a moderating effect at the degree level. Similarly, Fiel (2020) found that once controlling for potential confounders and their interactions, there were no declining elasticities after high school completion. These results both suggested that a degree did not causally moderate the intergenerational association but that the effect came down to selection bias or spurious correlation. In light of these findings, the results of the present research are somewhat surprising in that including these additional interactions in fact increased the moderation effect at the binary level, although this was less clear at the five-category level.

To understand potential reasons behind this discrepancy, it is necessary to look at the results in more detail. While controlling for background characteristics and their interactions increased the difference in mobility between those with a degree and those without a degree, it reduced differences between levels of educational attainment in the five-category analysis, so that the only significant difference was between higher education and lower secondary, rather than lower secondary and higher secondary. This could be due to reduced statistical power; however, it could also suggest that confounding is happening at a lower education level. Similarly, the difference between lower secondary and upper secondary might be 'absorbing' other interactions- such as gender, or migrant background, or family structure. According to work by Beiser-McGrath & Beiser-McGrath (2020), interaction terms can absorb the effects of other unmodeled interactions, and as the present research shows, there are underlying interactions with education between key demographic background characteristics and education on offspring earnings. Again, more research needs to go into this to truly understand the reasons behind this. More detailed gender analysis is conducted in the next section, but data with more information on family structure, and migrant background is necessary for a more in-depth exploration of these potential confounders. It is also necessary to remember that the present research did not attend to fully account for potential confounders and selectivity as in previous work but only explore some common confounders. However, overall the findings show that a degree partially moderates the intergenerational income association net of key demographic background characteristics.

Summary of findings and contributions

Overall, the present research has made a novel contribution through finding a moderating role of educational attainment in intergenerational income mobility in the UK. To the author's knowledge, it is amongst the first to explore the question in a UK context using a measure of parental income as

179

socioeconomic background, and thus amongst the first to explore the moderating role in income-to-income transmission. Previous findings for the UK have suggested that there was no moderating effect of educational attainment when it comes to offspring earnings, which has its own implications (Vandecasteele, 2016). However, the present study addresses some of the limitations of the existing research and builds on it by suggesting that there is a partially moderating effect on income mobility, which is more in line with international findings and theoretical expectations. The study also makes a methodological contribution by estimating the moderating role of education while accounting for common measurement biases and looking at rank-rank slopes rather than intergenerational elasticities, which allows the findings to be attributed solely to re-ranking rather than to both re-ranking and changes in the income distribution. Finally, it contributes by suggesting that the influence of parental income on offspring earnings does not fully disappear for those with a bachelor's degree.

Limitations and future research

It is important to consider some limitations to these findings. Firstly, the research is not causal in nature. While the analysis aimed to account for some potential confounders, it did not account for all potential confounders, such as cognitive skills or ambition. Thus, it cannot be inferred whether education has a causal effect on individuals' mobility. It is vital to be aware of the underlying assumptions and their limitations, as the assumption would imply that expanding higher education would be a solution to increasing income mobility, which is widely contested in the literature (Breen, 2010; Bukodi & Goldthorpe, 2016; Fiel, 2020; Karlson, 2019; Vallet, 2004; Zhou, 2019). Overall, the underlying mechanisms cannot be discerned from the present research, as it was associational in nature. While some US-based research has attempted to identify the causal moderating effect of education, this has not been studied in the UK, which presents an avenue for future research to better inform policy and practice.

Secondly, there are limitations to the measure of educational attainment. As mentioned, education, particularly within tertiary degrees, has become increasingly internally stratified across type of institution and subject studied (Britton et al., 2016; Triventi, 2013). With a lot of heterogeneity within the broad category of degree-holders, said heterogeneity could be obscuring some of the moderation effect. Likely, if the analysis was performed with more data on type of institution and subject studied, there would be differing results. For example, Zhou (2019) extended their analysis by creating a category of selective and non-selective college degrees. They found that the reproduction of inequality was partially explained by college selectivity, as those who attended more selective colleges experienced higher mobility than those who attended non-selective colleges. Based on this, it is expected that similarly in the UK, those who attended more selective universities would have higher income mobility than those who attended less selective universities. Future research should take account of this horizontal stratification in understanding the moderating effect of education in income mobility.

Thirdly, the results suffer from several data limitations. The sample sizes are quite small, especially when grouped into five educational categories. The sample sizes for individuals with no qualification, and with postgraduate qualifications are exceedingly small, which severely limits the analysis for those levels. Small sample sizes lead to larger confidence intervals and lower statistical power, which can increase the likelihood of false negatives in the moderation effect. This may especially apply to the finding of a lack of intergenerational association for those with a bachelor's degree only. Thus, results are taken within the context of the existing literature, and the directions of coefficients are taken into consideration. Furthermore, while the mean age for measuring educational attainment in the sample is 31, some have education measured as young as 25, which may also underestimate some individuals' lifetime educational attainment. Again, research into income mobility in the UK is generally limited by data availability, while in other countries administrative data is available (e.g., Acciari et al., 2019; Chetty, Hendren, Kline, & Saez, 2014; Deutscher & Mazumder, 2021). Thus, national estimates rely on survey data, keeping limitations in mind (Social Mobility Commission, 2023a). To fully understand income mobility, better data needs to be available with larger sample sizes, detailed measures of parental household socioeconomic status during childhood, and information on educational and socioeconomic outcomes of children into adulthood, maintaining intergenerational links.

Additionally, existing evidence has suggested that educational attainment may moderate differently across the income distribution. Results from Norway, Russia, Spain and the US indicated there was lower mobility for those with higher education, from higher income quantiles (Bernardi & Ballarino, 2016). This was interpreted as a 'boosting effect', where higher social origins provided an additional advantage to those at the top of the income distribution. Future research into the moderating role of education in the UK should investigate this potential nonlinearity, as differences across the income distribution may be obscuring certain moderation effects.

Finally, it was beyond the scope of this thesis to investigate further variation in the moderating effect of education, such as ethnicity, geography and disability. These factors have been shown to be important in variation of income mobility (Bididsha, 2009; Rohenkohl, 2019; Social Mobility Commission, 2023a), however it has been relatively underexplored as to the extent to which they interact with the moderating effect of educational attainment.

Taking these limitations into consideration, the present research suggests three areas for future research to prioritise: Firstly, using larger datasets in the UK to avoid the risk of false negatives, as results are somewhat inconclusive across five levels of education. This is especially important in the context of looking at differences between bachelor's degree holders and postgraduate degree holders, as existing evidence suggests that this may be an important threshold when considering the moderating role of education, and the underlying mechanisms. Secondly, continued research into the

underlying theoretical mechanisms that explain intergenerational mobility, especially in contexts outside of the US. For example, research in the UK that focuses on investigating the causal moderating role of education, as there is a dearth of research into this in the UK. Thirdly, investigating further horizontal stratification between institutions and courses, as this is likely key to better understanding how education can moderate income mobility.

Implications and recommendations

The present study's findings have several useful implications for policy. Firstly, the findings that obtaining a bachelor's degree is associated with higher intergenerational mobility provides useful information for policymakers who aim to improve social mobility. It implies that those with a university degree are at least partially protected from the influence of parental income on offspring earnings. How higher education may be partially moderating the intergenerational transmission of income depends on the mechanism at play, which in turn has different policy implications. For example, these findings may suggest that higher education strategies focused on increasing equality of opportunities may be somewhat successful, or alternatively that policies regulating the graduate labour market have resulted in fairer recruiting practices. Although, equally, it could suggest that universities are successful in selecting students based on unobserved characteristics in the studies. Overall, it demonstrates that the intergenerational persistence of income is being disrupted to a certain extent for those with degrees, and further research and insight into the underlying mechanisms can help facilitate an understanding of successful strategies, thus highlighting opportunities to expand and apply these lessons elsewhere. It is important to note that there are likely complex mechanisms at play, and that a comprehensive and holistic strategy is needed to target and improve and learn from the moderating role of higher education.

Not only is obtaining a bachelor's degree associated with higher intergenerational income mobility, but the findings also suggest that those from lower income backgrounds benefit more earnings-wise from achieving higher education compared to their more privileged peers, meaning educational attainment may function as a protective factor (or again, as a 'selector' of sorts). This suggests that widening access to students from lower income backgrounds is an important avenue for increasing intergenerational mobility and addressing intergenerational disadvantage, as opposed to widening participation in general although these recommendations should keep the limitation of causal interpretation in mind.

Secondly, with that being said, even when students do achieve a bachelor's degree and beyond, they still experience a certain amount of intergenerational persistence, meaning that those from higher income backgrounds tend to have higher earnings compared to their less advantaged peers with the same level of educational attainment. This too has important implications for policymakers. While the notion of the UK as an education-based meritocracy has been proposed, meritocracy in this context

referring to a system where individuals' outcomes are influenced more by their own efforts or abilities rather than by their family background, this notion has been contested (Goldthorpe, 2014; Mijs, 2016; Bukodi & Goldthorpe, 2018). The idea that education can help level the playing field is often implicit in educational policy discussions, though the extent to which this is achieved or even desirable is subject to debate. These findings offer a more nuanced perspective on the role of education in shaping intergenerational income mobility. It suggests that a degree is not always enough to break intergenerational cycles of disadvantage, highlighting that improving intergenerational mobility remains an important goal across levels of educational attainment, and it is necessary to continue considering how to tackle the socioeconomic background gap for those who attend university beyond their participation in education alone. Hence, the moderating role of education is an important indicator of equality of opportunity and 'meritocracy' (keeping in mind the drawbacks of such a concept) for the UK and should be monitored and reported on.

Despite many existing policies aimed at addressing this disparity, graduates from lower income backgrounds continue to face barriers when it comes to higher earnings, as well as graduates from higher income backgrounds maintaining an advantage in terms of earnings. Policies to address these inequalities may include promoting fairer hiring practices, such as banning unpaid and unadvertised internships; focusing more resources on helping students, especially those from lower income backgrounds, to navigate the graduate labour market at universities; or addressing the issue of prohibitive fees for postgraduate degrees amongst other strategies. There are many strategies to improve the labour market outcomes of graduates from disadvantaged backgrounds that go beyond widening participation to ensure better outcomes for students beyond graduation. On the other hand, if some of the moderation effect can be explained by the mechanisms of selectivity, where universities select candidates who are already more likely to be economically mobile, this would suggest inequalities in skills and attributes in the incoming cohorts. This would be in line with significant evidence of inequalities in cognitive and non-cognitive skills throughout schooling years (e.g., Education Policy Institute, 2024). In this case, policies addressing earlier cognitive and non-cognitive skills for lower income children would also be paramount to improving intergenerational mobility for degree holders later on. Additionally, inequalities in graduates' earnings may be due to horizontal stratification, with students from lower income backgrounds more likely to attend institutions and obtain degrees with lower earnings potential, in line with EMI theory. While earnings are certainly not the only purpose of higher education, policies may address these disparities to some extent by encouraging a greater focus on widening participation in selective universities, courses and at postgraduate degree levels. Additionally, ensuring students, especially those from lower income backgrounds, are well informed of their choices for higher education, for example the difference in earnings potential between different degrees and institutions and awareness that completion of a degree alone is not sufficient to guarantee certain outcomes. In fact, measuring graduates' earnings

including by socioeconomic background has been proposed as a way to regulate higher education courses, although it is unclear whether this would have an impact on improving intergenerational mobility (Britton et al., 2025).

Finally, those who do not achieve a university degree experience exceptionally low intergenerational income mobility. As students from low-income backgrounds disproportionately do not attend higher education, this has implications for equality of opportunity. Part of this may come down to the lack of options for those who do not follow the traditional academic path. There is ongoing debate in the UK surrounding the quality of vocational routes and their role in social mobility (Cavaglia et al., 2022; Eyles et al., 2022). While apprenticeships can offer routes to high earning careers that offer earn while you learn models which can particularly benefit young people from lower income backgrounds, young people from disadvantaged backgrounds are underrepresented in apprenticeships, particularly at higher levels (Cavaglia et al., 2022). Additionally, further education in the UK is underfunded compared to higher education, which is concerning given that they disproportionately serve less advantaged students (Drayton et al., 2025). According to compensatory advantage theory, while individuals from higher income backgrounds may be able to compensate for low educational attainment with additional resources, students from lower income backgrounds may not be able to. It is important to ensure there are options available to all, no matter their socioeconomic background. To improve income mobility across the board, there needs to be a focus on better options for those who do not go into higher education, and ensure these young people are not locked into low opportunities. In addition to improving the quality of further education, workplaces can also improve opportunities by not requiring a degree for jobs when possible. While this could help improve mobility for those without degrees, it could also reinforce compensatory advantage, so this strategy should be used in tandem with companies measuring the socioeconomic background of their intake and adjusting their hiring practices accordingly.

Overall, while these findings suggest that education can be helpful for improving intergenerational mobility, higher education is certainly no 'silver bullet', able to solve all issues of inequality of opportunity. It is important to remember that when looking toward solutions to improving intergenerational mobility. There are complex processes underlying the moderating role of education, and simplistic policies such as that of expanding participation in higher education may not have the intended effect. A key aim of the New Labour Government in 1999 was to increase higher education participation to 50% (BBC, 1999). These findings imply that participation in higher education is not enough to improve mobility in of itself as it only partially moderates the intergenerational transmission of income. For educational expansion to improve income mobility, it needs to be accompanied by a weakening association between parental income and offspring educational attainment, a strengthening association between educational attainment and the earnings return to that education, and a weakening or at least maintenance of the link between parental income and offspring

earnings happening through pathways other than education (Bukodi & Golthorpe, 2018). However, wider work on the underlying mechanisms suggests that increasing participation may in fact reinforce inequality by facilitating greater horizontal and vertical stratification, also referred to as MMI and EMI, which can in turn weaken that link between educational attainment and offspring income (Lucas, 2001; Wakeling & Laurison, 2017). Assuming that horizontal stratification has increased, the moderating role of a degree may be even weaker for current generations of young people in the UK, although this weakening may also be counteracted somewhat by other initiatives aimed at increasing intergenerational mobility, which is why it is important to continue monitoring equality of opportunity and how it relates to education. Similarly, educational attainment can be considered a positional good, so as more people get a degree, the 'worth' of that degree in labour market outcomes weakens, meaning that the link to earnings outcomes is pushed elsewhere (Bukodi & Goldthorpe, 2018).

5.2.1 Gender differences in educational attainment as a moderator

Key findings and contributions

Next, the moderating role of educational attainment in income mobility was also examined across gender using multigroup analysis and interaction tests. Findings showed that there was no difference in the moderating effect of education between men and women. There was a slightly more pronounced moderating role for men, but the difference was not found to be statistically significant. This means that the moderating effect of education on intergenerational income mobility does not differ significantly across men and women, and analysis ran on the pooled sample is generally applicable across gender.

The findings are mixed in the existing literature. Some evidence found no moderation effect of education for men nor women and some found a moderating effect for both men and women. In a US-based study of intergenerational income mobility, Zhou (2019) found that the moderating effect of a bachelor's degree did not differ across gender both before and after accounting for selectivity. Furthermore, Witteveen & Attewell (2020) found a similar earnings advantage based on parental education across education levels across gender too, using large sample sizes in a UK-based study. Another study found similar U-shaped patterns of moderation across educational attainment in social class and occupational status mobility (Torche, 2011). While, as mentioned, there is a dearth of studies in the UK looking at the moderating role of education in income to income transmission, work by Vandecasteele (2016) looking at the moderating role of education in the association between parental SES and offspring earnings found no moderation effect for men nor women, implying a lack of difference across gender. Accordingly, the present study's findings are in line with some of the existing evidence. These existing results must be taken with caution as none of the studies explicitly tested the difference in the moderating role of education between gender but instead presented the

gender-stratified analysis and compared them visually. The present research contributes to the literature by providing statistical testing of this theory.

On the other hand, some studies suggested there were gender differences in the moderating role of education across a variety of socioeconomic measures. In the UK, one study found that degrees moderated the influence of parental SES on occupational status mobility for men but not women. They argued that this implied a "more meritocratic labour market for the highly educated is only valid for men" however, this interpretation has limitations as it relies on purely associational work that does not highlight the mechanisms at play (Vandecasteele, 2016, p. 227). In the US, Fiel (2020) found different patterns of mobility across education levels across men and women, with elasticities generally increasing after completing high school for men, whereas elasticities for women tended to decline slightly. However, they advised caution with interpreting these differences and emphasised that their study still left questions about gender differences, due in part to sample issues. Another study in the US found a U-shaped moderating pattern for income and earnings mobility for men, but not for women (Torche, 2011). They argue this may partly be due to the lower levels of intergenerational association for women in terms of earnings. However, their research was limited as it their measure of parental earnings only reflected paternal earnings, thereby excluding maternal earnings, meaning the intergenerational association involved a 'double transition' which may weaken patterns. The sample sizes were also small across education levels in Torche's work, suggesting that false negatives may be an issue. Overall, some of the existing evidence suggests weaker patterns of moderation for women than men, although again these papers did not explicitly test the theory, and some of it may come down to measurement issues. The present research appears to reflect this finding to a certain degree: while there are no statistically significant differences in the moderation effect, in general, the moderating effect was found to be stronger for men, but this difference does not hold up to formal testing. The present research also contributes to the evidence as it does not use logged earnings unlike much of the preceding research. Differences in distribution affects these analyses, and there tends to be gender differences in earnings distributions, by educational attainment too. However, by using earnings percentiles, this problem is minimised, and so the findings are less attributable to differences in distributions.

The findings demonstrate that the moderating role of educational attainment in intergenerational income mobility can be generalised across men and women in pooled samples. Pooled samples benefit from larger sample sizes, which can reduce the risk of false negatives. Some previous research only reported gender stratified analysis, which may have been limited due to sample sizes, and potentially missed out on information on more general patterns. Traditionally, research has only looked at sons' mobility, and accordingly, the moderating role of education in sons' mobility (e.g., Breen, 2010; Hout, 1988). However, the present findings again suggest that pooled analysis can be

used, albeit with theoretical consideration and understanding of potential underlying gender differences.

Overall, this thesis has made an important contribution by exploring the gender differences in the moderating role of education in intergenerational mobility and explicitly testing these differences. It contributed to the existing evidence, supporting the finding that there are no gender differences in the moderation effect and provided some reasons as to why there may be discrepancies in existing findings. It contributed also to the UK case by providing one of the first gender-pooled analysis of the moderation effect of educational attainment in intergenerational mobility, which addresses methodological limitations including sample sizes and differences in distributions of women's earnings.

Limitations and future research

It is important to note some limitations to these findings. Firstly, while the study showed that there was no gender difference in the moderating role of educational attainment in intergenerational income mobility, these findings do not denote that there are no *underlying* gender differences taking place. For example, there tend to be gendered differences in educational attainment, earnings, and returns to education, supported by the descriptive statistics and broader research. These may reflect different underlying mechanisms, but overall, there was no compelling evidence that the moderation effect of educational attainment in the intergenerational income mobility differed across gender.

There are also data limitations to consider. Considering that educational attainment was found to be a moderator in the pooled sample, but not for the gender stratified analysis, the analysis was likely affected by small sample sizes thus limiting statistical power. With wide confidence intervals, there is a chance this result is a false negative, especially based on the direction of the coefficients, and in context of previous findings. Thus, these results should be interpreted with caution. Furthermore, as previously mentioned, significant heterogeneity within degrees and returns to education may further weaken the moderation effect, which may be further stratified by gender as suggested by Torche (2011). Both this heterogeneity and lowered statistical power may have contributed to weaker moderation effects leading to no statistically significant moderation effect found for neither men nor women. Unfortunately, due to small sample sizes, it was beyond the scope of this thesis to consider differences between men and women for the moderating effects of education attainment at five different levels of education.

Finally, while the lack of gender difference implies that the moderating role of education in intergenerational mobility is a good indicator of fluidity across education and gender, there may be other moderation at work, such as intersectionality with race or ethnicity that the present thesis did not explore.

187

Future research should prioritise using larger sample sizes to investigate gender differences in the moderating role of educational attainment in intergenerational income mobility to reduce the chance of false negatives and thus provide more consistent evidence. Equally, future research would benefit from running both pooled analysis and stratified gender analysis, as the present study suggests that the results are generalisable, do not differ across gender, and that effects may be diluted in gender stratified samples with increased chances of false negatives. Finally, another avenue for future research would be to investigate potential explanations as to why the moderating role appears to be similar across gender, despite a number of underlying differences in educational attainment, returns to education and earnings.

Implications and recommendations

These findings suggest that contrary to some of the existing evidence, educational attainment plays a similar role in mitigating the influence of parental income on offspring earnings for both men and women. They also suggest that while intergenerational income mobility is higher for men and women with higher education, there still remains a significant influence of parental income. These findings suggest to policymakers that the moderating role of education is a measure that applies across gender, and interventions aiming to improve intergenerational mobility can be implemented across gender too. Additionally, it suggests that interventions beyond education may be necessary for improving intergenerational mobility for all across gender, as even amongst those with higher education, parental income still influences offspring earnings.

5.3   *Moderating role of relationships during adolescence*

Finally, this section discusses the results of the third research question, to what extent income mobility varied by offspring relationships with family and teachers at age 14, or to what extent they acted as protective buffers. Firstly, results for family relationships are discussed, then teacher relationships. Finally, gender differences are examined. Findings are discussed in the context of the literature and the theoretical framework, then limitations and implications are explored.

5.3.1   Family relationships

Key findings and contributions

This thesis aimed to estimate to what extent the intergenerational income association was moderated by family relationships at age 14, using a measure of how offspring felt about their family, and how often they ate an evening meal with their family a week at age 14. This built on previous literature that considered how positive family relationships could moderate the association between family SES and behavioural and academic outcomes, but expanded this research by looking at longer-term, socioeconomic outcomes. Overall, the results showed that income mobility did not vary by how offspring felt about their family, but it did vary by frequency of evening meals with their family.

Findings showed that those who ate 6-7 times a week with their family experienced higher intergenerational income mobility than those who ate 1-2 times a week with their family, with over twice the amount of persistence in the latter group. Furthermore, those from lower income families benefitted more from eating more often with their family compared to those from higher income families. This suggests that eating with family during adolescence may function as a protective buffer against the risk of growing up with a low income on future earnings.

The study found a significant interaction effect between how often offspring ate with family and parental income, meaning that those who ate more often with their family experienced higher intergenerational income mobility than those who ate less often with their family. This finding is generally in line with existing research on how aspects of family relationships during childhood and adolescence acted as a moderator or protective buffer in the association between parental SES and certain behavioural and educational outcomes (Hill, 2001; Ogg & Anthony, 2020; Oxford & Lee, 2011; Yum, 2023). For example, Ogg & Anthony (2020) found that parental warmth predicted science growth for children from lower SES background but not for children from higher SES backgrounds. Thus, the present results were consistent with these previous findings. These findings suggest that better family relationships can act as a protective buffer in low-income contexts, rather than in general contexts. However, few studies have looked at longer-term outcomes such as offspring earnings, so the present research contributed by demonstrating that aspects of family relationships during adolescence had a moderating effect on longer-term outcomes, and net of educational attainment. The finding also makes an important contribution to the social mobility literature, highlighting this moderating role of eating with family in intergenerational mobility, drawing on development theories and evidence. Furthermore, few studies have looked specifically at the interactions between parental time investment and socioeconomic background on offspring outcomes. One study that did look at future income found that equalising parental time investment was an important avenue in improving intergenerational mobility, corroborating the current findings (Yum, 2023).

On the other hand, the null finding of an interaction between how offspring felt about their family and parental income is also supported somewhat by the existing evidence. There are mixed findings on some aspects of family relationships as moderators of the association between family SES and children's outcomes. For instance, while Ogg and Anthony (2020) found that parental warmth moderated the association between family SES and science growth, they found no such interaction between family SES and maths or reading growth. Similarly, Hill (2001) found an interaction between family SES and parental warmth for pre-reading skills, but not for pre-math skills. Mixed findings are to be expected to a certain extent, as these studies employ different measures of parental SES, different offspring outcomes, and measure different aspects of family relationships at different ages. For example, these two existing studies use specific, short-term academic measures, whereas the

current study captures a much broader longer-term socioeconomic outcome, which while not picking up on specific cognitive skills may be picking up on broader mechanisms.

Additionally, the discrepancy in results may come down to differences between the two moderators used in the present study. How offspring felt about their family and how often they ate with their family represent two unique aspects of family relationships. The former is a measure of a young person's perception of their family, while the latter is a measure which signals parental time investment into their children. As these represent two different aspects of parent relationships, the difference in results may signal that offspring's perception of family relationships is not a moderator, and that parental time investment is, which in turn may be suggestive of the mechanisms through which parenting influences their offspring's outcomes. Positive perception of family alone may not be a good predictor of offspring outcomes, as other parenting behaviours are also crucial such as autonomy granting behaviour, and discipline (Jeynes, 2023). This is corroborated by meta-analyses that have found that permissive parenting styles, characterised by high warmth and low discipline are associated with worse academic outcomes (Pinquart, 2016). Along these lines, these findings may suggest that a positive perception of family does not act as a protective buffer, perhaps unless paired with other supportive aspects of parenting such as discipline or quality time spent with parents. Ultimately, positive perception of family is but one aspect of a broad parenting strategy.

Alternatively, the findings could suggest that how positive the family relationship is (i.e., quality) matters less as a protective buffer than time spent together (i.e., quantity), however this would go against the general consensus in existing literature that parenting quality is more important than parenting quantity, in other words, time investment (Fabricius et al., 2012; O'Hara et al., 2019). Research has shown that the frequency of family meals together is associated with higher quality family relationships, meaning that it may capture both quality and quantity (Musick & Meier, 2012). This null effect could also be explained by data limitations. There was not a wide range of responses for how offspring felt about family, with the majority answering generally positive. Without much variation, the variable may not be fully capturing the nuance and variation in the quality of relationships. This may reflect social desirability in answering. Furthermore, feel about family is a highly subjective and complex construct, and using a single item to measure it may be limited in reliability. These issues have less of an impact on frequency of evening meals with families as a more objective measure, which also had a wider distribution. While eating with family was included as a proxy of family time spent together, it is also important to consider that the variable may reflect other factors such as family values or routine which can also impact the interpretation of this finding, further discussed below. Overall, the interpretation of a null effect of feel about family should be made keeping these limitations in mind.

Furthermore, the present findings suggested that while more frequent family meals acted as a protective buffer for offspring from lower income families, it was not so beneficial for those from higher income families. Previous research has suggested that parental time investment and family meals are associated with better offspring outcomes for the general population (Fulkerson et al., 2006; Harrison et al., 2015; Snuggs & Harvey, 2023). However, these findings provide more nuance to this association with insight into how this interacts with socioeconomic background. These results are also consistent with previous research that has considered the moderating role of SES in the association between aspects of parenting and academic outcomes. For example, Ogg & Anthony (2020) found that while higher parental warmth was associated with higher science growth for children from lower socioeconomic backgrounds, lower parental warmth was associated with science growth for children from higher socioeconomic backgrounds. Hill (2001) similarly found that there were stronger relationships between parenting behaviours and pre-reading scores for lower income families than higher income families. Providing this nuance in the association between parenting and children's outcomes is important, as previous studies that haven't accounted for the heterogeneous effect of socioeconomic background on family relationships have argued that family relationships aren't associated with young people's outcomes when controlling for socioeconomic background. For example, Hartas (2015) found that parental involvement, parental warmth and discipline did not contribute to academic outcomes, leading them to the conclusion that family policy wasn't aiding social mobility in the UK. In contrast, the present research demonstrates that targeted family interventions may do just that.

These findings offer potential insight into the underlying mechanisms behind this protective function. For example, higher income families may be able to compensate for spending less time with their offspring with other types of investment such as tutors, extracurricular activities, or other quality time spent together on weekends or vacations. Alternatively, the protective nature of evening meals with family is consistent with the bioecological systems theoretical framework, which posits that certain aspects of parental relationships act more as a protective buffer, than can mitigate some of the negative consequences of growing up low income on future earnings (Darling, 2007). Growing up low income is associated with negative behavioural, academic and health outcomes, and as highlighted earlier in this thesis, lower socioeconomic outcomes. However, this theory suggests that having more supportive relationships with parents can help mitigate some of these risks, potentially through increased resilience, or better mental health or confidence. The potential of stronger family relationships to mitigate some of the adverse effects of poverty have also been highlighted in qualitative research through the intergenerational transmission of psychosocial assets such as wellbeing, norms, values and attitudes that can mitigate the effects associated with material deprivation (Wright, 2018). Overall, these findings present an important theoretical contribution to the field of social mobility by drawing together development theories and applying them to the study of

intergenerational mobility, finding that the frequency of family meals together can act as a protective factor for disrupting the intergenerational transmission of income. This is also important in that it emphasises avenues of transmission that happen outside of education, of which are less understood and studied.

These findings also challenge and extend existing development theories. The finding that spending time with family is beneficial for the future earnings of lower income offspring and not higher income offspring challenges the notion common to child development theories that spending quality time with parents is beneficial for all children, such as is central to attachment theories and self-determination theories. These findings question this assumption and suggest that it may be more of a protective factor, rather than a factor beneficial for all, and that distal contexts should be taken into account. Of course, this only applies to future earnings in the context of this thesis, and there are many other theorised and evidenced benefits of spending quality time with parents. Furthermore, these theories have largely been applied to understand the association between parent-offspring relationships and academic or behavioural outcomes, whereas the current findings demonstrate that there is an influence beyond educational outcomes and even net of educational achievement. The finding of this long-term moderation effect may hint at broader mechanisms, such as how while spending more time with family may improve motivation to learn which may in turn improve English or maths scores, it may also improve someone's relationship to education, their confidence, resilience or ambition which in turn may influence major decisions such as further and higher education, and impact on someone's career. The findings of the current study contribute by extending existing theoretical frameworks to longer-term outcomes net of educational attainment.

The moderating role of family meal frequency likely operates through several underlying mechanisms, reflecting more than simply the act of shared meals. Family meals were included as a proxy for parental time investment, which is hypothesised to have a positive impact on adolescents through social capital, or according to self-determination theories whereby spending time with parents, adolescents can become more motivated to learn and explore (Deci et al., 1991). Parental time investment may also signal more broadly parental interest and involvement with their children. However, frequency alone is not the sole determinant as important factors also include what conversations are had, how positive the interactions are and even how nutritious the meals are (Snuggs & Harvey, 2023). For example, if families use mealtime to show an interest in their schooling or talk about educational activities, then this can be especially impactful on offspring outcomes (Jeynes, 2023). The association between frequency of family meals and offspring earnings may also improve future earnings through improving behavioural and psychosocial outcomes. A body of literature demonstrates that eating family meals together or spending more time with parents is associated with decreased engagement in risky behaviour, and better psychosocial outcomes in youth, which in turn could explain the association with future earnings (Harrison et al., 2015). Overall, there

are likely complex mechanisms at play, which were beyond the scope of the current research to investigate.

While family dinners together were included as a proxy for parental time investment, and quality of family relationships more generally, it may also capture other factors including a range of family values. As Putnam (2015) argues, the growing socioeconomic divide in having family meals together may be a sign of increasing socioeconomic divide in values of social capital and community cohesion. The author theorised that family values and time spent together are important to the intergenerational transmission of advantage (Putnam, 2015). It would be beneficial for future research to look more into how family meals may be acting as a moderator in this intergenerational transmission of economic status.

While the present research has not looked at causal mechanisms, there is research that has suggested the amount of time parents spend with their children has a direct and likely causal impact on children's outcomes (Gayle et al., 2018; Price & Kalil, 2019). In fact, Gayle et al. (2018), using instrumental variables, found that once they accounted for parental time input with children, parental income was no longer associated with their child's educational attainment, suggesting that parental time investment was a mediator of intergenerational transmission, and was directly related to increasing children's educational outcomes. So, there is some evidence behind the causal effect of parental time investment, although again, there is nuance lacking on understanding how the time is spent together which misses the importance of other aspects of parenting such as supportiveness and warmth.

Unlike most previous evidence, these findings demonstrate that there is a moderating effect of parental relationships net of educational attainment, suggesting that there is a moderating effect regardless of degree attainment. In contrast, most previous research has focused on shorter-term behavioural or educational outcomes. This finding is consistent with the present thesis hypothesis. Existing evidence suggests that family relationships and parental time investment are associated with a range of outcomes including decreased engagement in risk behaviours (Snuggs & Harvey, 2023), internalising and externalising problems (Pinquart, 2017a, 2017b) and wellbeing in later life (Chen et al., 2019) amongst other factors. These are all behaviours that may contribute above and beyond educational attainment to earnings and success in the labour market. Whereas education reflects more cognitive skills, earnings may reflect more broad skills and behaviours including non-cognitive skills (Carneiro et al., 2012). Similarly, it demonstrates that these parent relationships in adolescence can have life-long consequences, emphasising the importance of parenting not only for short-term or educational outcomes, but for socioeconomic outcomes too.

While the initial interpretation of these findings may be that children from low-income backgrounds who eat more often with their families will be more protected from lower future earnings, there is also

the possibility that the association is bidirectional. In other words, parents may spend more time with their child as a response to their behaviour, for example if the child wants to spend more time together, which would have implications for the underlying mechanisms. Bidirectionality has been found between parental warmth and behavioural control, where parents show more warmth if their child shows better behavioural control (Pinquart, 2016). This would question assumptions of the causality of parents spending more time with their children and instead suggest that children who already display more social behaviour are more likely to experience higher intergenerational mobility, which is corroborated by evidence that suggests a link between intergenerational mobility and non-cognitive skills (Blanden et al., 2007).

Overall, this study found that eating more often with family moderated the association between parental income and offspring earnings, in line with existing literature. The study makes a novel contribution to knowledge by extending analysis to longer-term socioeconomic outcomes, finding that parental time investment has a long-term moderating effect. It also contributes by looking at adolescents in particular, as most previous work has focused on younger children, and by analysing family meals specifically.

Limitations and future research

It is important to note certain limitations to these results. Firstly, it was beyond the scope of the research to investigate through which mechanisms the moderator worked. The research was descriptive in nature, so no causal interpretations can be made. The association is also likely impacted by unobserved mediators such as cognitive and non-cognitive skills. This leaves a lot of uncertainty about how family meals are related to improved intergenerational mobility, which presents an important avenue for future research to investigate. Qualitative research in particular might be useful for highlighting mechanisms through which this moderation may function, especially as most existing theoretical models mostly apply to academic outcomes, rather than long-term future outcomes.

Secondly, there are some measurement issues and data limitations to be considered. As mentioned, the variable measuring how offspring felt about their family is limited as it relies on a single item for a complex, subjective concept which cause issues with validity and measurement error which can lead to false negatives. It is also known that relationships vary over time, and may have different effects at different ages, so the full picture is not given here. This might also explain the lack of moderation effect for how adolescents felt about their family. Additionally, the variables used refer to 'family' rather than 'parents', which most previous theoretical and empirical literature is based on. The broader question of family may pick up on other mechanisms that are less related to parents, and more to siblings for example. Finally, due to a small sample size, and the use of survey weights and multiple imputation, standard errors were large which may have also affected the statistical power.

Thirdly, while the study shows that teenage years are important, without longitudinal data, it is not possible to conclude whether the teenage years are uniquely important. For example, families that spend more time together with their adolescent offspring may also be families that spent more time together in childhood. A lot of research suggests that early childhood is amongst the most important phases of development for future outcomes, which the present research could be reflecting unknowingly without controlling for parenting behaviour over time (Anderson et al., 2003; Heckman & Mosso, 2014).

Finally, these findings are based on the fact that there *is* a moderation effect and has not gone into detail interpreting the *magnitude* of the moderation effect. It could be argued that the magnitude of the effect was quite strong, with offspring who ate more often with their families experiencing over 2.5 times the amount of intergenerational mobility compared to those who ate less often with their families. In other words, this moderation effect is stronger than the difference in intergenerational mobility between those with and without a bachelor's degree. However, the confidence intervals of the interaction effect were large and almost overlapping with zero, limiting the interpretation of the size of the interaction.

Overall, it is crucial to remember that this research has specifically looked at frequency of family meals and how offspring felt about their family at age 14, the association between parental household income and offspring earnings in the UK. While throughout it has generalised to family relationships in adolescence between parental SES and offspring SES, it is important to consider how generalisable these findings are. These are but two isolated aspects of a multidimensional concept of supportive and nurturing parenting. Furthermore, previous research has shown that parenting styles can have different effects across cultural contexts too (Maynard & Harding, 2010). The present research sample is mostly white, non-immigrant British families, so this should also be taken into consideration.

Given these limitations, there are a few important avenues for future research to take. First of all, future research into intergenerational mobility should take account of family processes, as an underexplored avenue of intergenerational mobility, and take account of child development theories such as bioecological systems theory. Clearly, proximal processes have an important, yet under researched role to play in intergenerational transmissions. Furthermore, future research should look into the causal relationships behind why and how parental time investment such as family meals may play a protective role in children's future outcomes, and importantly, what is it about parental time investment that can be promoted to inform future policies and practice. Additionally, the findings have highlighted that spending time together may not be as beneficial for the future earnings of children from higher income families. Future research should investigate how consistent this finding is across different outcomes, and potential reasons as to why this is. The findings also highlight the importance of studying relationships in adolescence. Much of the literature focuses on early childhood

relationships and theories, which can undermine the importance of researching the effect of teenage relationships. The focus on early childhood in the wider literature has been criticised as the narrative can frame investment into older children as 'too late' or a waste of resources, however these findings amongst others demonstrate the importance of teenage experiences to long-term outcomes. Finally, future research should use more multidimensional and longitudinal measures of parenting behaviours, to better understand the impact and moderating role of SES.

Implications and recommendations

The findings also have several important implications for policy and practice. Firstly, this finding suggests that policymakers wishing to improve intergenerational mobility could explore and place a stronger emphasis on the factor of parenting. Some current policies in the UK emphasise the importance of parenting, especially in addressing inequalities through Family Hubs, the Start for Life programme, school-parent partnerships and have been emphasised in social mobility policies (Hartas, 2015; Riordan et al., 2023). However, these policies and programmes mostly focus on the early years. It would be beneficial to target interventions to teenagers too. A range of other parenting interventions are discussed in Kalil and Ryan (2020), and although they largely pertain to early childhood, many of the lessons are applicable to older children too. For example, reading interventions aimed at getting parents to read to their young children more often highlight intervention methods that influence how parents spend time with their children, and may be applied to encouraging parents to have more family meals together. Additionally, the Education Endowment Foundation toolkit recommends interventions that aim to improve parental engagement, their meta-analysis concluding that parental engagement interventions have a moderate impact for a very low cost based on extensive evidence (EEF, 2023). There is mixed evidence on the impact of interventions specifically targeting increasing family mealtimes (Middleton et al., 2020). In the context of a cost-of-living crisis, this evidence is more important than ever as a way to help protect children from some of the negative consequences of growing up with a low income. Overall, the findings suggest that these interventions would be more effectively targeted at lower income families rather than generally, functioning more as protective factors against the potential adverse effects associated with growing up on low income. While spending quality time with parents has broader benefits that future socioeconomic outcomes, this suggests that policies aiming to break intergenerational cycles of poverty may best be aimed at low income families whose children may have more to gain from more quality time with parents. However, influencing direct parenting practices and parental time use can be difficult, and problematic as it can lay the blame on low-income parents (Hartas, 2015). It is crucial to also consider the broader reasons behind why poorer parents may be spending less time with their children, which can include having less time due to working unsocial hours, and increased stress related to low-income (Kalil & Ryan, 2020).

This is especially important considering the socioeconomic gap in parenting. Policies could aim to indirectly improve parenting practices by targeting the underlying reasons behind why poorer parents may spend less constructive time with their children. This might include policies that address financial stress including free childcare, cash transfers or removing the two-child benefit cap in England, although there is mixed evidence on the impact of cash transfers on parenting practices and parental time investment (Kalil & Ryan, 2020; Yum, 2023). Interventions aimed at parent mental health and stress may also have an impact (Kalil & Ryan, 2020). Again, these policies have tended to emphasise the importance of parenting in the early years, which has been shown to be especially influential on children's outcomes, however the present research suggests that parental time investment is still important for improving socioeconomic outcomes in adolescence too. Overall, policies addressing parenting practices both directly and indirectly are important in helping improving children's outcomes for those from low-income families.

5.3.2 Teacher relationships

Key findings and contributions

This study also examined the moderating role of teacher relationships in the association between parental household income and offspring earnings. It contributed to the existing literature by exploring teacher relationships, a factor that has scarcely been researched in intergenerational mobility studies, and by expanding previous literature that looks at the moderating role of teacher relationships on the association between SES and educational and behavioural outcomes to longer-term socioeconomic outcomes. The findings indicate that teacher relationships did play a moderating role in the intergenerational association of income, meaning that those who perceived more positive relationships with their teachers at age 14 experienced lower intergenerational income persistence, net of educational attainment.

The finding that more positive teacher relationships moderated the intergenerational association is in line with previous findings that have found positive teacher relationships to moderate the association between parental SES and educational and behavioural outcomes (Bussemakers & Denessen, 2023; Hamre & Pianta, 2005; McCormick & O'Connor, 2015; Olsen & Huang, 2021; Roorda et al., 2011). In line with these previous findings, they show that for most students, more positive relationships with their teachers acted as a protective factor, more so for those from lower income backgrounds. For example, Olsen & Huang (2021, 2022) looked at the interaction between student-teacher relationships and socioeconomic status on maths and reading achievement for first graders in the US. They found that less conflictual relationships were associated with increased achievement scores for all students, but especially for students from low SES backgrounds, emphasising the buffering effect against risk factors for lower achievement such as low SES. However, these previous studies considered academic achievement and did not look at longer-term outcomes such as future earnings. Therefore, this study

197

expanded on these previous findings by showing that teacher relationships could moderate even longer-term outcomes, and also that there is an effect net of educational attainment. Furthermore, this study also contributes to the literature by studying relationships during adolescence, as most of the previous literature focuses on relationships in earlier childhood. This is important as while adolescence is an under-studied time period when it comes to research on teacher-student relationships, it represents a crucial stage of development, where young people make highly consequential decisions about their futures, and when relationships can be especially volatile (Dahl et al., 2018).

However, the moderation effect was quite weak at 0.056, and when including interactions with family relationships, the teacher relationship interaction became statistically insignificant. A few previous studies have found a lack of moderation by teacher-student relationships in the association between socioeconomic background and academic motivational outcomes (Bergeron et al., 2011; Desmet et al., 2023). These differing results may be explained by the range of measurements and concepts employed. The moderation effect may also disappear once parent relationships are accounted for as the literature suggests that the two are interrelated, and positive teacher relationships can even act as a protective buffer against the consequences of negative parent relationships although no interaction effect was found in the present study (Nauman et al., 2023; McGrath & Bergen (2015). As the descriptive statistics show, parent relationships are correlated with teacher relationships albeit not very strongly, which is also supported by the literature, as child-parent relationships have been found to influence teacher-parent relationships (O'Connor & McCartney, 2006). Based on this, the teacher relationships moderation effect may be lost among the interrelationship between parent relationships and teacher relationships, which was beyond the scope of this thesis to examine due to data limitations. The weak to null moderation effect could also mean that it is absorbed to a certain extent by educational attainment, in line with existing evidence and theory.

Throughout the analysis, there remained a main effect of teacher relationships on future earnings, meaning that those with more positive relationships with their teachers had higher future earnings, controlling for parental income and other covariates. In other words, positive teacher relationships were beneficial for students on average, albeit they had a stronger effect for students from lower income backgrounds, in line with the theory of it playing a protective buffering role (Darling, 2007). This finding is in line with most previous studies on the association between teacher student relationships and academic outcomes (Roorda et al., 2011). The current research expands on the extant literature by demonstrating that positive student-teacher relationships have a positive association with even longer-term outcomes such as future earnings, net of educational attainment. In fact, in the analysis comparing those with and without degrees, the findings demonstrated that there was an association between teacher relationships and offspring earnings for those without a degree, but not for those with a degree, demonstrating that positive relationships with teachers may be

especially important for less educated individuals. These findings shed light on how important and beneficial student-teacher relationships can be for socioeconomic outcomes, across the socioeconomic distribution.

The finding of a moderation effect is consistent with bioecological systems theory which posits that proximal factors such as positive teacher relationships can act as a protective buffer for at-risk low-income teenagers on their future socioeconomic outcomes (Darling, 2007). These findings also have broader implications for theory. Firstly, most theories focused on student-teacher relationships are hypothesised around early childhood relationships, such as early attachment theory (Ainsworth, 1989). However, these findings demonstrate that there is an association for relationships during adolescence, which is more in line with motivational or self-determination theories (Deci et al., 1991). However, these theories have largely been applied to understand the association between positive student-teacher relationships and academic outcomes, whereas the current findings demonstrate that there is an effect beyond educational achievement, even net of educational attainment. This presents an important avenue for theoretical and qualitative research to explore further how teacher relationships may specifically be beneficial for future earnings, regardless of educational attainment. Self-determination theories may extend to socioeconomic outcomes in this case, where motivation to learn and sense of security translates to more than just academic skills, but also broader skills and behaviours that may be reflected in socioeconomic outcomes net of educational attainment.

It is important to consider whether the variable measuring teacher relationships is truly capturing just that. The measure may also be capturing attitude about school, which also has been shown to have an association with youth outcomes, however it is unclear as to the causality behind these associations (Gorard, 2012). The association could also be affected by the presence of unobserved confounders, for example behaviour, cognitive or non-cognitive skills. Evidence shows that positive student-teacher relationships are associated with a variety of outcomes including school engagement (Roorda et al., 2011), social behaviour (Ansari et al., 2020), problematic behaviour (Bussemakers & Denessen, 2023) and executive functioning (Vandenbroucke et al., 2017) amongst other factors, which may also explain the association with earnings as well as higher education. The relationships could also be bidirectional. In other words, students who are more likely to reach out to teachers to form better relationships are more likely to have higher intergenerational mobility due to resilience, social skills, ambition or other factors (Bernstein-Yamashiro & Noam, 2013). Alternatively, teachers may form better relationships with students because they show higher skills and better behaviours in the classroom. This questions some of the underlying assumptions behind the impact of teacher-student relationships, and future research should investigate these potential mechanisms.

In sum, the present research has contributed to existing literature by providing evidence that student-teacher relationships moderate the association between parental SES and longer-term socioeconomic outcomes, net of educational attainment.

Limitations and future research

Finally, this study comes with a few limitations that should be considered. Firstly, the research is descriptive and associational in nature, meaning conclusions about causality and the underlying mechanisms cannot be made. There may be unobserved confounders such as motivation, cognitive skills or non-cognitive skills. As research has shown, student-teacher relationships can be associated with such skills, which in turn are generally related to a range of outcomes including socioeconomic outcomes (Nauman et al., 2023; Vandenbroucke et al., 2017). So, while the study attempted to control for some relevant confounders, it cannot rule out the possibility of unmeasured confounding. Future research should continue to explore the underlying mechanisms of how positive student-teacher relationships can influence children's future outcomes to help inform policy and practice.

Secondly, there are several data limitations and measurement issues. Teacher relationships are a complex, multidimensional and highly subjective concept, but the measure employed in the present study relies on one point in time answers and sums two measures meaning that it may not accurately measure the underlying construct or be tested for internal validity. Most existing psychological research prefers to use multiple items to measure such topics. Furthermore, research shows that relationships change with time, and also that conflict and closeness may have different associations meaning that the present measure of teacher relationships cannot pick up on these potentially important nuances (Hughes et al., 2012). Additionally, as the measures used are not longitudinal, it cannot be said whether these effects are unique to adolescents or determine whether they are bidirectional.

Overall, this study has specifically focused on teacher relationships, parental income and offspring earnings in the UK for a cohort who were aged 14 between 1991 and 2007. It is important to consider how generalisable these findings are, and how relevant they are to education policy today. However, arguably there are consistent findings on the moderation effect of student-teacher relationships on the association between parental SES and academic outcomes, it is likely applicable to multiple contexts, the present time period and a range of SES outcomes to a certain extent.

Given these limitations, it is important that future research utilise measures of teacher relationships that can more accurately capture the complex underlying concept of teacher relationships across ages, and also to investigate underlying mechanisms. This may also be achieved by further qualitative work, better understanding how student-teacher interactions may act as protective buffers for at-risk students. Furthermore, future research into intergenerational mobility should consider more subjective factors, and factors proximal to children to explain intergenerational processes. Future research into

the impact of student-teacher relationships should consider its interaction with socioeconomic context and also consider longer-term outcomes beyond academic achievement.

Implications and recommendations

These findings also have important implications for policy and practice. Firstly, these findings point towards the potential that student-teacher relationships have to break intergenerational cycles of disadvantage, especially with targeted interventions for young people from low-income backgrounds. These findings demonstrate that it is important for teachers to develop supportive relationships with young people in the classroom, especially those from lower income backgrounds. Interventions that focus on improving student-teacher relationships may in turn be effective in improving socioeconomic outcomes. Furthermore, the importance of student-teacher relationships could be emphasised more in teacher training and professional development. It is already generally recognised that teachers are one of the most important factors in children's academic outcomes, and this research presents further evidence of how teachers may impact young people's future outcomes.

Given the importance of teachers and forming relationships with students, the current teacher recruitment and retention crisis in England is of great concern, with 1 in 10 teachers leaving teaching in state schools one year after qualification, the highest number since records began (Department of Education, 2023). High stress and workload are indicated as a key issue for teachers in England, which can harm opportunity for teachers to develop meaningful, supportive relationships with students (Emeljanovas et al., 2023; National Education Union, 2024). Furthermore, teachers feel disincentivised to work in more disadvantaged schools, with disadvantaged schools struggling more with teacher recruitment and retention, referred to as the recruitment gap (Allen & McInerney, 2019). The high turnover of teachers and difficulty in attracting talented teachers to low-income areas where they are needed most has especially concerning implications for intergenerational mobility. There is a strategy in place to address the teacher recruitment and retention crisis, and further recommendations have been made for improving the recruitment gap, for an overview see Allen and McInerney (2019). Given the findings of the present research, these recommendations should be implemented as a policy priority.

Overall, these findings also have implications for broader social mobility strategies. Firstly, these findings suggest that social mobility strategies should have a broader focus, not only on higher education and the labour market, but on more subjective and proximal factors during childhood and adolescence too. Social mobility strategies have traditionally been focused on high level factors, but avenues such as improving teacher-student relationships show promise as impactful interventions too. More recently, social mobility strategies published by the Social Mobility Commission have focused more broadly on factors including family and parenting programmes, and childhood origins of social mobility, which is a step in the right direction.

201

Furthermore, these findings have implications for how social mobility and equal opportunities are monitored. In general, measures for schools and on equality of opportunity tend to focus on academic attainment. For example, there is an emphasis on the attainment gap in Scotland and England, which measures academic attainment. Furthermore, a metric in secondary school league tables measures how many students go on to study degrees, in a Russell Group university, or at Oxford or Cambridge. While equalising access to higher education is an important goal, it should not be the only focus. The present findings show that positive teacher relationships can help low-income student's future outcomes regardless of educational attainment. In fact, the findings suggest that they are *especially* helpful for students who do not go through the traditional route of higher education, a group that have lower social mobility and lower earnings. These outcomes are not picked up in these current measures, which can undermine these pupils' success. Higher education is not right for everyone, and research has shown that the pressure to attend university and the devaluing of other options can be detrimental for students' mental health (Jaremus et al., 2023). These measures of mobility show how teacher-student relationships may be important for young people's future outcomes, and how many measures of equality of opportunity may miss out on these outcomes.

Overall, these findings have important implications for policies that focus on teacher quality, suggesting that forming positive relationships with students may have longer lasting effects than is obvious, and importantly, than is monitored. Based on this implication, the study recommends that school league tables have a more holistic and nuanced focus, also reflecting disadvantage levels. Teacher training and professional development could also emphasise the importance of student outcomes other than academic attainment.

5.3.3 Gender differences

Key findings and contributions

Finally, the thesis examined whether the moderating role of relationships with parents and teachers varied across gender. The findings showed that there was no gender difference, indicating that parent and teacher relationships during adolescence played a moderating role for both males and females. More specifically, the results found a lack of a moderation effect in gender stratified samples, with broadly overlapping confidence intervals. The findings also revealed that there was a significant main effect of teacher relationship on earnings for men but not for women, but the confidence intervals overlapped for these too. Furthermore, analysis found no interaction between gender and either family or teacher relationships on offspring earnings. While descriptive statistics showed that girls were slightly more likely than boys to rate their family and teacher relationships more positively, these differences did not contribute to different moderation patterns.

There is scarce evidence on whether the moderating role of parent relationships or teacher relationships in the association between family SES and children's outcomes varies by gender. In fact,

the author could not identify any papers that specifically looked at how the interactive effect may differ. Thus, the present study contributes by investigating whether the moderation effect differs across gender, finding that it does not, implying that the moderation effect can be generalised across gender.

While findings on the gender element of the interaction between SES and children's outcomes is scarce, there is existing literature on whether the association between relationships and young people's outcomes differ across gender. This thesis' findings showed that there were no main effects of parent relationships on offspring income, either feel about family or eating with family and that these did not differ significantly across gender. This finding is generally consistent with the existing literature. For example, a meta-analysis found that there were no significant differences in the moderating effect of parent-child relationships on academic outcomes across boys and girls (Pinquart, 2016). Another meta-analysis also found no gender differences in the association between parental warmth and involvement and offspring academic and behavioural outcomes (Jeynes, 2023). As for teacher-student relationships, the findings showed that there were statistically significant main effects of teacher-student relationships for males and not for females. In other words, more positive teacher relationships were associated with higher earnings for males, holding all else equal. However, the confidence intervals were overlapping, so this difference cannot be concluded as statistically significant. The existing evidence is mixed on gender differences in the association between student-teacher relationships and children's outcomes. Some find a stronger moderating effect for boys, some find a stronger moderating effect for girls, and some found no gender differences (Hamre & Pianta, 2001; Roorda et al., 2011). According to a meta-analysis, effect sizes of positive teacher relationships on academic achievement were found to be larger for samples with more girls, however, there was no gender differences found in the relationship between negative teacher relationships and achievement (Roorda et al., 2011). Furthermore, a larger effect size of teacher relationships was found on engagement for boys, further demonstrating the mixed findings. Another study found that high quality teacher-child interactions were associated with higher language scores for girls, but not so for boys (Nauman et al., 2023).

There were also contending theoretical expectations, with gender role socialisation perspective suggesting that girls would experience a greater benefit from stronger relationships, and academic risk perspective suggesting that boys would benefit more from the protective factor of positive relationships (Hamre & Pianta, 2001; Maccoby, 1998). While the present findings are more supportive of the latter perspective with regards to teacher relationships, they must be taken with caution given the overlap of confidence intervals and limitations to the interpretation, discussed below.

Overall, the present research contributed to the existing evidence by investigating gender differences in the moderation effect of relationships in intergenerational income mobility, concluding that there were no gender differences.

Limitations and future research

These results should be taken with their limitations in mind. Firstly, while the results suggested there were no gender differences in the moderation effect, this does not necessarily mean that there are no gender differences taking place at all. As mentioned already, there are complex and wide-ranging gender differences, from academic outcomes, to earnings, to relationships with parents and teachers. There are also contending theories as to how gender differences may apply to the association between relationships and children's outcomes. Given this, there may be different underlying mechanisms, and the finding of a lack of difference on average may be concealing important underlying gender differences.

Furthermore, there are several data limitations to keep in mind. For example, the gender stratified samples are affected by small sample sizes, lowering their statistical power. Smaller sample sizes can lead to a larger risk of false negatives and considering that statistically significant interactions were found in the gender pooled samples but not the gender stratified samples suggests that false negatives may be affecting the analysis. Furthermore, the measure of teacher relationships is summed from both closeness and conflict, which previous research has indicated are two dimensions that have different implications for boys and girls (McCormick & O'Connor, 2015). Thus, this summed measure may be missing out on this important nuance. Finally, the interpretation of main effects should be taken with caution- the main effect reflects the relationship between for example teacher relationships and offspring earnings when the household income variable is at zero, and as the pooled analysis shows, that association changes across the household income so there are limitations to this interpretation.

Without clear existing evidence to draw on, it is important for future research to utilise larger samples to investigate this gender difference further. Overall, this study concludes that relationships are important moderators across gender.

Implications and recommendations

This finding has important implications for policy and practice, suggesting that interventions aimed at improving intergenerational mobility through teachers and parent policies can be effective for both boys and girls. This is important as while some may assume relationships are more important for girls, as their socialisation tends to be more focused on relational aspects, positive relationships are equally important for boys. In the current context of low educational outcomes for boys from lower socioeconomic backgrounds, positive relationships represent an important avenue for equalising outcomes.

5.4   Chapter summary

This chapter discussed the key findings of the present research, putting them in context of the existing evidence and theory, examining potential limitations and reviewing their implications for policy and practice. The following chapter concludes the thesis.

6. Conclusion

6.1   Aim of chapter

This chapter provides a conclusion for the thesis, synthesising its core objectives, findings and implications. Firstly, it provides an overview of the aims of the thesis, establishing the questions that have been addressed in the research. The second section discusses the overall key findings and contributions of the thesis, highlighting how the results have advanced the field of study. The third section examines the overall limitations of the research and proposed potential avenues for future research. The fourth section summarises the overall implications, offering recommendations for policy and practice. Finally, concluding remarks are provided.

6.2   Aim of thesis

The overall aim of the thesis was to estimate intergenerational income mobility in the UK and understand the moderating role of education and the protective factors of positive relationships with parents and teachers. The thesis sought to achieve this first by estimating income mobility to obtain the national average level of income mobility. Following from these national estimates of income mobility, the next part of the research questioned whether income mobility was linear across the parental income distribution and whether it varied by offspring gender. The purpose of this was to determine whether national estimates were useful summary measures or not, or whether it was disguising important heterogeneity.

The second research question aimed to understand whether income mobility varied by educational attainment. Education is believed to play an important role in income mobility as a mediator, in that education can both help improve intergenerational mobility, and reinforce intergenerational income persistence. However, less is known about the moderating role of education, particularly in a UK context. Based on theory and international empirical evidence, it was hypothesised that higher education would be associated with higher intergenerational income mobility, but there is a dearth of research into the moderating role of educational attainment in income-to-income transmission in the UK. Thus, the thesis endeavoured to find out whether income mobility varied by education, and whether that moderating role varied by gender.

Finally, it aimed to understand the moderating role of relationships with parents and teachers in adolescence in intergenerational income transmission. Drawing on child development theory which acknowledges the importance of these relationships on various outcomes, the thesis hypothesised that quality of relationships may have a moderating role in intergenerational income mobility. More specifically, it was hypothesised that more positive relationships with parents and teachers would act as a protective buffer against the risks of growing up in a low income household on future earnings in line with bioecological systems theoretical framework which posits that multiple levels of systems

and processes affect a person's development. Some studies have looked at how these relationships moderated the association between family socioeconomic status (SES) and children's academic outcomes, but scarcely any research has considered longer-term outcomes. It also aimed to understand whether the moderating role of relationships varied across gender.

6.3   Overall key findings and contributions

With these research aims in mind, this section summarises the overall key findings. Firstly, the analysis found a significant association between parental income and offspring earnings, suggesting that roughly a third of advantage of parental income is passed on to offspring earnings. This was true even when controlling for educational attainment and key demographic characteristics, and it was found to be linear across parental income and apply across gender. This finding built on existing research, providing estimates of intergenerational mobility for a more recent generation in the UK, adjusting for common measurement biases and utilising detailed parental income data.

Next, the thesis estimated the moderating role of education in the association between parental income and offspring earnings. It found that those with a degree experienced higher mobility than those without a degree, although they still experienced significant intergenerational persistence of income. This was also true across gender. This contributed to the extant research by being amongst the first research in the UK to estimate the moderating role of education in income mobility using detailed parental income data, addressing a common measurement bias. Contrary to some previous research, it found that a degree did play a moderating role in income mobility, putting UK findings more in line with theoretical expectations and international evidence.

Finally, the thesis considered the moderating role of parent and teacher relationships in intergenerational income mobility. It found that frequency of family meals and how offspring felt about their teacher at age 14 both moderated the intergenerational association, with more frequent meals and more positive teacher relationships associated with higher income mobility. They were particularly effective as protective factors for offspring with lower parental income. However, it did not find a moderation effect for how offspring felt about their families. These findings applied across gender. The research contributed to the literature in two ways. Firstly, it contributed to the evidence on intergenerational mobility, investigating the relatively unexplored factors of family and teacher relationships in intergenerational mobility. The findings demonstrate the importance of proximal factors, and how development theories can contribute to our understanding of processes of intergenerational mobility. It also contributed to the literature on the importance of parent and teacher relationships. The existing evidence largely focuses on shorter-term outcomes such as academic achievement and behavioural outcomes; however, the present study extended this research finding that the influence of these relationships last well into adulthood, and net of educational attainment. The finding also demonstrates the need for future research to take socioeconomic context into account

when looking at the effects of childhood relationships and children's outcomes, as the potential heterogeneity may be obscuring patterns.

With the key findings summarised, this thesis now turns to a discussion of its overarching findings and contributions. Overall, these results demonstrate that intergenerational income mobility is a useful measure of fluidity and progress in society. A considerable strength of the analysis is the use of parental income and offspring earnings as many existing estimates in the UK rely on parental social class or education measures, which can miss out on significant disparities within these broad categories. The use of parental income rather than parental social class has highlighted some differing results to previous research, including the persistence of parental income net of educational attainment on offspring earnings, amongst both non-graduates and graduates emphasises the enduring impact of household income on people's socioeconomic outcomes.

In line with existing literature, these findings affirm the central role of education but also demonstrate that factors beyond education, such as parenting and teacher relationships play a critical role. This emphasis aligns with recent research trends focusing on family influence and skill formation in social mobility (Heckman & Mosso, 2014). Moreover, the novel finding of family and teacher relationships as moderators of intergenerational income persistence advances the field of study of intergenerational mobility, calling attention to understudied mechanisms that can inform targeted policies and practices. Similarly, these results highlight the importance of understanding socioeconomic context in educational psychology literature, as missing out on these important contexts can risk overlooking meaningful patterns that hint at the underlying mechanisms.

Throughout, the findings have also highlighted a somewhat complex story of gender differences. While overall, no gender differences were found in the summary measures, analysis did hint at underlying gender differences. For example, descriptive gender differences in earnings, education, family relationships and teacher relationships. A strength of this analysis is that it provided both pooled results and gender stratified results, whereas many traditional studies of intergenerational mobility have focused on father to son earnings. It also highlights a caveat that similar overall measures and moderation effects may still conceal different processes and mechanisms happening, which means that an understanding of gender differences remains essential to intergenerational income mobility analysis.

6.4   *Overall limitations and future research*

Following on from the discussion of the various strengths of this research, it is also important to highlight its limitations. In each section of Chapter 5, limitations and caveats to the analysis were outlined. In this section, overarching methodological, substantive and conceptual limitations are discussed, and directions for future research are proposed.

Overall, the research was associational and descriptive in nature, limiting the possibility of causal inferences based on the findings. Furthermore, while the findings have been generalised to wider contexts to a certain extent, it is important to consider how generalisable these findings really are. The analysis was based on a sample of individuals born between 1977-1991, living in the UK. While survey weights were used to make the sample more representative of the general UK population, these may still leave representation of certain groups lacking, especially due to a significant amount of attrition of certain groups. Furthermore, income mobility measures are historic in nature, as they must be based on offspring who have matured into adulthood, although this thesis has argued that implications from the findings are relevant to policy today. Finally, the results mostly pertain to a UK context, and accordingly the discussion mostly relates them to a UK context. However, the overall findings are likely generalisable to similar institutional contexts, and the present research also draws on research from the US, Australia and some European countries. Though, the education systems are unique to each country, so generalisations to other institutional contexts should be used with caution.

Conceptual limitations

The main concept used throughout this thesis was intergenerational income mobility, operationalised as the association between parental income and offspring earnings. It is important to consider what substantive implications can be drawn from this outcome. Offspring earnings is measured before tax, benefits or loan payments. In other words, it does not represent disposable income or wealth but instead reflects earnings potential in line with labour market processes. Generational wealth is increasingly important to younger generations, being hailed as 'the new social cleavage' (Hällsten & Thaning, 2022). Even with similar earnings, coming from a wealthier family can still have an important impact on adult offspring's disposable income. Therefore, even if graduates experience higher mobility, meaning less of an association between parental income and offspring earnings, those from lower income families likely still face barriers and financial constraints. For example, raw earnings do not reflect the difference between an individual who has taken out student loans to pay for tuition and maintenance during university compared to an individual who did not. Those who took out loans effectively experience an earnings penalty to pay back their student loan, which would cause a decrease in intergenerational mobility for graduates if included. Similarly, with broader implications for the general population, earnings alone do not capture distinctions between individuals who, possibly with family assistance, have purchased a home and those who continue to rent- an increasingly important distinction for today's 'generation rent'. On the other hand, benefits are also not reflected, which are distributive and if included would likely have an equalising effect on intergenerational mobility. Overall, it is important to keep in mind that the results in this thesis pertain to earnings which reflect the labour market for offspring rather than their quality of life or broader indicators of economic success.

Normative limitations

The aim of this thesis was to estimate the moderators of intergenerational income mobility, in order to inform policy and practice on how to improve it, and social mobility more widely. However, it is important to consider the critique of social mobility as a normative goal. It has been argued that social mobility as a goal can be used to justify inequality. Some argue that social mobility shifts the focus from structural barriers to mobility to individualistic factors, promoting the idea that it is up to an individual's talent and hard work to break cycles of disadvantage. In a similar vein, theory suggests that people who experience intergenerational mobility are more likely to attribute their success to their own effort and abilities (Kluegel & Smith, 2017). Empirical evidence has also shown that people who experience intergenerational mobility are "more likely to blame poverty on individual characteristics such as laziness and lack of willpower, and less likely to attribute failure to injustice in society", dependent on some contextual factors (Gugushvili, 2016, p. 402).

This normative and individualistic perception of social mobility also goes hand in hand with the concept of meritocracy, a controversial concept. Indeed, some even argue that the concept of social mobility is premised on inequality and meritocracy, although this thesis would dispute this (Francis & Wong, 2013). First popularised in a satirical fiction, meritocratic systems justify people's place in society based on talent or intellect (Young, 1958). While some theorists have argued that post-industrial societies become more meritocratic over time, or become education-based democracies, this trend has not clearly manifested, particularly with regards to intergenerational income mobility (Bell, 1973). It is largely agreed that meritocracy is a myth, and can be used to perpetuate and justify inequality, laying blame on individuals for their own inequality and poverty (Markovits, 2019; Mijs, 2016). Rather, an individual's chances in life are determined dually by individual attributes *and* it is heavily influenced by structural factors, including parental SES as demonstrated in this thesis and wider research.

With these limitations in mind, it is crucial to state that this thesis does not support normative concepts of social mobility and meritocracy in order to condone inequality, or lay blame on individuals or families. It rather employs the concept of social mobility as descriptive and is motivated in explaining intergenerational persistence, and ways to improve equality of opportunity and fluidity in society while acknowledging the structural barriers to people in fulfilling their potential. The investigation of more community-based ideas of social mobility and exploring structural factors of intergenerational mobility are important avenues for future research. In a similar vein, while this thesis focuses on earnings as an outcome, that is not to say earnings is the only important measure of a person's life chances. While earnings are linked with life quality to an extent, other factors are also important including but not limited to wellbeing, health and happiness.

Methodological limitations

In-depth data and methodological limitations were explored in chapter 5, but there are also some overarching methodological limitations. This thesis chose to employ secondary data analysis using quantitative methods to investigate its research questions. Quantitative methods are commonly used to investigate questions around intergenerational mobility, as they have strengths including the ability to distinguish general patterns based on large numbers of people, which is often beyond the scope of smaller scale qualitative studies. However, there are also drawbacks to this approach.

Firstly, a caveat of using secondary data analysis is that the data is already collected, not with the researcher's goals in mind. Thus, the thesis had to use the variables available. Given the limited scope of survey data that has recorded both parental income and offspring income past the age of 25, the variables employed were sometimes limited in scope. Furthermore, even though the scale was larger than what could have been achieved in primary analysis, the sample was still limited in size, limiting further moderation analysis with ethnicity and geography. These limitations also have implications for future survey data design, for example greater sampling of ethnic minorities, and greater consistency in questions around parenting and teacher relationships across childhood, as important avenues for future research. Finally, greater availability of intergenerational data, with parental income allowing for more analysis of intergenerational mobility. Current studies will likely prove useful in the future including the Millenium Cohort Study and Growing up in the 2020s.

Overall, while quantitative research has its benefits, it is vital to use it in tandem with qualitative research, which is why the present research drew on both quantitative and qualitative research. Qualitative research was integral to forming the hypotheses, especially for the third research question. The study's findings are useful in many ways, and also present avenues for future qualitative research to explore in more depth, such as further investigation into the moderating role of parental time investment and teacher relationships.

Finally, measures of intergenerational mobility are incredibly model-dependent. In other words, results can change dependent on a myriad of model decisions including income concept, differences between men and women, the age and period at which income is measured, how to treat zero values and the parameter of association amongst others (Engzell & Mood, 2023; Strömberg & Engzell, 2023). While this does limit its substantive interpretation, it is still an important and informative measure, and the thesis has aimed to make transparent and theoretically motivated model decisions, but the exact measurement reflects the model used.

Future research

The present research was limited in scope. However, if the study were to be extended, several avenues would be prioritised for further exploration. Firstly, it would be beneficial to use multiple indicators of socioeconomic status. As mentioned, income is but one part of the multidimensional idea of

socioeconomic status, and different indicators can lead to different patterns. To provide a more in-depth picture, it would also measure indicators such as social class or wealth. Secondly, it would provide valuable insight to extend the measure of education to be more granular, for example including institution attended and subject studied, to understand the moderating effect of higher education better. Thirdly, it would add measures of cognitive and non-cognitive skills to understand whether these are mediators or confounders of the association.

Data availability limits the study of intergenerational income mobility in the UK, for example small sample sizes, unrepresentative samples, and lack of information on various factors including socioeconomic and educational characteristics. As mentioned, administrative data would be useful to study intergenerational income mobility, for example the data available in Nordic countries. In the UK, strides have been made with LEO and NPD data, providing detailed information on earnings and education. However, this data would benefit from more in-depth measures of parental income to facilitate a better understanding of intergenerational income mobility in the UK and inform evidence-driven policies to improve social mobility.

Overall, the study highlighted a few questions that need further exploration. Firstly, further research should investigate the interaction between education and background demographic characteristics, to understand what is happening and why. Furthermore, studies are needed to investigate the moderating role of parent and teacher relationships, with investigation into the causal mechanisms behind it so as to further inform policy and practice. In general, intergenerational income mobility research should focus on branching out to look at wider factors, drawing from human development theories to better understand how young people's experiences can impact future outcomes.

6.5   Overall implications and recommendations

The findings of this thesis have many important implications for policy and practice, discussed in depth in Chapter 5. A brief summary of the key recommendations is provided here, followed by a discussion of overarching implications.

The first study set out the first policy implication of intergenerational income mobility as an important metric to be used as a measure of progress and fluidity that requires ongoing measurement. Measurement is important for policy, to understand it, take it seriously, and inform evidence-based policy. Its applicability across gender and income distribution show that it is a useful summary indicator, although one that also comes with the need for other indicators to fully understand the breadth of the concept of intergenerational mobility. It also shows that measures of equality of opportunity that rely on offspring educational attainment may be missing further nuance, as even with similar educational attainment, there are still disparities in earnings based on socioeconomic background. The fact that parental income influences offspring earnings to such an extent, while not a surprise, contributes to the plethora of evidence that individuals' outcomes are determined by their

birth circumstances. The finding draws attention to this and then goes on to provide some more explanation of the intergenerational association.

The second part of this thesis looking at the moderating role of education also provided important implications for policy. While higher education was associated with higher mobility, intergenerational income persistence still remained amongst graduates. Again, this showcased its importance as an indicator and measure of progress, and also as a reminder that even for graduates, parental income influences future outcomes, albeit to a lesser extent. It points toward the fact that interventions are still needed to improve mobility chances for those from lower income backgrounds at universities who face barriers compared to their more advantaged peers. It also highlights the need for good post-16 options for those who do not attend university. Interventions such as widening access, contextual admissions and targeted support can be life-changing for individuals, helping to break intergenerational cycles of disadvantage and enabling them to reach their potential no matter their socio-economic background. But while these interventions can have important impacts on individuals' outcomes, it is more questionable as to their impact on societal levels of intergenerational income mobility, discussed further in the final section. These findings also point toward the fact that other avenues are needed to improve mobility outside of education, which informed the next part of the research.

The final part of the thesis found that intergenerational mobility was moderated by frequency of evening meals with families and relationships with teachers at age 14, highlighting their protective role for low-income families. These findings imply that efforts aimed at improving intergenerational mobility may benefit from focusing on family and teacher focused interventions. Family interventions are increasingly recognised as an important part of social mobility and equal opportunities strategy (Hartas, 2024; Jones et al., 2025). This thesis provides an important contribution to the evidence base of how improved parent-offspring relationships may lead to improved intergenerational mobility and reduced intergenerational inequalities, especially for low-income families as the findings showed that more positive family relationships acted as a protective buffer for young people from lower SES backgrounds. At a broader level, it implies the importance of pathways outside of education and what happens in the family home to disrupting intergenerational cycles of (dis)advantage. These findings underline the importance of interventions that support families and children such as family hubs throughout childhood and adolescence. It's also important to remember that the benefits of positive family relationships during childhood go beyond improved intergenerational mobility and opportunity but also improved psychosocial and behavioural outcomes among others.

Furthermore, it emphasises the importance of relationships between students and teachers for policies surrounding teachers, including their influence on children's outcomes net of educational attainment. This underscores the need for policy and practice to emphasise the importance of supportive teacher

relationships as this study shows that students who had better relationships with teachers experienced greater income mobility, particularly those from lower SES backgrounds. Furthermore, these policy strategies provide evidence of how it is more effective to target students from lower income backgrounds, a mechanism that is easily implemented through existing pupil premium funding in England and Wales and pupil equity funding in Scotland.

Overall, these results show that the UK has a social mobility problem. With individual's earnings explained by parental income, even amongst those with similar educational attainment, the evidence is clear that the UK is not the education-based meritocracy some believe it to be. Hence, given the educational inequalities and the cost-of-living crisis, it is more important than ever for the UK to be pursuing evidence-led policies that address social mobility and equality of opportunity, to ensure young people's life chances are not based on how much their parents earn.

6.6 Concluding remarks

Overall, the thesis aimed to make recommendations for policy and practice focused on improving intergenerational mobility. While these are important recommendations that would likely improve individual's opportunities which is an important goal of itself, it is debateable how much effect these recommendations would have on the overall societal level of intergenerational mobility in the UK. Research suggests that intergenerational income mobility in the UK (and globally) is relatively stable, with no clear upward trend despite successive government policy reforms aiming to improve intergenerational mobility, including monumental changes to the education system from introducing university fees, widening participation in higher education, abolishing grammar schools to changing entire curriculums (Van der Erve et al., 2024; Chetty, Hendren, Kline, Saez, et al., 2014). In fact, policies that have aimed in part to increase social mobility by increasing participation in higher education can have perverse effects, reduce the 'value' of a degree, and push advantage elsewhere (Bukodi & Goldthorpe, 2018). Less research has explored how improving family relationships or teacher relationships may impact societal levels of mobility but approaches to improving societal levels of intergenerational mobility may require something at a more system-wide level.

System-wide level changes may include changes in culture, welfare state and levels of inequality (Beller & Hout, 2006; Jerrim & Macmillan, 2015). Underlying issues that are linked to social mobility include poverty and inequality. Research suggests that greater inequality leads to lower mobility (and vice versa) which means addressing inequality and poverty are paramount if government aims to improve intergenerational mobility (DiPrete, 2020). The UK has high and increasing inequality, especially in the top 1% which is especially concerning for mobility and likely reduces the impact of any approaches attempting to address inequality of opportunity in this way (World Inequality Lab, 2022). Reducing inequality can make the consequences of 'falling down the ladder' less severe. Thus,

214

improving economic equality presents an important goal, which likely goes hand in hand with increasing more societal-wide levels of intergenerational mobility.

6.7 Conclusion

This thesis has investigated the role of moderators in intergenerational income mobility in the UK using secondary data analysis. It concluded that intergenerational income mobility does not vary by gender or parental income, but it is moderated by educational attainment. It also found that more frequent meals with family and more positive relationships with teachers can act as a protective buffer to intergenerational cycles of disadvantage. These findings underscore opportunities for targeting interventions to improve intergenerational mobility in the UK, an important consideration for future policymakers.

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233

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Appendix A1: Robustness checks

A.1 Intergenerational income mobility with a sample aged 30+

Below are the results for estimating intergenerational income mobility with rank-rank slopes for an older sample measuring income from age 30 onwards. Model A includes basic controls only, Model B includes demographic controls, and Model C includes education and relationships.

Appendix Table A1 Association between parental income and offspring earnings with older sample

	Model A	Model B	Model C
Parental household income	0.404***	0.397***	0.360***
	[0.286;0.521]	[0.270;0.524]	[0.235;0.485]
Year of birth	-0.360	-0.270	-0.476
	[-1.454;0.733]	[-1.303;0.763]	[-1.575;0.622]
Number of income obs.	1.458	1.399*	1.652*
	[-0.089;3.005]	[0.053;2.745]	[0.170;3.133]
Number of parental income obs.	-0.083	0.293	-0.052
	[-1.114;0.948]	[-0.726;1.313]	[-0.895;0.791]
Age when income measured	-0.132	1.105	-0.596
	[-3.748;3.484]	[-1.820;4.030]	[-3.832;2.639]
Parents' age when parental income measured	-0.486	-0.636*	-0.745*
	[-1.163;0.191]	[-1.247;-0.026]	[-1.317;-0.173]
Female (ref: male)		-11.814***	-19.552***
		[-18.645;-4.982]	[-25.991;-13.114]
Ethnic minority (ref: white)		18.334	6.785
		[-1.022;37.691]	[-15.505;29.074]

At least one migrant parent (ref: no migrant parent)		-8.467	-10.667
		[-21.620;4.685]	[-25.051;3.717]
Single parent household (ref: two-parent household)		4.669	1.028
		[-4.094;13.433]	[-9.837;11.893]
Degree (ref: no degree)			15.507***
			[8.173;22.840]
Feel about family			1.660
			[-1.532;4.852]
Eat with family (6-7 times)			
3-5 times			3.249
			[-6.233;12.732]
1-2 times			0.500
			[-8.928;9.928]
0 times			3.998
			[-7.123;15.118]
Teacher relationship			-1.423
			[-4.565;1.720]
Constant	755.086	547.428	1017.279
N	559.000	559.000	559.000
r2	0.202	0.243	.332

Note: *p<0.05, **p<0.01, ***p<0.001. Weighted analysis. 95% Confidence intervals in square brackets.

A.2 Intergenerational income mobility (at least 3 earnings observations)

Rank-rank slopes were estimated for a sample of individuals with at least three observations of earnings during adulthood while not in full-time education.

Appendix Table A2 Association between parental income and offspring earnings with three or more earnings observations

	Model A	Model B	Model C
Parental household income	0.398***	0.436***	0.349***
	[0.305;0.491]	[0.337;0.535]	[0.252;0.446]
Year of birth	-1.187**	-1.144**	-1.476***
	[-1.957;-0.418]	[-1.949;-0.339]	[-2.201;-0.750]
Number of income obs.	1.641	1.534	1.794*
	[-0.276;3.557]	[-0.228;3.296]	[0.141;3.447]
Number of parental income obs.	0.231	0.268	0.324
	[-0.423;0.886]	[-0.397;0.932]	[-0.281;0.929]
Age when income measured	-2.101	-1.659	-2.669
	[-5.696;1.495]	[-4.903;1.586]	[-5.761;0.424]
Parents' age when parental income measured	-0.386	-0.499*	-0.662**
	[-0.892;0.120]	[-0.956;-0.042]	[-1.075;-0.248]
Female (ref: male)		-14.531***	-15.932***
		[-19.768;-9.295]	[-21.032;-10.832]
Ethnic minority (ref: white)		3.426	1.327
		[-12.876;19.727]	[-15.765;18.419]
At least one migrant parent (ref: no migrant parent)		-6.596	-8.982
		[-18.119;4.927]	[-20.039;2.075]

Single parent household (ref: two-parent household)		4.179	2.613
		[-4.199;12.557]	[-5.880;11.107]
Degree (ref: no degree)			17.977***
			[12.026;23.927]
Feel about family			1.273
			[-1.196;3.742]
Eat with family (ref: 6-7 times)			
3-5 times			4.297
			[-2.867;11.460]
1-2 times			2.329
			[-5.112;9.769]
0 times			3.773
			[-4.306;11.852]
Teacher relationship			-1.942
			[-4.181;0.296]
Constant	2446.864**	2359.693**	3055.571***
N	857.000	857.000	857.000
r2	0.185	0.248	.323

Note: *p<0.05, **p<0.01, ***p<0.001. Weighted analysis. 95% Confidence intervals in square brackets. Gender reference category= male. Ethnicity reference category= White. Migrant background reference category= no migrant background. Family structure reference category= two parent family. Education reference category= no degree. Eat with family reference category = 6-7 times.

A.3 The moderating role of relationships in the intergenerational income association

Below, full moderation models are presented with each relationship variable.

Appendix Table A3 Association between parental income and offspring earnings fully interacted with relationships

	Model A	Model B	Model C
Parental household income	0.271***	0.202*	0.051
	[0.125;0.416]	[0.030;0.373]	[-0.233;0.334]
Year of birth	-0.878	-0.322	-0.014
	[-2.026;0.269]	[-1.267;0.623]	[-2.031;2.003]
Number of income obs.	1.739	1.277	2.539
	[-0.625;4.102]	[-1.156;3.710]	[-0.779;5.856]
Number of parental income obs.	-0.118	-0.143	-0.936
	[-1.224;0.987]	[-1.085;0.799]	[-2.740;0.869]
Age when income measured	-1.684	-1.006	-1.965
	[-6.256;2.889]	[-5.595;3.583]	[-8.137;4.208]
Parents' age when parental income measured	-0.711	-0.644	-0.905
	[-1.505;0.082]	[-1.344;0.056]	[-2.135;0.325]
Female (ref: male)	-13.687***	-14.204***	-18.447**
	[-21.550;-5.824]	[-21.656;-6.753]	[-31.840;-5.055]
Ethnic minority (ref: white)	-4.642	6.576	-0.632
	[-27.320;18.035]	[-11.430;24.581]	[-38.161;36.897]
At least one migrant parent (ref: no migrant parent)	3.819	-5.438	10.991
	[-15.124;22.763]	[-22.038;11.163]	[-17.064;39.046]

Single parent household (ref: two-parent household)	11.095	8.297	3.762
	[-2.033;24.223]	[-4.029;20.624]	[-16.894;24.418]
Degree (ref: no degree)	13.914**	19.139***	12.168
	[4.977;22.852]	[11.560;26.717]	[-2.399;26.736]
Feel about family	199.385	2.573	4.241
	[-764.212;1162.982]	[-0.751;5.897]	[-1.940;10.422]
× Household rank	0.025		
	[-0.032;0.083]		
× Year of birth	-0.099		
	[-0.582;0.383]		
× Number of income obs.	0.014		
	[-0.883;0.912]		
× No. of parental income obs.	0.183		
	[-0.286;0.652]		
× Age when income measured	-0.035		
	[-1.770;1.700]		
× Parents' age when parental income measured	0.017		
	[-0.344;0.378]		
× Female	-0.318		
	[-3.658;3.023]		
× Ethnic minority	5.140		
	[-4.482;14.762]		

× At least one migrant parent	-6.713		
	[-15.556;2.131]		
× Singel parent household	-4.051		
	[-8.318;0.216]		
× Degree	1.359		
	[-2.595;5.313]		
× Eat with family 3-5 times	-2.450	-2.885	
	[-7.397;2.496]	[-8.382;2.613]	
× Eat with family 1-2 times	-1.941	-3.031	
	[-6.677;2.795]	[-8.102;2.041]	
× Eat with family 0 times	-1.766	-1.755	
	[-6.798;3.265]	[-6.725;3.214]	
× Teacher relationship	-0.405		-0.683
	[-1.546;0.737]		[-1.813;0.448]
Eat with family 3-5 times	7.690	1027.663	2.482
	[-3.962;19.342]	[-2792.653;4847.980]	[-16.736;21.699]
× Household rank		0.093	
		[-0.195;0.382]	
× Year of birth		-0.487	
		[-2.400;1.425]	
× Number of income obs.		1.523	
		[-1.585;4.631]	
× No. of parental income obs.		-0.381	

		[-2.073;1.311]	
× Age when income measured		-2.171	
		[-8.002;3.660]	
× Parents' age when parental income measured		-0.113	
		[-1.465;1.240]	
× Female		0.655	
		[-11.201;12.511]	
× Ethnic minority		12.552	
		[-20.118;45.222]	
× At least one migrant parent		-1.938	
		[-25.516;21.640]	
× Single parent household		-3.938	
		[-23.758;15.881]	
× Degree		-3.930	
		[-16.214;8.354]	
× Teacher relationship		1.454	0.244
		[-3.354;6.263]	[-4.047;4.534]
Eat with family 1-2 times	4.337	3642.875*	-2.832
	[-7.595;16.269]	[151.887;7133.863]	[-21.987;16.323]
× Household rank		0.299**	
		[0.077;0.521]	
× Year of birth		-1.835*	
		[-3.579;-0.092]	

243

× Number of income obs.		-0.072	
		[-3.425;3.281]	
× No. of parental income obs.		0.503	
		[-0.982;1.987]	
× Age when income measured		-0.149	
		[-6.441;6.143]	
× Parents' age when parental income measured		-0.223	
		[-1.246;0.801]	
× Female		1.162	
		[-11.068;13.391]	
× Ethnic minority		-14.268	
		[-39.892;11.357]	
× At least one migrant parent		-6.429	
		[-34.021;21.164]	
× Single parent household		-10.364	
		[-25.872;5.144]	
× Degree		-6.415	
		[-19.371;6.540]	
× Teacher relationship		1.772	0.780
		[-2.339;5.883]	[-3.031;4.591]
Eat with family 0 times	4.957	2335.480	-1.781
	[-8.843;18.756]	[-2193.892;6864.852]	[-23.552;19.990]
× Household rank		0.113	

	[-0.121;0.347]	
× Year of birth	-1.179	
	[-3.448;1.090]	
× No. income obs.	0.948	
	[-2.291;4.187]	
× No. parental income obs.	1.989*	
	[0.326;3.653]	
× Age when income measured	-1.173	
	[-6.847;4.500]	
× Parents' age when parental income measured	0.168	
	[-1.023;1.359]	
× Female	-3.515	
	[-17.941;10.911]	
× Ethnic minority	-4.399	
	[-31.729;22.932]	
× At least one migrant parent	-14.727	
	[-43.062;13.607]	
× Single parent household	-1.423	
	[-22.277;19.431]	
× Degree	-1.899	
	[-17.059;13.262]	
× Teacher relationship	2.343	0.903
	[-2.379;7.066]	[-3.514;5.320]

Teacher relationship	-1.225	-3.372*	474.941
	[-4.248;1.797]	[-6.404;-0.340]	[-401.704;1351.585]
× Household rank			0.059*
			[0.002;0.115]
× Year of birth			-0.244
			[-0.683;0.195]
× No. of income obs.			-0.197
			[-0.852;0.457]
× No. of parental income obs.			0.271
			[-0.111;0.652]
× Age when income measured			0.073
			[-1.122;1.269]
× Parents' age when parental income measured			0.041
			[-0.219;0.301]
× Female			1.042
			[-1.753;3.836]
× Ethnic minority			0.828
			[-6.542;8.198]
× At least one migrant parent			-4.594
			[-10.556;1.368]
× Single parent household			-0.169
			[-4.149;3.811]

× Degree			1.158
			[-2.187;4.503]
Constant	1846.379	734.692	165.271
N	1165.000	1165.000	1165.000
r2	.321	.314	.342

Note: *p<0.05, **p<0.01, ***p<0.001. Weighted analysis. 95% Confidence intervals in square brackets.