Associations between the dynamics of socioeconomic status and children's externalizing behaviour, internalizing behaviour, and language development

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A thesis manuscript submitted to the University of Strathclyde for the degree of Doctor of Philosophy

February 2023

Authors Declaration

This thesis is the result of the author's original research. It has been composed by the author and has not been previously submitted for examination which has led to the award of a degree.

Signed:  Date: 26/02/2023

Acknowledgements

I would first of all like to thank my supervisors, Dr Edward Sosu and Dr Markus Klein for their time, support and patience. Throughout the process, their guidance, encouragement and support had been invaluable, and this thesis would never have materialised without them. It has been a great experience working with you both and I have learned a lot.

I would also like to thank my family for their support and encouragement over the past few years. It has been a long slog and you have always encouraged me to press on. Thanks to my friends for their patience and understanding and for providing some much needed distractions. Thanks to Dr Mark Elliott and Dr Allan McGroarty for the unhealthy breakfasts and Abigail for listening to my list of complaints, the encouragement, and the reassurance. It is very much appreciated. My thanks also go to my fellow postgrads and the PsyPAGers. Meeting you all has been one of the highlights of this process and I am so grateful to be friends with you all. Our “writing retreats” and conferences will always be memorable.

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Glossary of acronyms and abbreviations

ADHD	Attention deficit hyperactivity disorder
AIC	Akaike's information criterion
APA	American Psychiatric Association
APU	Applied Psychology Unit
ASD	Autism spectrum disorders
BAS	British Ability Scale
BAS-NV	British Ability Scale - Naming Vocabulary subscale
BAS-WR	British Ability Scale - Word Reading subscale
BAS-WS	British Ability Scale - Word Similarities subscale
BIC	Bayesian information criterion
BLRT	Bootstrapped likelihood ratio test
BST	Bioecological Systems Theory
BTEC	Business and Technology Education Council
CFI	Comparative fit index
CLT	Central Limit Theorem
DWP	Department for Work and Pensions
FIM	Family Investment Model
FIML	Full information maximum likelihood
FSM	Family Stress Model
FSS	Fair Start Scotland
GCM	Growth Curve Modelling
GCSE	General Certificate of Secondary Education

GMM	Growth Mixture Modelling
GNVQ	General National Vocational Qualification
GSVQ	General Scottish Vocational Qualification
HNC	Higher National Certificate
HND	Higher National Diploma
ISD	Information Services Division
LCGA	Latent Class Growth Analyses
LCT	Life Course Theory
LD	Learning difficulties
LMR	Vong-Lo-Mendell-Rubin test
MAR	Missing at random
MCAR	Missing completely at random
MCS	Millennium Cohort Study
MI	Multiple imputation
MNAR	Missing not at random
NOLB	No One Left Behind
NS-SEC	National Statistics Socio-economic Classification
NVQ	National Vocational Qualification
OECD	Organization for Economic Cooperation and Development
ONS	Office for National Statistics
RMSEA	Root mean square error of approximation
RSA	Royal Society of Arts
SAAS	Student Awards Agency Scotland

SCOTVEC	Scottish Vocational Educational Council
SD	Standard Deviation
SDQ	Strength and Difficulties Questionnaire
SEG	Socioeconomic Groups
SES	Socioeconomic status
SIMD	Scottish Index of Multiple Deprivation
SSS	Subjective Social Status
SVQ	Scottish Vocational Qualification
TLI	Tucker–Lewis index
VIF	Variance inflation factor

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Abstract

This thesis examined the associations between the dynamics of family socioeconomic status (SES) and children's language ability, internalizing behaviour, and externalizing behaviour. Longitudinal national cohort data from the Millennium Cohort Study was used which provided data from six time points when children were 9 months, 3, 5, 7, 11, and 14 years old. SES was conceptualised as family income, education, and occupation (social class) and was recorded at each time point. Children's internalizing and externalizing behaviour were recorded using the parental report Strengths and Difficulties Questionnaire (SDQ) when children were 3, 5, 7, 11, and 14 years old. Children's language ability was measured by British Ability Scale (BAS) Naming Vocabulary Scale when children were 3 and 5 years old, the BAS Word Reading scale when they were 7 years old, the BAS Word Similarities scale when they were 11 years old, and by the Applied Psychology Unit Standardised Vocabulary Test when they were 14 years old. This first study examined the extent to which family SES was associated with children's language ability, internalizing behaviour, and externalizing behaviour at different stages of childhood. The childhood stages examined were early, middle, and late childhood. Results identified that family income was associated with all child outcomes at all stages of childhood. Education was associated with all child outcomes at all stages of childhood apart from internalizing behaviour during late childhood. Occupation was associated with all child outcomes at all stages of childhood apart from internalizing behaviour during middle and late childhood. The second study examined whether different family SES trajectories could be found in the sample and whether the different trajectories were associated with children's language ability, internalizing behaviour, and externalizing behaviour. Results found several family income, education, and occupation trajectories and indicated that persistently low SES trajectories were associated with the most

language and behavioural problems. It also found that increasing SES trajectories over the life course was associated with improved child outcomes. The third study examined whether family SES trajectories were associated with children's likelihood of belonging to different trajectories of language ability, internalizing behaviour, and externalizing behaviour. Results found several outcome trajectories and showed that children were more likely to be in problematic outcome trajectories if their family SES trajectories were persistently low. Children were also more likely to be in high language ability and low behaviour problem trajectories if their family SES trajectories were also improving over the life course. The findings have implications for policymakers interested in improving children's outcomes by increasing family SES. A multidimensional approach to improving family SES was discussed as the results suggest that targeting parents' education and occupation might be beneficial in addition to current policies that target family income. A prolonged approach to supporting family SES at different stages of childhood was also discussed as the result indicated that each SES dimension was associated with children's outcomes at all stages of childhood and that different SES trajectories were associated with children's developmental trajectories over time. The possibility of targeting stress as a mechanism through which SES is associated with children's development was also discussed as an alternative to targeting SES dimensions directly.

Chapter 1: Introduction

1.1 Overview

Widening economic disparities continue to be a problem in the UK and the past decade has seen a steady increase in the number of children living in poverty with approximately one in three children in the UK living in poverty (Social Mobility Commission, 2020). Socioeconomic inequality is prevalent in the United Kingdom which is ranked 32nd out of 38 countries (OECD, 2022). This is problematic as research consistently shows that family socioeconomic status (SES) is associated with a myriad of child developmental outcomes such as language ability (Barnes et al., 2010; Buckingham et al., 2013), numeracy and problem solving ability (Khanam & Nghiem, 2016; Fomby & Musick, 2018), internalizing and externalizing behaviour (Zachrisson & Dearing, 2015), educational attainment (Reardon et al., 2013) and lower future employment and earnings (Chetty et al., 2011; Erola et al., 2016). Children with problematic developmental outcomes disproportionately belong to families with low SES which has led researchers and policymakers to focus on better understanding the inequality gaps in children's development (Clarke & Thévenon, 2022; ISD, 2019; Youth Wellbeing NI, 2020; NHS Digital, 2021; Scottish Government, 2022). Although the associations between SES and children's development are well established in the literature, there remain complexities such as the dynamics of SES that can influence the associations that need further examination. The dynamics of SES refer to factors such as the timing, change, movement, or stability of SES over time and they have been found to be important factors to consider in the associations between SES and children's development (Zachrisson and Dearing, 2015; Björkenstam et al., 2017; Miller et al., 2021). For instance, the associations between SES and children's development outcomes can vary depending on the stage of childhood and the trajectories of family SES over the life course (Mazza et al.,

2017; Burchinal et al, 2018; Miller et al., 2021). Examining whether different dynamics of SES influence the associations between SES and children's development will provide researchers and policymakers with better insight into how inequality gaps might be addressed.

1.2 Focus of this study

This study examined the associations between SES dynamics and children's language ability and socioemotional behaviour. Children's language ability and socioemotional behavioural development were examined due to the significance they have for other developmental domains and their later life outcomes (Zdebik et al., 2019; Straatmann et al., 2018; Hukkelberg et al., 2019; Hulme et al., 2020). For instance, children's language abilities are critical for gaining access to areas of the education curriculum (Hulme et al, 2015; Chow & Jacobs, 2016; Hulme et al., 2020), maintaining social relationships and interacting with their environments (Gillespie-Lynch et al., 2012; Duff et al., 2015) and their future educational and economic outcomes (Duncan et al., 2010, Johnson et al, 2010; Wade et al., 2018). Children's socioemotional behavioural development is important for creating and maintaining healthy social relationships (Smith & Smith 2010; Barthel et al., 2018), maintaining good mental and physical health (Liu, 2004; Sagatun, 2014; Peverill et al., 2021), learning to behave appropriately in society (Barthel et al., 2018), and achieving positive economic outcomes (Liu, 2004; Goodman et al., 2011). Across the UK, between 18% and 33.1% of children failed to meet their communication and language targets and between 11% and 21.9% reported borderline or abnormal socioemotional behavioural problems with children showing language and behaviour problems disproportionally belonging to disadvantaged families (StatsWales, 2019; ISD, 2019; Department for Education, 2019; Public Health England, 2020; Youth Wellbeing NI, 2020; NHS Digital, 2021; Public Health

Wales, 2021). Due to their significance, policymakers are keen to improve children's language ability and socioemotional behaviour and reduce the economic gap in their development (Youth Wellbeing NI, 2020; NHS Digital, 2021; Public Health Wales, 2021; Scottish Government, 2022).

This study defined SES as a multidimensional construct comprising of family income, parent's level of education, and parent's level of occupation which is the most widely used definition of SES (Bradley & Corwyn, 2002; APA, 2007) and is consistent with theory (Weber, 1968; Bourdieu, 1986; Coleman, 1988). This study examined two types of SES dynamics, the stage of childhood (timing) and trajectories of SES, because evidence indicates that children are sensitive to the negative effects of low SES during different stages of childhood (Blakemore, 2014) and because SES is not a static construct meaning people can transition between different social circumstances over their life to create different trajectories (Elder, 2003).

1.3 The rationale for the study

Although a lot of attention has been paid to the associations between SES and children's outcomes, there are some gaps in the literature that need to be addressed.

First, SES is a multidimensional construct and includes measures such as income, education, occupation, poverty, and neighbourhood deprivation (McLoyd, 1998). The majority of the literature has examined the associations that family income or composite measures of SES have on children's language and behavioural outcomes which do not provide information about which SES dimensions have the largest associations with children's outcomes (Kiernan & Huerta, 2008; Violato et al., 2011; Letourneau et al., 2011; Khanam & Nghiem, 2016; Cooper & Stewart, 2017; Fitzsimons et al., 2017). Each SES dimension is theoretically distinct (Weber, 1968), and is associated with unique pathways known to be important for

children's development (Coddington et al., 2014). For instance, parents' education is associated with cognitive and linguistic stimulation while family income is associated with standard of living each of which is associated with children's development (Coddington et al., 2014). It is therefore likely that the extent to which different SES dimensions are associated with children's outcomes varies. Examining the associations between different SES dimensions and children's language and behavioural outcomes would be useful as UK policy is interested in improving family income, level of education, and occupation (Welfare Reform Act, 2016). However, current policies largely focus on increasing family income (Northern Ireland Executive, 2016; Welsh Government, 2015; Scottish Government, 2018), so evidence that different SES dimensions are also important for children's language and behavioural outcomes might be useful for policymakers interested in targeting other SES dimensions.

Second, the extent to which SES is associated with children's developmental outcomes varies depending on the stage of childhood. It has generally been accepted that early childhood is the most important stage as it is when brain development is of critical importance for establishing neural structures and functions that are responsible for future cognitive and behavioural processes (Brummelte et al., 2017) and therefore would be most susceptible to the adverse effects of low SES. Consequently, the majority of studies examine the SES associations with children's language and behavioural outcomes during early childhood (e.g., Schoon et al., 2011; 2013; Dickerson & Popli, 2012; 2016; Burchinal et al., 2018). However, a growing body of literature has found that SES during middle and late childhood is also important (e.g., Sullivan & Brown, 2013; Mazza et al., 2017; Miller, et al., 2021). However, it is difficult to determine which stage of childhood is most important as studies tend to examine short time frames such as early childhood (Schoon et al., 2011; 2013; Burchinal et

al., 2018) or middle and late childhood (Sullivan & Brown, 2013; Mazza et al., 2017; Miller, et al., 2021). Examining at which childhood stage family income, education, and occupation are associated with children's language and behavioural development would help policymakers understand when children would benefit from intervention or if prolonged intervention would be best especially since several policies already focus on early childhood (e.g., Child Payment is available when children are under 6 years old, Best Start Grant ends when the child enters schooling, early learning and childcare end when children are 4 (5 in Scotland)).

Third, SES is not a static construct and can change over the life course to form trajectories (Elder, 2003) and different SES trajectories have different associations with children's language and behavioural outcomes (e.g., Jackson et al., 2017; Björkenstam et al., 2017; Hoyt et al., 2019). However, the current SES literature only focuses on family income (Dearing et al., 2001; Schoon et al., 2011; Duncan et al., 2014; Zachrisson & Dearing, 2015; Jackson et al., 2017; Miller & Votruba-Drzal 2017; Björkenstam et al., 2017; Comeau et al., 2018; Hoyt et al., 2019) which means the extent to which other SES dimensions have various trajectories and whether they are associated with children's outcomes remains unclear. Further, the studies that examine associations between income trajectories and children's language and behavioural outcomes tend to focus on short timeframes such as early childhood (Dearing et al., 2001; Zachrisson & Dearing, 2015; Jackson et al., 2017) or from mid-childhood to late-childhood (e.g., Miller & Votruba-Drzal 2017; Comeau & Boyle, 2018). Since trajectories are formed based on experiences and life events of the life course, when more data points over a longer period of time are used more trajectories are generally found (Cavanagh et al., 2016; Björkenstam et al., 2017; Oshio et al., 2018). Therefore, examining income, education, and occupation trajectories over the entire childhood timeline would give policymakers more

detailed information about how different SES trajectories over the life course are likely to impact children's later language and behavioural outcomes. This would be particularly useful given current policy interventions are aimed at improving family income, education, and occupation (e.g., No One Left Behind and Restart programmes (Scottish Government, 2020; Department for Work and Pensions, 2020).

Fourth, similar to SES, children's language and behavioural outcomes are not static and can also form trajectories over the life course (Mangin et al., 2017; Miller & Votruba-Drzal, 2017; Comeau, 2018) and static measures of SES have been associated with children's membership to different developmental trajectories (Ukoumunne et al., 2012; McKean et al., 2017; Hentges et al., 2019). Since SES is associated with children's developmental trajectories it is likely that SES trajectories are also associated with children's developmental trajectories, however, this has not been examined in previous studies. Examining the likelihood of children belonging to a particular language and behavioural trajectory based on their family SES trajectories would provide useful information for policymakers. For example, it would provide evidence on the extent to which children are likely to belong to improving language and behavioural trajectories if policy supported family SES dimensions.

1.4 Aims of this study

The overall aim of this study was to address the gaps in the literature mentioned above by examining the associations between different dynamics of family socioeconomic status and children's language ability, internalizing behaviour, and externalizing behaviour. First, this study aims to examine during which stages of childhood family income, parents' education, and parents' occupation are associated with children's language ability, internalizing behaviour and externalizing behaviour. By using secondary longitudinal cohort data from the

millennium cohort study this study can examine SES associations during early, middle and late childhood as the data were collected from 9 months until 14 years old. Second, this study aims to explore trajectories of family income, parent education, and parent and occupation trajectories across the entire childhood timeline and examine the associations that each trajectory has with children's language and behavioural outcomes. Since using more data improves the likelihood of finding new trajectories compared to studies that used shorter timeframes (Cavanagh et al., 2016; Oshio et al., 2018), this study examined trajectories by using data collected from 6 time points (when children were 9 months, 3, 5, 7, 11, and 14 years old). It is also likely that new trajectories of parents' education and occupation will be found as this is not examined by current SES trajectory literature. Third, this study seeks to explore whether trajectories of family income, parents' education, and parents' occupation are associated with trajectories of children's language ability, internalizing behaviour, and externalizing behaviour. Predicted probabilities of belonging to particular outcome trajectories will be produced to examine the likelihood that children will belong to outcome trajectories based on their family income trajectories.

1.5 Research questions

This study attempts to address the following research questions:

1a) To what extent are dimensions of family SES (income, education, and occupation) uniquely associated with children's developmental outcomes (language development, internalizing, and externalizing behaviours)?

1b) Are some SES indicators more strongly associated with children's language and behavioural outcomes and is this consistent through to adolescence?

2) To what extent does the association between family SES and children's outcomes vary by stage of development?

3. To what extent does family income, parents' education, and parents' occupation change or remain stable from childbirth through late childhood?

4. To what extent are family income, parent's education, and parent's occupation trajectories associated with children's language and behavioural outcomes during late childhood?

5. To what extent do children belong to different developmental (language, internalizing and externalizing behaviour) trajectories?

6. To what extent does the likelihood of belonging to different developmental (language ability, internalizing and externalizing behaviour) trajectories differ by family SES trajectory (stable, increasing, or decreasing SES)?

1.6 Structure of the study

Chapter 1 gives an overview of the study including a brief introduction to the context and rationale for this study. Chapter 2 gives a more detailed overview of the context and policy that is relevant to this study before presenting an overview of child development and a discussion on why language ability and socioemotional behaviour are examined in this study. The chapter then introduces SES and discusses its different conceptualisations before explaining how it is defined in this study. Theory that helps explain the associations between SES and children's development is then introduced followed by a literature review on the associations between SES and children's language ability and socioemotional behaviour. Following this, SES dynamics are introduced and a literature review of the importance of the stage of childhood for the association between SES and children's language and behavioural development. Further literature reviews on the associations between SES trajectories and children's developmental outcomes are presented. Research aims and questions are then outlined. Chapter 3 outlines the methodology of this study. It presents the background of the dataset that was used, how the data were collected, and the sample used. The outcome

measures were then described followed by independent variables and covariates. Data screening and missing data procedures are then discussed followed by an overview of the analytical procedures used for each of the studies.

Chapter 4 presents the first study examining the associations that family income parents' education and parents' occupation have with children's language ability, internalizing behaviour, and externalizing behaviour at different stages of childhood. It presents a literature review and research questions, the methodology, and a discussion on the regression models used. The results and their implications are then discussed. Chapter 5 presents the second study examining the different family income, parent education, and parent occupation trajectories and their associations with children's language ability, internalizing behaviour, and externalizing behaviour. It presents a literature review and research questions, the methodology and an overview of latent class growth analysis used to generate the trajectories and the relevant model fit criteria. The results and their implications were then discussed. Chapter 6 presents the third study examining the different trajectories of children's language ability, internalizing behaviour, and externalizing behaviour. It presents a literature review, research questions, and the methodology. The results were then presented in a series of graphs for improved interpretability and their implications were discussed. Chapter 7 provides a general discussion of this study. It gives an overview of the aims of the study before discussing the key findings and their implications. Overall implications were presented followed by limitations and future research recommendations. A final conclusion to end the study was presented.

Chapter 2 – Literature review

2.1 Aim of this chapter

This chapter has five sections. The first section sets out the context of the socioeconomic inequalities in children's language development and behavioural outcomes and the legislation in place to improve family socioeconomic status (SES) to reduce developmental inequalities. The second section gives a brief overview of child development and the key theories that explain how children develop. The third section presents different conceptualizations and measures of SES from the literature and presents how SES is conceptualized in the current study. In the fourth section, an overview of theory explaining why SES is associated with children's development is provided before moving on to present the literature on the associations between SES and children's language development, internalizing behaviour, and externalizing behaviour. This section will also discuss that the associations between SES and children's development differ depending on the outcomes being examined and the SES dimensions being measured. In the fifth section theory about why different SES dynamics (stage of childhood, duration, and trajectories) are associated with children's outcomes. An overview of the current literature is presented on the association between SES and child development at different childhood stages, between different durations of low SES and children's development, between different trajectories of SES and children's development, and between SES trajectories and children's developmental outcome trajectories.

2.2 Context

Socioeconomic inequalities in children's language proficiency and socioemotional behavioural development are widespread across Organization for Economic Cooperation and Development countries (Clarke & Thévenon, 2022; OECD, 2022). In all 38 OECD countries,

children with the best language ability and socioemotional outcomes disproportionately belong to families with a higher socioeconomic status indicating that inequality remains a pervasive issue for children's development (Clarke & Thévenon, 2022). Socioeconomic inequality is particularly problematic in the United Kingdom as according to the most recent OECD data, the UK has one of the highest levels of economic inequality among OECD countries ranking 32nd out of 38 countries (OECD, 2022). Across the four UK nations, between 18% and 33.1% of children failed to meet their communication and language targets and between 11% and 21.9% of children were reported to show borderline or abnormal socioemotional behavioural problems (StatsWales, 2019; ISD, 2019; Department for Education, 2019; Public Health England, 2020; Youth Wellbeing NI, 2020; NHS Digital, 2021; Public Health Wales, 2021; Scottish Government, 2022; Moore et al., 2022). In each UK nation, children with language and socioemotional problems disproportionally belonged to disadvantaged families (ISD, 2019; Youth Wellbeing NI, 2020; NHS Digital, 2021; Scottish Government, 2022). For instance, at the time of writing the most recent data in the UK comes from Scotland which shows that 80.7% of the least deprived children but only 56% of the most deprived children achieve their expected literacy score (Scottish Government, 2022). Similarly, 25% of the most deprived children but only 9% of the least deprived children show borderline or abnormal socioemotional behavioural problems (Scottish Government, 2022). This is more concerning since child poverty has been forecast to rise to approximately 38% even prior to the COVID-19 pandemic (e.g., Scottish Government, 2018a). Addressing inequality related developmental gaps is therefore a priority for the UK.

2.3 Policies to address developmental inequalities

Legislation in effect in the UK and the devolved nations mandate that local authorities improve children's language and socio-emotional development and reduce the developmental inequality gap (The Childcare Act (2006); Well-Being of Future Generations (Wales) Act (2015); Children's Services Co-operation (Northern Ireland) Act (2015); The Education (Scotland) Act (2016)). Based on this legislation, The Early Years Foundation Stage (England), the National Improvement Framework (Scotland), Children and Young People's Strategy (Northern Ireland), and the Early Years Outcomes Framework (Wales) are presented to outline the objectives of each UK nation and strategies to achieve them. These frameworks have made reducing the socioeconomic inequality gap in children's developmental outcomes an explicit priority with children's language skills and socioemotional development being key indicators. For example, The National Improvement Framework (2021, pp. 6) in Scotland outlines the following four key objectives:

- "*Improvement in attainment, particularly in literacy and numeracy.*
- *Closing the attainment gap between the most and least disadvantaged children and young people.*
- *Improving children and young people's health and wellbeing*
- *Improving employability skills and sustained, positive school-leaver destinations for all young people"*.

Since low-income children are most likely to have problematic development, policymakers have put in place legislation to support low-income families with children. For instance, the

Child Poverty (2010) Act pledged to end child poverty by 2020. This act required each UK nation to publish their strategies for tackling poverty and set the following income targets:

- *"Less than 10 per cent of children live in households that are in relative poverty.*
- *Less than 5 per cent of children live in households that are in absolute poverty.*
- *Less than 5 per cent of children live in households that are in combined low income and material deprivation.*
- *Less than 5 per cent of children live in households that are in persistent poverty."*

In 2010 the UK government contended that narrowly focusing on income-based poverty targets encouraged policymakers to focus on mitigating the effects of low income rather than addressing the causes of low income in the first place (Department for Education, 2011). The government argued that a multidimensional approach was required to reduce current child poverty and prevent future child poverty (Department for Education, 2011). This resulted in The Welfare Reform Act (2012) which aimed to target the underlying social causes of poverty including education and employment in addition to low earnings. The Welfare Reform and Work Act (2016) repealed the statutory requirement the report on income-based poverty targets and publish child poverty strategies. Instead, the Welfare Reform and Work Act (2016) required authorities to measure, report, and improve levels of household worklessness and educational attainment at age 16 as they were seen as 'root causes' of poverty (Department of Work and Pensions, 2017). This framework allowed policy to target broader indicators of poverty rather than income alone.

The devolved nations of the UK have maintained the income-based poverty targets set by the Child Poverty (2010) Act and continue to measure and publish child poverty plans (e.g.,

Northern Ireland Executive, 2016; Welsh Government, 2015; Scottish Government, 2018b). The Scottish Government has more devolved powers than the other devolved nations in the UK and has more control over their policies. The Scottish government states that child poverty is primarily due to income and passed The Child Poverty (Scotland) Act 2017 (Scottish Government, 2017) which stipulated that the targets set out in the Child Poverty Act (2010) should be met by 2030. Therefore, Scotland's child poverty plan is largely focused on income but also includes some focus on improving employment and education. Despite differences in reporting requirements between the four UK nations, policies tackling child poverty are similar and take the form of three broad categories: *Increasing income from employment, social security, and reducing the cost of living*.

Increasing income from employment is the UK government's primary focus for reducing child poverty and they aim to achieve this by improving families working status and income from work. Policies like The Work Programme and The Restart Scheme (Department for Work & Pensions, 2011; 2022) are aimed at getting people into work who have been unemployed for over a year and the Help to Work scheme designed to help them beyond that if they are still unemployed by giving training or work experience. Similar policies are in place in Wales (e.g., the ReAct+ programme, Communities for Work programme, and Parent's Childcare, and Employment programme; Welsh Government, 2022), Scotland (e.g., No One Left Behind and Fair Start Scotland; Chief Economist Directorate, 2022), and Northern Ireland (e.g. the Step Up to Sustainable Employment programme, Northern Ireland Executive, 2021).

Policies also aim to encourage working by making it more beneficial to be in work than not. For example, the Benefit Cap assumes that benefits would not total more than the average

weekly wage and the rollout of Universal Credit incentivises work as it allows families to work more hours without revoking their benefits which leaves them better off (Department for Work & Pensions, 2017; Low Pay Commission, 2022). The National Living wage of £7.20 was also introduced in 2016 which at the time reflected an additional £910 per year for full-time employees who were on minimum wage (Low Pay Commission, 2022). The National living wage has been increased year on year and is currently at £9.50 (Low Pay Commission, 2022). The income tax allowance has also allowed families to keep more of their earnings (Low Pay Commission, 2022).

Policy is also in place to help workers progress in their jobs through training and raising their level of qualifications with the goal of increasing their income (Welfare Reform and Work Act, 2016; Scottish Government, 2018b; 2023; Welsh Government, 2022; Northern Ireland Executive, 2021). Across England and Wales, the National Careers Service currently helps parents choose what type of education would benefit them and provides free English and maths education for low-educated parents and funding is available for adult apprenticeships and traineeships (Department for Business Innovation & Skills, 2012). Parents can also enrol in college or university courses with some support from grants such as the Lone Parent Grant and the Lone Parents' Child Grant and they are exempted from council tax if studying full time. Wales also offers Community Employability Programmes (Communities for Work+ and Parents Childcare and Employment) designed to support disadvantaged people get into work by providing training and work experience (Welsh Government, 2022). Northern Ireland also does not deviate far from the UK government policies however it also offers the Step Up to Sustainable Employment programme which is designed to reduce the barriers to employment by helping people with appropriate training and education (Northern Ireland Executive, 2021). In Scotland, if parents are under 26 years old their tuition fees are funded

by Student Award Agency Scotland. In Scotland, Fair Start Scotland and No One Left Behind programmes help parents from the most disadvantaged families overcome their barriers to employment so that they can gain sustained employment (Chief Economist Directorate, 2022). Fair Start Scotland also helps currently employed low-income parents progress in their careers with the aim of increasing their income (Chief Economist Directorate, 2019). There is an acknowledgement that the skills required to participate in the labour market are changing which risks job loss. Policy aims to help working families by providing education, training and reskilling for higher-paid positions and job retention. For example, the Flexible Workforce Development Fund is in place for employers to fund academic or non-academic training to up-skill and re-skill their current employees (Scottish Government, 2018b). The National Transition Fund also aims to support new jobs, educate, and reskill people for jobs of the future such as high-tech and high-skilled jobs and green jobs (Scottish Government, 2018b).

Social security entitlements aim to increase family income. The primary social security policy in the UK is Universal Credit which combines Employment and Support Allowance, Jobseeker's Allowance, Housing Benefit, Working Tax Credit, Child Tax Credit, and Income Support into one payment (Welfare Reform Act, 2012). Families can also claim child benefits for children under 16 or under 20 if they are in full-time education. Additionally, in Scotland, low-income families also receive the Scottish Child Payment for children under 6 years old which was initially £20 per week (Scottish Government, 2018b) and was increased to £25 per week in 2022 (Scottish Government, 2022b). The Best Start Grant also provides families with a payment at key stages of children's lives; The Pregnancy and Baby Payment from pregnancy until the child is 6 months old; the Early Learning Payment when the child is between 2 and 3.5 years old; and the School Age Payment when the child is old enough to go

to school (Scottish Government, 2018b). Similarly, the Best Start Food Grant provides monthly payments on to a prepaid food card to families until the child is 3 years old (Scottish Government, 2018b). Due to fewer devolved powers, Wales and Northern Ireland have limited power to implement social security benefits beyond what is available at the UK level (e.g., Universal Credit) and therefore do not have specific payments for poor families with children (e.g., like the Scottish Child Payment). However, it has been increasingly recommended that they both implement a similar policy to help lift children out of poverty (Birt et al., 2022). Although they have limited powers, the Welsh Government provide support to low-income families with children under 5 from the Child Investment Fund (Welsh Government, 2022). Although Northern Ireland does not have specific benefits for child poverty, the Fresh Start Agreement (Northern Ireland Executive, 2015) provides financial top-ups to low-income families who have been negatively affected by the benefit cap. Welfare Supplementary Payments are also available for low-income families that have continually been in receipt of benefits since 2016 in an attempt to continue to support these families (House of Commons, 2022).

Reducing the cost of living helps families retain as much of their income as possible. Several policies such as the Warm Home Discount, Water Sure scheme, and Healthy Start are all designed to mitigate the cost of essential consumables in each of the four UK nations (Department for Environment Food and Rural Affairs 2012; Health and Social Care Act, 2012; The Healthy Start Scheme and Welfare Food (Miscellaneous Amendments) Regulations, 2020; Department for Business, Energy, & Industrial Strategy, 2022). Free School Meals are also a crucial benefit designed to support families and have been extended to all primary school pupils in Scotland and they are available all year round including holidays (Scottish Government, 2018b). Wales are also aiming to provide free school meals

to all primary school children by 2024 and offer a Pupil Development Grant to ensure children have a school uniform and equipment for school (Welsh Government, 2023). In Northern Ireland, free school lunches are only available for children if their parents receive Universal Credit, have a parent studying full time, and have an income of less than £14,000 (Birt et al., 2022).

Early learning and childcare provisions are available for low-income families in Scotland, England, and Wales allowing families to receive free childcare, but at present, there are no free childcare provisions in Northern Ireland (Department for Education, 2018; Scottish Government, 2018b). In Northern Ireland, parents may apply for 12.5 hours of free pre-school education during term time but have no specific free childcare (Employers for Childcare, 2022). Eligible families in England are allowed up to 30 hours of free childcare per week during term time for 3–4-year-old children totalling 1,140 hours of free childcare per year (Department for Education, 2018). Scotland offers the same 1,140 hours of free childcare per year but has increased flexibility by allowing families to distribute their 1,140 hours across the entire year while England only allows families to use their 1,140 hours during term time. Scotland also provides 1,140 hours of early learning and childcare for 2-year-old children for low-income families while all families are entitled to the same service for their 3- and 4-year-old children (Scottish Government, 2018b). In Wales, families can get up to 30 hours of free childcare per week for 48 weeks for 3–4-year-olds totalling 1,440 hours per year (Welsh Government, 2022). This simultaneously improves the parents' availability to work more flexible hours whilst reducing the childcare costs for doing so. Similarly, low-income families are entitled to free after-school care for children so that they can be more available for work. Allocation is now available via The Pupil Premium in the UK and Pupil Equity Fund (PEF) in Scotland for schools to absorb the costs of childcare for

older children by providing after-school care or study allowing parents of older children to be more available for work (Scottish Government, 2018b). The Pupil Premium and PEF are discretionary funds that can be used by schools to improve children's chances and reduce the financial costs of schooling for parents (e.g., for school uniforms, activities, after school tuition).

Overall, apart from a spike during the 2008 recession, income inequality in the UK has remained consistent for the past 20 years despite the above-mentioned policies that have been implemented (Cribb et al., 2022). However, over the same 20-year period the child poverty rates have fluctuated. In 1999, after the government pledged and took action to end child poverty by 2020 (Piachaud & Sutherland, 2001), the child poverty rates began to decline from approximately 33% in 2000 to 28% in 2005 (Joseph Rowntree Foundation, 2022). However, the child poverty rates began to increase leading up to the 2008 recession peaking at 31%. After the 2008 recession and the implementation of the Child Poverty Act (2010), child poverty declined from 31% to 27% and remained at 27% for several years (Joseph Rowntree Foundation, 2022). However, from 2014 onward child poverty steadily rose and was back to 31% in 2020 (Joseph Rowntree Foundation, 2022). The current forecast for child poverty was anticipated to rise in 2022/2023 and this was before the energy crisis, cost of living crisis, and rising inflation (Francis-Devine, 2022). It is therefore likely that child poverty will be worse than the forecast if no interventions are implemented.

2.4 Child Development

Child development refers to the ways in which children change over time from when they are born until they reach adulthood (Kail, 2015). There are many domains of child development including physical, cognitive, language, social, and emotional development (Kail, 2015).

Since the domains of child development cover a wide spectrum of abilities, skills and dispositions, I will focus on children's language ability and socioemotional behaviour (internalizing and externalizing behaviour) because of their significance for other developmental domains (Liu, 2004; Schoon et al., 2010; Park et al., 2011; Broeren et al., 2013; Hukkelberg et al., 2019; Hulme et al., 2020) and the impact that they can have on life course outcomes (Johnson et al, 2010; Duncan et al., 2010; Goodman et al., 2011; Wade et al., 2018; Pedersen et al., 2019).

Children's language abilities are critical for their future development and learning because it determines children's ability to understand, interact, and communicate competently with people in their environments (Gillespie-Lynch et al., 2012; Duff et al., 2015) and gives them access to other areas of the education curriculum such as reading and numeracy (Hulme et al, 2015; Chow & Jacobs, 2016; Hulme et al., 2020). Children's language ability is one of the most reliable predictors of their school readiness (Hoff, 2013), educational attainment (Wade et al., 2018), occupational outcomes (Johnson et al, 2010), and future income (Duncan et al., 2010). It is also important for children's social relationships as language development is essential for communication. Children with lower vocabularies are less able to express themselves and are more likely to have health issues (Schoon et al., 2010; Park et al., 2011), and relationship problems (Britto et al., 2017). Deficits in language ability are therefore detrimental to children's overall development and their ability to thrive in their societies.

Socioemotional behavioural development (SEB) enables children to create and maintain social relationships, behave appropriately, and navigate their social worlds (Barthel et al., 2018). SEB normally comprises externalizing and internalizing behaviour (Löytömäki et al., 2022). Internalizing behaviours are directed toward the self rather than towards others and include anxiety, depression, poor self-regulation, and other mental health problem (Broeren et

al., 2013). Childhood internalizing behavioural problems are associated with poorer developmental outcomes such as education attainment (Gustafsson et al., 2010; Smith & Smith, 2010; Pedersen et al., 2019), mental and physical health (Sagatun, 2014; Peverill et al., 2021), social relationships (Smith & Smith 2010), and future SES (Goodman et al., 2011). Internalizing problems experienced during childhood can persist into adolescence (Zdebik et al., 2019; Straatmann et al., 2018). Externalizing behaviour on the other hand refers to behaviours that are projected outward towards the environment (Eisenberg et al., 2001). During early life externalizing behaviour can be seen as benign such as lying or arguing (APA, 2013) but can escalate as the child gets older to include behaviours such as physical and verbal aggression, delinquency and hyperactivity (Liu, 2004). Children with childhood externalizing behaviour problems are more likely to be involved in crime later in life that leads to criminal convictions (Liu, 2004), have poorer educational outcomes and occupational attainment, lower future income, have poor mental health (Liu, 2004), struggle to maintain social relationships and have an overall lower level of social competence (Hukkelberg et al., 2019). Overall, socioemotional behavioural problems hinder children's ability to successfully develop in a healthy way that helps them thrive in their societies.

Due to the significance that children's language ability and socioemotional behavioural development have for other developmental domains and their later life outcomes, they have both attracted significant policy attention in each of the four UK nations with policymakers keen to improve children's language and behavioural outcomes and reduce the economic gap in their development (StatsWales, 2019; ISD, 2019; Department for Education, 2019; Public Health England, 2020; Youth Wellbeing NI, 2020; NHS Digital, 2021; Public Health Wales, 2021; Scottish Government, 2022). This study will therefore examine the associations between different family socioeconomic dynamics and children's language and socioemotional behavioural outcomes.

2.4.1 Theory of child development

The Bioecological Systems Theory (BST) is an evolving theory which presents an explanation as to how children's environments are associated with their development (Bronfenbrenner, 1986; Bronfenbrenner & Morris, 2006). It presents the environments as four concentric layers ranging in proximity from the developing child called the microsystem, mesosystem, exosystem, and macrosystem (see figure 1; Bronfenbrenner, 1976; 1979). The microsystem is the most immediate system that the child interacts with and includes the contexts that the child has direct contact with (e.g., family, home, and school; Bronfenbrenner, 1974; 1979). These are the environments that children can engage with directly and how they engage will influence their development (Bronfenbrenner, 1976; 1979). The mesosystem is where two different microsystems interact to influence children's development (e.g., do the home and school environments interact to influence development; Bronfenbrenner, 1979). The exosystem are environments that can influence children's development indirectly (e.g., parents' place of work; Bronfenbrenner, 1974; 1978; 1979). The macrosystem represents the wider societal context that the child lives in (e.g., cultural, institutional, and political contexts; Bronfenbrenner, 1976; 1978;1979). A fifth system, called the chronosystem, refers to 'time' and focuses on how the timing of events, consistency or changes in the environment, and life transitions can influence children's development (Bronfenbrenner, 1986; 1989).

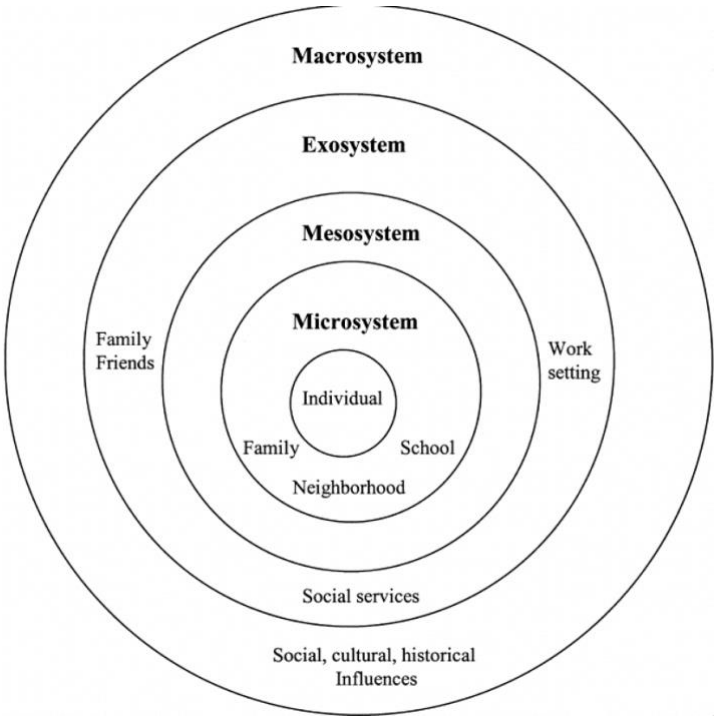

Figure 1. Ecological Systems Model (Bronfenbrenner, 1979)

The BST proposes that complex bidirectional interactions between the child and their environment are the primary drivers of child development (Bronfenbrenner & Ceci, 1993; Bronfenbrenner & Morris, 1998; Bronfenbrenner 1999; Bronfenbrenner & Evans, 2000). These bidirectional interactions are termed proximal processes and include interactions such as parents reading and playing with children, and children interacting with objects in their homes (Bronfenbrenner & Ceci, 1993; Bronfenbrenner & Morris, 1998). The BST makes two main proposals about what is needed for proximal processes to facilitate child development. First, interactions between the child and their environment must be frequent, reciprocal, happen over extended periods of time, and be increasingly complex Bronfenbrenner (Bronfenbrenner, 1986; Bronfenbrenner & Ceci, 1993). Second, the extent to which interactions between children and their environments have positive or negative associations with children's development is dependent on the characteristics of the child, their immediate and remote environments, and the outcomes being examined (Bronfenbrenner & Morris,

1998; 2006). Bronfenbrenner states that better development occurs when positive relationships are formed with people in the environment and if the environment provides the opportunity to observe and engage in activities with assistance from more skilled people to facilitate learning (Bronfenbrenner, 1973; 1979b).

Family socioeconomic status (SES) has consistently been highlighted as a key environmental factor in children's development (Sirin, 2005; Letourneau et al., 2011; Cooper & Stewart, 2013; 2017). It is proposed that family SES is important for children's development because it can shape the home environment and influence the interactions that occur within it (Conger & Donnellan, 2007; Conger & Conger, 2010) and these interactions are ultimately what shape children's development (Bronfenbrenner, 1986; Bronfenbrenner & Morris, 2006). The next section will provide an overview of SES by discussing how SES has been conceptualized in the literature and how it is defined in this study.

2.5 Conceptualisation of SES

The following section will discuss how SES is conceptualised in this study. It does this by discussing the theoretical considerations that helped define SES and the different measures that can be used to represent SES. There will be a discussion on key factors that led to this study conceptualising SES as a multidimensional construct and why family income, education, and occupation were chosen to represent the different SES dimensions.

2.5.1 Theoretical considerations

SES is a multidimensional construct but has no universally accepted definition, and the appropriate measurement of SES has been subject to debate for decades (e.g., Mueller & Parcel, 1981; White, 1982; Entwisle, & Astone, 1994; Gottfried, 1985; McLoyd, 1998; Sirin,

2005). The issue with defining SES is that agreement on how best to measure the different economic and social resources has not been reached. Researchers conceptualize SES based on the measures that they choose to use, which are determined by their specific research questions. This leads to considerable debate about how best to measure and define SES. With no current single definition or standard measurement of SES (Oakes & Rossi, 2003), researchers often draw on the broadly accepted general understanding that SES is a combination of economic and social resources and refers to an individual's social position based on their ability to access and deploy financial, human, and cultural resources (APA, 2007). In the literature, SES is most commonly operationalised by measuring income, education, and occupation.

The theoretical rationale for conceptualising SES as a combination of economic and social resources and measuring it with income, education, and occupation is largely credited to theories proposed by Marx (1967) and Weber (1968). They each present how social stratification occurs. Marx (1967) proposed that an individual's SES was determined at birth and could be explained entirely by their social class, which was measured by an individual's relationship to the labour market. His theory proposed a two-class stratification system whereby individuals' social classes are differentiated based on whether they owned the means of production (e.g., land, factories, business etc.) or were an employee.

Weber's (1968) theory also indicates that social class is an important factor in determining SES. However, his work differs from Marx in several ways. First, Weber believes that there are multiple social class categories that people are stratified into (e.g., upper class, upper middle, lower middle, and lower class) rather than the two categories proposed by Marx (owner and employee). Second, Weber takes a multidimensional approach to understanding

SES, while Marx proposes a unidimensional approach. Weber suggests that people are stratified based on their positions across several different indices in addition to social class. He proposed three dimensions that could be used to stratify people: classes, status groups, and parties. Classes can be represented by economic resources such as income or occupation, status groups can be represented by the level of prestige in the community such as an individual's level of occupation or education and skills (Liberatos et al., 1988), and parties refers to one's access to power which can be represented as income and occupation. Weber argues that an individual's SES is determined by their ability to utilise their education, skills, networks, and other qualities to their advantage to navigate their social environment. People are therefore stratified into SES groups which are comprised of individuals who score similarly across several different dimensions. Third, Weber notes that SES is not a static construct and that individuals are active participants in generating their SES as they can improve their standing across different SES indices over time (e.g., increased income, education, or occupation) ultimately improving their overall SES.

Like Weber, other theorists also suggest a multidimensional approach to conceptualising SES such as Bourdieu (1986) and Coleman (1988). They both propose that stratification is based on an individual's access to, and ability to deploy, different forms of capital (e.g., economic, human, and social). *Economic capital* refers to the economic resources that people can access immediately to purchase goods or services such as income. *Social capital* refers to the formal (institutions such as occupations) and informal (such as peer groups) social networks that individuals accrue over time and have available to them. *Human capital* refers to the education, skills, and knowledge that people have gained in their environments. Each form of capital is measured differently and represents a distinct component of SES.

2.5.2 Individual vs composite measures

Researchers have used the different measures of SES individually or combined to create a composite measure of SES. Using a composite measure of SES is advantageous in some research scenarios as it is more likely to capture the greater overall association that SES has with the outcome of interest as it will encompass the additive effects of the multiple dimensions (Cowan et al., 2012). In this scenario it would be a useful way for researchers to determine an overall association between SES and outcomes of interest where the specific mechanisms between SES and the outcome were not the focus of the study. A composite measure of SES may also be useful for research that wish to use SES as a covariate in the relationship between another independent variable and an outcome.

Researchers have utilised several SES indicators to generate their own composite measures of SES from data available to them. For example, in the UK Britton et al. (2021) used local deprivation measures and free school meal eligibility as an SES scale. Hanscombe et al. (2012) generated a composite SES index using parental education, occupation, and income. Schoon et al. (2021) constructed an SES composite using parental education, social class, parental worklessness, family income, and home ownership. Duckworth & Schoon (2012) use a socioeconomic index of parental education, parent social class, lone parent, teen parent, housing tenure, and worklessness. Dearden et al. (2011) generated a measure of SES using equivalised income, mother and father's class, housing tenure, the experience of financial difficulties, and material deprivation. Recently the Civil Service recommended that employers interested in the SES of their employees create a composite score from their occupation, the highest qualification of their parent, the type of secondary school the individual attended, and whether they were eligible for free school meals. They note that any number of other measures could be used in addition to their recommendations including subjective measures of SES (Civil Service, 2018).

The downside of using a composite measure is that it does not allow for a proper examination of the individual associations between the different SES indicators and the outcome of interest (Eriksson et al., 2021). This is because the associations of each SES indicator could be masked by the associations of other indicators if they are combined as a composite. The unique mechanisms through which different SES indicators operate are also neglected when they are combined as a composite (Cowan et al., 2012; Eriksson et al., 2021). Composite measures of SES are limited in their ability to help inform policy beyond understanding that SES is important for children's developmental outcomes as they limit the amount of information that we can see about the associations between SES and children's development (Cowan et al., 2012). To properly benefit policy, we need to know which SES indicators are being measured and understand the extent to which each SES indicator is associated with children's outcomes to ensure that attention and resources are targeted at the appropriate dimension. This is evident in the literature which indicates that different SES indicators have different associations with different outcomes of interest but also that they have different associations when regressed on to the same outcome (Darin-Mattsson, 2017). This suggests that more useful information is likely to be gathered when using individual SES indicators. Therefore, this study will examine SES indicators independently.

2.5.3 The importance of SES dimensions

Researchers that opt to use individual SES measures must select which indicators to use. When selecting which SES indicators to use, the literature indicates that SES is most often conceptualised as family income, parental education, and parental occupation (McLoyd, 1998; Bornstein & Bradley, 2003; Darin-Mattsson et al., 2017). It has been argued in the literature that SES indicators can be used interchangeably such that the associations between education and child outcomes are used to support the associations between income or

occupation and child outcomes (Geyer et al., 2006). This practice largely stems from Lazarsfeld's (1939) research that found different measures of economic status had similar associations with outcomes. From this, it was argued that it was likely that the different indicators of economic status measured the same underlying construct and therefore the measures could be used interchangeably.

However, this is problematic. Although income, education, and occupation are correlated with each other (Darin-Mattsson et al., 2017; Festin et al., 2017) they represent theoretically distinct constructs that represent the different economic and social resources a family can access (Weber, 1968; Bourdieu, 1986; Colemann, 1988; Jæger, 2007; Bukodi & Goldthorpe, 2013; Harding et al., 2015; Festin et al., 2017). It is also noted in the literature that the correlations between different SES dimensions are generally small to moderate and therefore ideally one should not be used to represent another (Geyer, 2006; Hoffmann et al., 2019). Each indicator is proposed to operate via unique pathways (Conger et al., 2010; Harding et al., 2015; Erola et al., 2016; Davis-Kean et al., 2021; Thaning, 2021) so even if the overall association between different indicators and outcomes were similar, it may not be due to the same reasons (Gayer et al., 2006). Using different SES indicators interchangeably is also problematic for the interpretation of results as claims made about low SES measured by different SES indicators may be less beneficial for policymakers because they can differ depending on the SES dimension measured or the outcome being examined (Avlund et al 2003; Davis-Kean, 2005; Letourneau et al., 2011; Sullivan & Brown, 2013; Boe et al., 2014; Coddington et al., 2014; Jackson et al., 2017; Cooper & Stewart, 2017; Fitzsimons et al., 2017; Gonzalez et al., 2020). For example, Boe et al (2014) indicate that family income had the strongest association with children's internalizing problems, but parents' education had the strongest association with children's externalizing problems. Therefore, policymakers

would benefit from a more accurate understanding of which SES dimensions are more important for children's language and behavioural outcomes.

2.5.4 SES Measurement

Drawing on the above theories gives researchers a wide scope of possible measures to define SES in their studies. At the individual and family level, objective SES measures often include family income, parental education, and parental occupational class, which are referred to as 'The big 3' (Willms & Tramonte 2019). Income, education, and occupation are generally accepted to be the main indicators of SES (Duncan et al., 1972; Bradley & Corwyn, 2002) and are the most commonly measured indicators (Smith & Graham, 1995; Bradley & Corwyn, 2002; Bornstein et al., 2003; Duncan & Magnuson, 2003). They can be used individually or in different combinations as a composite latent construct to measure SES.

2.5.4.1 Occupation

Occupation is considered a primary measure of SES and has been used to determine the social class in the UK for some time. For example, between 1921 and 2001 the Registrar General's Social Class (SC or Social Class based on Occupation) and Socioeconomic Groups (SEG) were used to measure social class via occupation. In 2001 the National Statistics Socio-economic Classification (NS-SEC) replaced both of these measures by drawing on their advantages. The NS-SEC is based on Goldthorpe's schema (1997) which allows occupations to be collapsed into a small number of meaningful categories by considering employment relations (Rose & Pevalin, 2003). Determining social class via occupation employment relations reflects people's working conditions, skill requirements, and their social networks (Fujishiro et al., 2010; Muntaner et al., 2010). Employment relations refer to the nature of the relationship between the employee and the employer and are usually

determined by service relationships or labour contracts. Service relationships and labour contracts generally stem from the ease at which the employer can define and monitor the job requirements. If the employer can define the role requirements, then they can more easily assign earnings by monitoring productivity (e.g., hourly rate) and dictating terms of the labour contract (Goldthorpe, 2007).

Labour contracts are more likely to be assigned to working-class roles because they are normally easier to define and monitor because less specialist knowledge is required. This means that the employer can assign an hourly rate based on the amount of work and productivity (Chandola, 2001) and tie a worker's earnings to their productivity. These roles generally have poorer working conditions, less autonomy as the role requirements are defined, less working flexibility, work under supervision, and employees are more easily replicable as specialist skills are not required (Goldthorpe, 2007; Williams, 2016). Service relationships are more likely for upper-class roles where skills and specialist knowledge are required. Due to the required knowledge, it is more difficult for the employer to define the precise job requirement and monitor the employee's progress, so it is difficult for the employer to assign earnings based on productivity. Since skilled employees are more difficult to replace it is in the employer's best interest to incentivise the employee to continue working in the interest of the business. Employees with a service relationship, are therefore likely to have more working autonomy and flexibility, less supervision, greater job security, and promotion opportunities (Goldthorpe 2007; Williams, 2016). Data on occupational employment relations are normally gathered by asking parents to state their current or most recent occupation through open-ended questions where probes can be used to better ascertain the requirements of their job and more accurately determine their relationship to the labour

market. Alternatively, parents are asked to report their occupation from a list of occupational categories.

2.5.4.2 Education

Education level is another common measure of family SES. Education reflects parents' knowledge and skills that can be utilised to improve their children's life chances (e.g., increased communication, positive family values towards education, higher expectations in terms of developmental outcomes and behaviour etc.). Since parents' education is usually completed during their youth it is considered a more stable indicator of SES compared to income and occupations which can decrease over time (Duncan et al., 2002). This means that parental education is a particularly good indicator of children's early life SES as parents' education is likely to be established before pregnancy, remain the same through birth, and cannot decrease. It is normally measured as either a continuous or categorical variable. If measured as a continuous variable, then parents would be asked to indicate the number of years spent in education and as a categorical variable, they would be asked to indicate the highest level of qualification achieved (Galobardes, 2006).

2.5.4.3 Income

Income reflects a family's financial resources and the purchasing power that individuals have access to which enables them to buy the materials and services that they need to thrive in their society. Income information has been gathered in different ways across the literature. It has been gathered by asking families to report their weekly, monthly, or annual income or asking families to indicate their income band from a selection (Office for National Statistics, 2020). Income data can also be equivalized to account for families' needs based on their household composition so that families with different compositions can more accurately be

compared (Office for National Statistics, 2020). Poverty status is also a common measure of income in the literature (Galobardes, 2006) and can be defined as absolute or relative (Townsend, 1979). Absolute poverty measures one's ability to meet a certain standard of living against a static threshold, meaning that whether the society is better or worse off, the threshold does not change to reflect it. Relative poverty measures one's ability to participate in their society, meaning the poverty threshold changes to reflect society's current state. In the UK relative poverty is defined as those who have an income that is more than 60% below the median household income. Income measures, therefore, relate to the financial risks of poverty (e.g., Short, 2016). Where information on family income is not available, proxy measures such as family wealth and free school meals can be used (Galobardes, 2006; Gorad, 2012).

Although family wealth can be used as a proxy for family income it is distinct in that it is a combination of household wealth (e.g., property asset value minus debt) and financial wealth (e.g., family savings and investments minus debt) while income indicates liquid assets able to pay for goods and services (Miller et al., 2021). However, wealth does not necessarily represent purchasing power or the liquid assets that people can immediately deploy for goods and services and is a more difficult SES dimension to measure than family income as it requires wealth indices to adequately represent the different facets of wealth (Poirier et al., 2019; Miller et al., 2021). Wealth is also less dynamic than family income (Duncan et al., 2002) with studies examining the intergenerational transfer of wealth showing that family wealth is relatively stable compared to family income (Hällsten & Thaning, 2022). Therefore, family income is more suitable for the purpose of the current study which focuses on the dynamics of SES over time. Children's eligibility for free school meals is also a common proxy measure of family income however it is less dynamic than family income due to it being a binary measure (Gorad, 2012). Children are eligible for free school meals if their

parents are unemployed or on an income support benefit such as Universal Credit (Taylor, 2017). While eligibility for free school meals is a common and convenient measure in research, some evidence indicates that it does not accurately represent the lowest income children once all benefits are accounted for (Gorard, 2012). For example, Hobbs and Vignoles (2010) found that only 25-50% of children eligible for free school meals belonged to the lowest income households meaning that some of the lowest income children were missed by the free school meal indicator. Similarly, Taylor (2017) found that approximately 8% of children living in chronic poverty did not meet the free school meal eligibility criteria.

2.5.5 Alternative measures

There are also alternative economic and social indicators of SES other than the 'big 3'. Housing circumstances are often used as an SES indicator which measures a family's material circumstances and accumulated wealth rather than a reflection of their purchasing power (Dalstra et al., 2006). Housing circumstances can be measured by tenure, conditions, and access to amenities. Housing tenure assesses whether the property is owned (either outright or through a mortgage) or rented. Housing conditions refer to whether the house is safe and clean to live in, for example, is it free from dampness and overcrowding. Access to amenities is measured by asking whether the house has clean running water, heating, or utilities such as washing machines. In the UK, the most frequently used measure of housing circumstances is housing tenure (Nightingale et al., 2018).

Housing circumstances are not examined in this study as they are closely linked to family wealth (Office of National Statistics, 2022, Advani et al., 2020) and therefore share similar limitations as family wealth as discussed above. For example, housing tenure is less dynamic than other SES dimensions as once a person becomes a homeowner, they tend not to become

a renter and recent data shows that homeowners tend to stay in the same home for over 10 years and over 20 years for those who have paid off their mortgage (Scottish Government 2019c, Ministry of Housing, Communities, and Local Government, 2020). People renting social housing on average stay in the same home for 12 years (Scottish Government 2019c, Ministry of Housing, Communities, and Local Government, 2020), while private renters live in the same home for between 2 and 8 years (Scottish Government 2019c, Ministry of Housing, Communities, and Local Government, 2020). Similarly, housing tenure is normally measured as a dichotomous variable assessing whether an individual is a homeowner or renter (Grundy & Holt, 2001; Khalatbari-Soltani et al., 2021) which is also less dynamic than other SES dimensions that offer more possible categories means it is less useful for this study focussing on SES dynamics.

Neighbourhood SES is another alternative measure of SES used in the literature and is measured using composite scales that reflect the level of deprivation of a neighbourhood based on the quality of the social and physical environment and the characteristics of the people that live there. In the UK, for example, the Townsend Deprivation Index (Townsend et al., 1988) measures unemployment, overcrowding, the proportion of households with no car ownership, and homeownership. The Carstairs and Morris index (1991) is similar and measures area SES as a composite of car ownership, occupation, household overcrowding, and male unemployment. More recently, the UK nations have used a multiple deprivation index that is slightly different based on their specific needs. They all measure income, education, occupation, health, disability deprivation, and area crime. England includes additional measures of barriers to housing and services and the family's physical environment (McLennan et al., 2019). In Scotland, the Scottish Index of Multiple Deprivation (SIMD) also measures access to services, and housing. Northern Ireland measures access to services and

the physical environment, and Wales measures access to services, housing, and the physical environment. Neighbourhood SES was not used in this study because it does not always reflect an individual's SES since it is an aggregate measure of SES in a given geographical area (Galobardes et al., 2006) which is especially problematic in rural areas due to the greater heterogeneity rural populations (Pardo-Crespo et al., 2013; Xie et al., 2020). Additionally, as discussed in section 2.3.2 above, since neighbourhood SES is a composite measure, it does not allow for examination of individual dimensions of SES (Eriksson et al., 2021).

Subjective Social Status (SSS) measures are used less frequently in the literature as an alternative to objective SES measures. SSS reflects an individual's perception of their own SES compared to others in society. For example, the MacArthur scale of Subjective Social Status (Adler & Stewart, 2007) presents respondents with a hierarchical ladder of 10 points and an explanation that the top of the ladder is the most well-off people with high level jobs, education, high income, and the most respect, while people at the bottom of the ladder are worst off. Participants are then asked to select where they believe they belong on the ladder. Although SSS measures explicitly ask participants to think about dimensions of SES when determining their subjective SES, there is evidence that SSS is a better measure of social indicators (e.g., individuals' control over their life and social influence) than economic dimensions (e.g., income, education, and occupation) (Galvan et al., 2022). SSS is also proposed to operate via different pathways compared to objective measures of SES such as via emotions (Gallo & Matthews, 2003; Destin et al 2012), sleep quality (Moore et al., 2002), and health issues (Zahodne et al., 2018).

SSS was not measured in this study because it does not differentiate between SES dimensions which is what this study aimed to do. Instead, it is hypothesised in the literature that cognitive

averaging takes place (Singh-Manoux et al., 2003; Andersson, 2015; Präg, 2020) which means that participants consider their income, occupation, education, and standard of living as a whole in relation to others in society and indicate where they believe they belong on a social ladder (e.g., Langlois et al., 2020). Furthermore, people can report their perceived SES based on different factors as subjective measures are open to participants interpretations. For example, some people base their subjective SES on their past, present, and future potential SES as opposed to only their current SES (Singh-Manoux et al., 2005). People may also have different understandings of the levels of income, education, and occupation in society and therefore ascribe different subjective assessments on SES dimensions (Adler et al., 2000; Kraft et al, 2022). Therefore, SSS is arguably more useful as an overall indicator of SES, similar to composite measures, than a tool for examining individual dimensions of SES (Singh-Manoux et al., 2003; Zahodne et al., 2018; Amir et al., 2019; Präg, 2020).

2.5.6 Conceptualisation of family SES in this study

In this study, I conceptualise SES as a multidimensional construct comprised of a combination of economic and social resources and will measure family income, parents' level of education, and occupation. I chose these measures since the theories discussed in section 2.3.1 outline that each dimension represents a different type of resource that families have access to and can draw upon which should mean they each have unique associations with children's outcomes (Weber, 1968; Bourdieu, 1986; Coleman, 1988). Family income was chosen to represent the financial resources that families can access to purchase goods and services. It was chosen over proxy measures of income such as family wealth because wealth does not necessarily reflect a family's purchasing power and is less dynamic than income (Miller et al., 2021; Hällsten & Thaning, 2022). Parent education is measured because this most closely represents the human resources that people have (Alan et al., 2008). Occupation

was measured to represent social capital because it is likely that parents with different employment relations have different social networks through their work (Meanley et al., 2020).

The conceptualisation of SES in this study is also in line with current policy as the UK aims to reduce the socioeconomic inequalities in children's outcomes (The Childcare Act (2006); Well-Being of Future Generations (Wales) Act, 2015; Children's Services Co-operation (Northern Ireland) Act, 2015; The Education (Scotland) Act, 2016) by improving income, education, and occupation outcomes (Department for Work and Pensions, 2011;2022; Department for Education, 2021). To monitor progress toward these goals the UK government measures income, education, and occupation (Welfare and Work Reform act, 2016; Northern Ireland Executive, 2016; Welsh Government, 2015; Scottish Government, 2018b). Overall, the UK nations acknowledged that income, education, and occupation are all important SES dimensions for improving family SES and reducing the developmental inequality gap. However, they place different levels of importance on different SES measures. Researching the association between the different SES dimensions and children's outcomes will therefore be useful in determining which measures are more important in a UK context.

2.6 SES and children's developmental outcomes

2.6.1 Theoretical considerations

This section will outline the theoretical considerations that help explain why and how family SES is associated with children's language and behavioural outcomes to outline the framework that informed this study. First, the bioecological systems theory is outlined as it provides the overarching framework explaining why SES is important for children's

developmental outcomes by emphasising the role of the environment. Second, encompassed within the broader bioecological framework, the family stress and investment models outline how family SES is associated with children's developmental outcomes by emphasising pathways between family SES and children's outcomes. Evidence supporting the family stress and investment models is also provided.

2.6.1.1 Bioecological framework

As established in section 2.2.1, the Bioecological Systems Theory (BST: Bronfenbrenner, 1986) proposes that child development takes place due to complex bidirectional interactions (*proximal processes*) between the child and their environment (Bronfenbrenner & Ceci, 1993; Bronfenbrenner & Morris, 1998; Bronfenbrenner 1999; Bronfenbrenner & Evans, 2000). *Proximal processes* have the strongest influence on children's development when they occur in the most proximal environments because these are the environments that children are exposed to most frequently (Bronfenbrenner & Ceci, 1993; Bronfenbrenner & Morris, 1998). The *microsystem* is the innermost layer of children's environments and helps explain why SES is associated with children's development (Bronfenbrenner, 1979). In the microsystem, children have frequent direct contact with their environments (e.g., family and home) and the people in them and is therefore where *proximal processes* have the strongest influence on children's developmental outcomes (Bronfenbrenner, 1979; Bronfenbrenner & Ceci, 1993; Bronfenbrenner & Morris, 1998).

Family SES is associated with children's development because it can determine the nature of microsystems that children directly interact with (Bradley & Corwyn, 2002; Sarsour et al, 2011). This means the type and quality of bidirectional interactions that occur between the child and their microsystems are likely to vary based on family SES (e.g., Conger et al.,

2010). This process is presented in the family stress and investment models, which propose several pathways in children's microsystems through which SES is associated with child outcomes (Conger & Donnellan, 2007; Conger et al., 2010). They each indicate that low SES can impair these pathways and therefore impair children's bidirectional interactions with them. These impaired interactions are proposed to lead to poorer developmental outcomes.

2.6.1.2 Family Stress Model

The Family Stress Model (FSM: Conger et al., 2010) outlines that SES is associated with children's development because it influences their microsystems which impairs the quality of bidirectional interpersonal interactions between children and their parents (a microsystem). The FSM proposes that SES is associated with children's development through parental distress and child-parent interactions. It states that economic hardship (e.g., low income) leads to economic pressures such as being unable to pay bills and buy nutritious food, clothing or other material needs. These economic pressures lead to parental distress (e.g., depression, anxiety, and stress) and increased conflict between parents (e.g., arguments and separations), which lead to more harsh or inconsistent parenting, neglect, and poorer parent-child interactions. These impaired bidirectional interactions lead to poorer developmental outcomes (see figure 2).

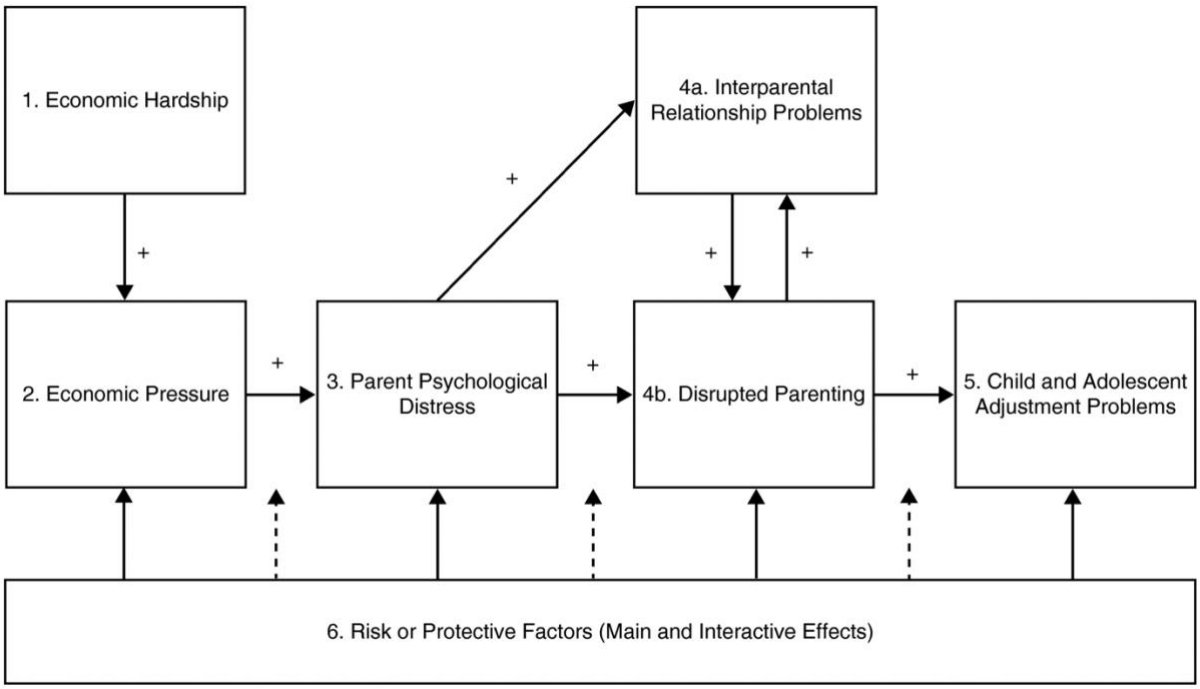

Figure 2. Family Stress Model (figure in Masarik & Conger, 2017)

2.6.1.3. Evidence Supporting The Family Stress Model

Evidence supports the FSM as low income (Katz, 2007; Shaw & Shelleby, 2014; Shelleby et al., 2014) and low occupation (Brooks-Gunn et al., 2010; Hadzic et al., 2013; Dockery et al., 2016; Cho, 2018; Moreira et al., 2019) are associated with increased parental distress which leads to poorer cognitive and behavioural outcomes (Kiernan & Manesh, 2009; Marryat & Martin, 2010; Avan et al., 2010; Neppl et al., 2016; Sosu & Schmidt 2017; Ahun et al., 2017). Increased parental distress can also lead to harsh, neglectful, and inconsistent parenting styles (Kohl et al., 2011; Micklewright et al., 2012; Rijlaarsdam et al., 2013; Shaw & Shelleby, 2014; Sutton et al., 2017) which are associated with worse child outcomes (Kiernan & Manesh, 2011; Micklewright et al., 2012; Shelleby et al., 2014; Sun et al., 2015; Sosu & Schmidt, 2017). Increased parental distress also increases family conflict (Benner & Kim, 2010; Ponnet, 2014; Landers-Potts et al, 2015; Fisher et al., 2015; Simons et al., 2016) and increases work-family conflict (Johnson et al., 2013; Dockery et al., 2016; Moreira et al.,

2019) which are associated with children's behavioural outcomes (Johnson et al., 2013; Dockery et al., 2016).

2.6.1.4 The Family Investment Model

The Family Investment Model (FIM: see figure 3) states that family SES is associated with children's development because it determines parent's ability to invest in the resources required for good child development such as nutritious food, educational materials, activities, and a good environment (Conger & Donnellan, 2007). Low SES families have fewer resources to invest and must concentrate on providing the basic requirements to children (e.g., food and shelter) while high SES families can provide developmental support (e.g., extra tuition and educational experiences). Family SES therefore determines the microsystems that children have access to and interact with which ultimately shapes their development (Bronfenbrenner, 1986).

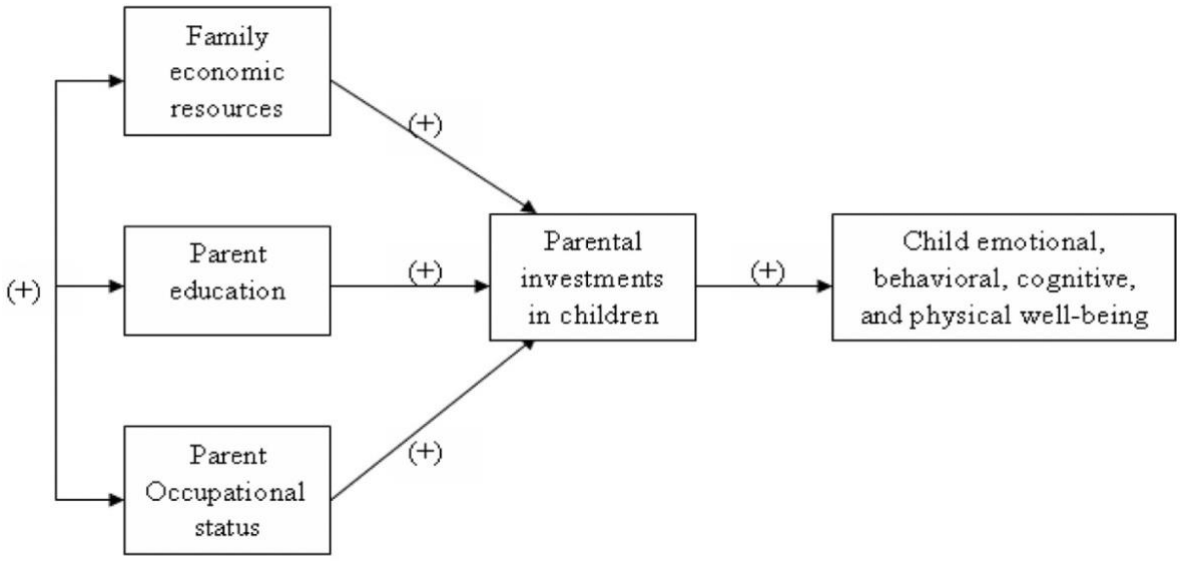

Figure 3. Family Investment Model (figure in Xiaofeng et al., 2018)

2.6.1.5. Evidence Supporting The Family Investment Model

Research indicates that family investments in children's education improve their language ability (Sohr-Preston et al., 2013) and externalizing behaviour (Sosu & Schmidt, 2017). When parents invest in a cognitively stimulating home environment (e.g., purchasing books and reading with children) then children's cognitive and behavioural outcomes improve (Prevoo et al., 2014; Longo et al., 2017). Investing in educational activities and support improves children's cognitive and behavioural outcomes (Fomby & Musick, 2018). Investing in a safe home environment is also associated with better cognitive and behavioural outcomes (Longo et al., 2017). Higher educated parents are more likely to invest more time, money, and effort into creating cognitively stimulating environments which lead to better cognitive and behavioural outcomes (Kalil, et al., 2012; Sohr-Preston et al., 2013; Jeong et al., 2017).

2.6.1.6 Summary

Overall, following a bioecological framework helps explain why children's environments are important factors in children's language and behavioural development by emphasizing the role of their most proximal environments and the interactions within them. Ultimately, since children's interactions are largely limited to their parents and their home for the first few years of life and remain their primary source of interactions throughout childhood it is these interactions that have a significant influence on their development (Bronfenbrenner & Ceci, 1993; Bronfenbrenner & Morris, 1998). The family stress and investment models within the bioecological framework help explain how SES is important for children's language and behavioural outcomes by showing that family SES can determine the quality of children's environments and the interactions that occur within them such as influencing family conflicts, parent-child interactions, stress, quality of cognitive stimulation, and investments each of

which are associated with children's language ability and behavioural development (Rowe, 2012; Landers-Potts et al, 2015; Longo et al., 2017; Jeong et al., 2017; Sosu & Schmidt 2017).

2.6.2 Evidence on SES and developmental outcomes

This section provides a brief overview of the evidence on the associations between SES and children's language ability and socio-emotional outcomes. The literature overall consistently finds that family SES is associated with children's language and behavioural outcomes in cross-sectional and longitudinal studies, and meta-analyses (e.g., Sirin, 2005; Berger et al., 2009; Kiernan & Mensah, 2009, 2011; Violato et al., 2011; Letourneau et al., 2011; Cooper & Stewart, 2013; 2017; Fitzsimons et al., 2017). However, there are differences between language ability and behavioural outcomes. For instance, in Letourneau et als (2011) meta-analysis SES was associated with children's cognitive and language ability in all seven studies ($g = 0.35$, CI = [0.24, 0.46]), with externalizing behaviour in six of seven studies ($g = 0.06$, CI = [0.02, 0.11]), and with internalizing behaviour in only two out of five studies ($g = 0.08$, CI = [0.01, 0.16]). Studies in the meta-analysis examining cognitive and language outcomes focussed on early childhood while studies examining behavioural outcomes focussed on later childhood. These findings indicate that there are likely several factors such as different mechanisms and dynamics (e.g., stage of childhood) that can influence the associations between SES and children's language and behavioural outcomes. This section will discuss this further by presenting evidence for language ability and socio-emotional behaviour.

2.6.2.1 Evidence on SES and language development

Theory indicates that children develop language through frequent exposure to language and bidirectional interactions with their parents (e.g., Vygotsky, 1978; Bronfenbrenner, 1986). Without exposure, it is likely that language development would be hindered. Low SES children likely get less exposure due to impaired parenting practices and child-parent interactions, and less investment in additional materials and educational services, as outlined in the family stress and investment models (Conger & Donnellan, 2007; Conger et al., 2010). These factors limit the quantity and quality of interactions between children and their caregivers which hinders language development.

The quantity of interactions is important for development as hearing parents speak improves children's language processing and ability to improve their vocabulary (Hoff, 2003; Marchman, & Fernald, 2008; Rowe, 2012). Low-SES parents speak to their children less frequently than high-SES parents (Hart & Risley, 1995; Rowe, 2008) and up to 18 times fewer words per day (Weisleder & Fernald, 2013). The family investment model suggests this is because low SES families have fewer resources to invest in educational materials and activities for children's development leading to fewer interactions and few words being spoken. This affects vocabulary growth and the speed of processing words (Weisleder & Fernald, 2013) as evidence indicates that the amount of talking that is heard is associated with children's vocabulary growth (Rowe, 2012; Weisleder & Fernald, 2013). Quality of child-parent interactions (e.g., better speech, responsiveness, and warmth) is also associated with children's language development (Hirsh-Pasek et al., 2015; Justice 2019). Higher SES parents are more likely to have higher quality speech (more complex words and grammar) due to higher levels of education (Huttenlocher et al., 2010; Zauche et al., 2016) and this

higher quality speech is associated with their children having better language development (Rowe, 2012; Cartmill et al., 2013).

Responsiveness (engaging warmly in a timely manner, Wilson & Durbun, 2013) is an important component of language development (Madigan, 2019). When parents are responsive to children during interactions then there are periods of joint sustained attention which are important for language development (Farrant & Zubrick, 2012). A recent meta-analysis found that children have 2.8 times better language ability if their parents show higher responsiveness and warmth during their interactions (Madigan, 2019). The family stress model indicates low SES parents are less likely to be responsive to their children and more likely to display poorer parenting practices (e.g., neglect) due to distress which will negatively impact their language development.

The Intergenerational-Transfer-of-Socioeconomic-Resources Model (Davis-Kean et al., 2021) states that higher SES families have higher expectations for their children, and they are more able to invest resources into their children's learning as outlined in the Family Investment Model (Conger & Donnellan, 2007). This is seen in the literature as higher SES families are more likely to place emphasis on education, be involved in schooling, invest more in activities to boost language development such as invest in reading materials, and read to their children. Each of these are important to children's language development (Bhattacharya, 2010; Hindman & Morrison, 2012; Yeo et al., 2014; Tichnor-Wagner et al., 2015; Gay et al., 2021). Lower SES parents are less likely to be involved in children's educational activities (Sonnenschein et al., 2014) and less able to provide the resources required (Conger & Donnellan, 2007; Hornby & Lafaele, 2011; Hornby & Blackwell, 2018). Lack of these resources can hinder language development (Tichnor-Wagner et al., 2015).

SES-related language differences can be seen at various stages of childhood from as early as infancy and continue to be seen across children's life course into adolescence (Betancourt et al., 2015; Brownell et al., 2016; Sharkins et al., 2017, Miller et al., 2021). Even during pregnancy parents' SES can have an impact on their children's language development when they are born (Brownell et al., 2016; Ribeiro et al., 2016; Berthelon et al., 2021). Family stress models explain this association because low-SES mothers are more likely than high-SES mothers to experience stress while pregnant (Conger et al., 2010). Research indicates that if mothers are stressed during pregnancy their children can have poorer language development (Laplante et al., 2004; King & Laplante, 2005; Berthelon et al., 2021; Ribeiro et al., 2016). Low SES continues to be associated with children's language ability throughout their life course as SES differences in vocabulary can be seen at 7 months (Betancourt et al., 2015) and by 18 months there are significant SES-related differences in vocabulary size and processing. By 24 months low SES is associated with poorer language outcomes (Spann et al., 2020; Markant et al., 2016) and there is up to a 6-month gap in language proficiency between low and high SES children (Fernald et al.,2013) which is an indicator of future language ability. SES is associated with vocabulary and sentence comprehension at 48 months (Schmerse et al., 2018), receptive language at 36-48 months (Morales et al., 2021), and persists through to 60-72 months (Miller et al., 2013; Morales et al., 2021), and language comprehension from 5 years to 14 years (Burneo-Garcés et al., 2019; Miller et al., 2021).

Overall, cross-sectional and longitudinal studies consistently indicate that low family SES is associated with children's current and future language ability (Feinstein 2003; Hansen & Joshi 2007; Berger et al., 2009; Blanden & Machin 2010; Goodman & Gregg, 2010; Washbrook & Waldfogel 2010; Violato et al., 2011; Buckingham et al., 2013; Waldfogel

2013; Platt et al. 2014; Kiernan & Mensah, 2009, 2011; Dickerson & Popli, 2014, 2016; Hernandez-Alava & Popli, 2017). Several meta-analyses have also examined the associations between SES and children's language development (e.g., Sirin, 2005; Letourneau et al., 2011; Cooper & Stewart, 2013; 2017). A recent meta-analysis by Cooper and Stewart (2017) found that family income was associated with children's language outcomes in 25 out of 30 studies with effect sizes ranging from .01 -.37. The authors cite methodological limitations as the cause of the five studies with non-significant results (e.g., controlling for variables that should be used as mediators weakened the income effects).

2.6.2.2 Evidence on SES and socio-emotional development

Social learning theory explains that children learn behaviour through observing the behaviours of people in their environments (primarily the parents), encoding the behaviours, and then imitating them (Bronfenbrenner, 1986; Vygotsky, 1978; Bandura, 1986). When children perform an observed behaviour, their parents can reinforce this behaviour positively or negatively to encourage or discourage the behaviour. Within the bioecological framework, these interactions would take place in the microsystem and are termed proximal processes. The reason SES is associated with children learning behaviour is that low SES can generate family conflict and impaired parenting practices (Conger et al., 2010). If children observe conflict in the household, then they are more likely to encode and imitate it at a later date. Similarly, if children experience harsh parenting practices and impaired parent-child interactions then children are less likely to receive positive reinforcement for desirable behaviours.

These theoretical assumptions are supported in the literature as low SES is associated with higher levels of parental stress (Zhu et al., 2019) which is associated with children's internalizing problems (Cote et al., 2018). Similarly, parental psychological distress (anxiety

and depression) has a direct association with children's externalizing problems (Brook et al., 2012). SES is also associated with children's internalizing problems via parental anxiety alone (Zhu et al., 2019). Low SES has been linked to disrupted and harsh parenting (Neppl et al., 2016), lack of support (Newland et al., 2013), and lower quantity and quality interactions between children and their parents (Iruka et al., 2012), each of which is associated with children's internalizing problems (Wu & Lee, 2020).

Ma et al. (2012) found that when parents exhibited punitive parenting practices 14-year-old children showed greater externalizing behavioural problems while children with parents who showed more warmth had fewer externalizing behavioural problems. A recent study by Kaiser et al. (2017) examined the pathways between poverty status and children's internalizing and externalizing behaviours. They found that mothers life satisfaction and parenting style significantly mediated the association between SES and children's behaviours with parenting style having a larger effect. Research also indicates that family conflicts such as abuse, sexual assault, and neglect also explain the relationship between low SES and children's internalizing problems (Liu & Merritt, 2018). Investment models also argue that low SES families are less likely to be able to invest in basic needs (e.g., nutrition requirements for children) and food insecurity has been associated with internalizing and externalizing problems (Slopen et al., 2010).

The literature examining the relationship between SES and internalizing, and externalizing behaviour is smaller than the literature for language development, but it does indicate that SES is associated with both internalizing and externalizing behaviour (Letourneau et al., 2011). Socioeconomic inequalities in internalizing and externalizing problems are evident in early childhood (Marryat et al., 2018). At age 3 SES inequalities are already associated with children's internalizing (Bøe et al., 2014; Ng-Knight & Schoon, 2017) and externalizing

problems (Bøe et al., 2014). Lower SES children have significantly worse internalizing (Evans & Cassles 2014; Bøe et al., 2014; Zachrisson & Dearin 2015; Ryan et al., 2015) and externalizing (Dearing et al., 2006; Bøe et al., 2014) outcomes than their non-poor peers, and this trend has been found to persists at all ages from 3-19 years of age (Peverill et al., 2021). Longitudinal studies indicate that SES during early childhood is associated with internalizing and externalizing outcomes later in life (Bøe et al., 2014; Hernandez-Alava & Popli, 2017; Hosokawa & Katsura, 2017; 2018; Straatmann et al., 2019).

Overall, cross-sectional and longitudinal studies consistently indicate that low family SES is associated with children's current and future socioemotional behavioural development (Berger et al., 2009; Violato et al .,2011; Wilson et al., 2012; Bøe et al., 2014; Bitsko et al., 2016; Flouri & Midouhas, 2017; Hosokawa & Katsura, 2017; Hernandez-Alava & Popli, 2017; Fitzsimons et al., 2017; Marryat et al., 2018; Tamura et al., 2020; Fuller et al., 2022). Meta-analyses have also examined the associations between SES and children's socioemotional behavioural development (e.g., Sirin, 2005; Letourneau et al., 2011; Cooper & Stewart, 2013; 2017). Cooper and Stewart's (2017) meta-analysis found that family income was associated with children's behavioural outcomes in 12 out of 16 studies. Effect sizes for internalizing behaviour ranged between .02 - .11 and for externalizing behaviour between .03 - .11. Of the four studies that found no effect of SES, two were experimental involving monthly cash transfers (Morris & Gennetian, 2003; Manley et al., 2015), one examined lottery winners (Cesarini et al., 2016), and one was observational (Violato et al., 2011). Although they had no association with behavioural outcomes, two found income associations with cognitive and language outcomes (Violato et al., 2011; Manley et al., 2015) which seems to indicate that SES associations could differ by outcome being measured. However, neither Violato et al. (2011) or Manley et al. (2015) distinguish between the type of behaviour (internalizing and externalizing) so it cannot be determined if this finding would be

consistent for all behaviour. Violato et al. (2011) only examined early childhood behaviour so it could be that behaviour outcomes are more likely to be associated with SES during later childhood. Letourneau et al. (2011) also conducted a meta-analysis distinguishing between dimensions of behaviour to examine associations between family SES and children's internalizing behaviour and externalizing behaviour. Six of seven studies found that low SES was associated with increased externalizing behaviour problems (g = 0.06, CI = [0.02, 0.11]) but only two out of five studies found an association between family SES and children's internalizing behaviour (g = 0.08, CI = [0.01, 0.16]) indicating that SES may have different associations with different dimensions of behaviour.

2.6.2.3 Summary

Taken together, evidence has consistently shown that family SES is associated with children's current and future language ability and socioemotional behavioural outcomes (Feinstein 2003; Hansen & Joshi 2007; Berger et al., 2009; Kiernan & Mensah, 2009, 2011; Schoon et al., 2010; Blanden & Machin 2010; Goodman & Gregg, 2010; Washbrook & Waldfogel 2010; Hansen et al. 2010; Violato et al., 2011; Buckingham et al., 2013; Waldfogel 2013; Platt et al. 2014; Bøe et al., 2014; Dickerson & Popli, 2014, 2016; Bitsko et al., 2016; Flouri & Midouhas, 2016; Brownell et al., 2016; Sharkins et al., 2017; Hosokawa & Katsura, 2017; Hernandez-Alava & Popli, 2017; Fitzsimons et al., 2017; Tamura et al., 2020; Fuller et al., 2022). Studies also indicate that different dimensions of SES (e.g., family income, parent occupation, and parent education) are associated with children's language and behavioural outcomes (Huttenlocher et al., 2010; Bøe et al., 2014; Zauche et al., 2016; Hernandez-Alava & Popli, 2017; Hosokawa & Katsura, 2017; 2018; Miller et al., 2021) and that the size of the associations between SES and children's developmental outcomes differ by outcome (Letourneau et al., 2011; Cooper & Stewart, 2013; 2017; Kiernan & Huerta, 2013; Votruba-Drzal, 2021).

The benefit of longitudinal studies is that they help identify complexities in the associations between SES and children's developmental outcomes by examining the SES effects over extended periods of time at different stages of childhood (Park & Rainsberry, 2020). The stage of childhood is an important consideration because evidence indicates that the strength of associations between SES and outcomes differs between studies but also between stages of childhood (Burnett & Farkas, 2009; Dickerson & Popli, 2014; 2016; Miller et al., 2021; Whitfield et al., 2021). Further evidence indicates that the duration of being in a low SES family has an impact on the associations between SES and children's language and socioemotional behavioural development (Kiernan & Mensah, 2009; Fitzsimons et al., 2017). Studies indicate that SES is not static, it changes over time generating different SES trajectories, and that the different SES trajectories have different associations with children's language and socioemotional behavioural outcomes (Fitzsimons et al., 2017). The literature examining the SES association with children's language and socioemotional behavioural is broad and inconsistent which makes it difficult to draw conclusions about what outcomes SES is most strongly associated with, at which time during childhood SES associations are strongest, and whether different exposures to SES are important. Meta-analyses have also been useful for drawing findings together to generate key points to consider. Several meta-analyses have examined the overall trends in the associations between SES and children's language and behavioural outcomes and have found that SES is consistently associated with children's language ability but there has been some variation in the SES association with behavioural outcomes (Sirin, 2005; Letourneau et al., 2011; Cooper & Stewart, 2013; 2017), particularly internalizing behaviour (Letourneau et al., 2011). Studies in the meta-analyses examining language outcomes focussed on early childhood while studies examining behavioural outcomes focussed on later childhood. This further indicates that the stage of

childhood is an important factor to consider in this study and will be discussed in later sections.

Overall, the current evidence highlights several important factors regarding the associations between SES and children's development. *First*, the extent to which family SES is associated with children's developmental outcomes differs depending on the outcomes being examined. *Second*, the associations between SES and children's developmental outcomes may differ depending on the SES dimensions being examined. *Third*, the dynamics (e.g., stage of childhood, duration, trajectories) of SES may influence the associations between SES and children's language and behavioural outcomes. The next section will discuss the association between the different dimensions of SES and children's development.

2.7 Evidence of different SES dimensions and children's development

As established, SES is associated with children's language ability, internalizing behaviour, and externalizing behaviour but it is unclear which dimensions of SES are most important for each outcome. The majority of the literature has examined the associations that income measures or composite measures of SES have on children's language and behavioural outcomes which do not provide information about which SES dimensions have the largest associations with children's outcomes (Kiernan & Huerta, 2008; Violato et al., 2011; Letourneau et al., 2011; Khanam & Nghiem, 2016; Cooper & Stewart, 2017; Fitzsimons et al., 2017). However, theoretically, each SES dimension represents a different resource that families have access to (Weber, 1968; Bourdieu, 1986; Coleman, 1988). These SES dimensions and the resources they represent are associated with children's development differently via both unique and overlapping pathways as outlined in the family stress model and investment models. Researchers have tried to identify whether there are unique

associations between different SES dimensions and children's language ability and behavioural outcomes. Compared to the broader SES literature, fewer studies have examined the unique associations between income, education, and occupation as individual dimensions and children's outcomes. Studies that have done this could reveal which SES dimensions are most important and help inform policy.

Education appears to be the most important SES indicator for language ability when only family income and parents' education are measured. Examining children's language ability, Davis-Kean (2005) found a direct association between parents' education and children's language ability, but not with income. Both parents' education and income were indirectly associated with children's language ability through parents' educational expectations for their children and parents' education had the largest association with parents' expectations. Similar results were found by Coddington et al. (2014) when examining the association between maternal education and family income and children's language ability through several different pathways. Maternal education, but not family income, was directly associated with children's language ability. Mother's education was also associated with all mediating pathways (standard of living, home ownership, cognitive stimulation, linguistic stimulation, publicly and privately funded early childcare and education) while family income was only associated with standard of living and private early childcare and education. This suggests that mother's education is the most important indicator for children's language ability especially for children with no access to private care and education. However, standard of living was the most important mediator which was significantly associated with both income and education indicating that they both are important SES indicators for children's language, but education is arguably more important as it had the strongest association with standard of living.

Including parents' occupation into their analysis, Gonzalez et al., (2020) examined the independent associations between parents' occupational class and level of education and children's language at age 4-5. They found that mother's education had a larger association with children's language scores than occupational social class or employment status. This indicates that education and occupation operate differently but it does not examine the unique effects of all three SES dimensions as it neglects family income.

Although these studies indicate that parents' education has the largest associations with children's language ability it seems to be dependent on the mediating variables being measured. The studies focus on education related mediators (e.g., parent's educational expectations and cognitive and linguistic stimulation) and it is likely that parent's education would be strongly associated with these educational factors as the Intergenerational-Transfer-of-Socioeconomic-Resources Model indicates that parents with higher levels of education expect better outcomes from their children (Davis-Kean et al., 2021). This can be seen in Coddington et al. (2014) study where family income was associated with mediators that can be purchased (e.g., standards of living and private childcare and education) but was not associated with mediators that cannot be purchased (e.g., parents' linguistic stimulation). This shows that different SES dimensions can operate via different pathways, but it does not allow conclusions to be drawn in terms of which SES dimension is most important. Instead, it raises questions about whether parents' education is also the most important SES dimension for non-cognitive outcomes (e.g., internalizing, and externalizing behaviour).

When other child outcomes are considered, there are inconsistencies about which SES indicators are most important. Jackson et al. (2017) examined the associations between

mothers' education, family income, and children's age 5 language ability and externalizing behaviour in a UK and US sample. In the UK, mothers' education and family income were both associated with children's language and externalizing behaviour. However, in the US, only family income was associated with children's language and externalizing behaviour. The differences between the UK and US samples could be attributed to differences in policy (e.g., healthcare and childcare) but it does indicate that parents' education could be important for children's behavioural outcomes in the UK indicating a need to understand this association with UK data. Similarly, Boe et al (2014) examined associations between family income, parents' education and children's internalizing and externalizing behaviour. They found family income was directly associated with children's internalizing problems and had the biggest overall association with internalizing problems. Parents' education had the only direct association with children's externalizing problems, but negative parenting practices had the largest overall association with externalizing problems. Both income and maternal education were associated with negative parenting, but income had a slightly larger association with it. These results suggest income is the most SES dimension for children's internalizing problems, but it is unclear which is most important for externalizing problems. Hosokawa and Katsura (2018) found similar inconsistencies as family income was the only SES dimension associated with children's internalizing behaviours at 6 years old. However, both family income and maternal education were significantly associated with children's externalizing behaviours with education having a slightly stronger association. These studies indicate that family income is more important than parents' education for children's internalizing behaviours during early childhood, but it cannot tell us whether it is more important than occupation as it was not measured. The findings are less clear about which SES dimension is most important for externalizing behaviour as the differences between income and education associations are small.

Measuring all three SES indicators, Sullivan and Brown (2013) examined unique associations between income, education, and occupational class on children's age 16 arithmetic, spelling, and vocabulary scores. They found that income and education were associated with all outcomes, while occupation was only significantly associated with children's arithmetic. They also found that education had the strongest association with all outcomes, followed by income, and occupation. When parents reading behaviour at home was controlled for education still had the strongest association with all outcomes while income was only significantly associated with arithmetic. Occupation had no significant associations with any outcomes. This would suggest that higher educated parents were more likely to read with their children which improves their language ability. Different conclusions are drawn by Miller et al. (2021) who also examined the associations between family income, mothers' education, mothers' employment, and children's externalizing and internalizing behaviour, maths ability, and language ability. When children were 5-6 years old, mothers' employment had the largest association with children's externalizing outcomes, mothers' education had the largest association with internalizing problems and language ability, and income had the largest association with mathematics ability. At age 9-10, the findings were the same apart from income, rather than education, had the largest association with children's language ability. At age 13-14, mothers' occupation had the largest association with internalizing and externalizing problems, mothers' education had the largest association with language ability, and income had the largest association with mathematics ability. These inconsistent findings represent the problem with the current literature as it indicates that SES dimensions, outcomes, and childhood stage are all important factors to consider in research.

Overall, the literature examining the independent unique associations between different SES dimensions and children's language and behavioural outcomes is inconsistent and it is difficult to determine which SES dimension is most important. With studies measuring different dimensions, it makes it difficult to compare findings. Across the studies, each dimension has been found to be the most important which suggests that the relationship between SES dimensions and children's outcomes is complex. The evidence does indicate that each SES dimension has a unique association with children's outcomes which supports theory (e.g., Weber, 1968), but it indicates that the associations are dependent on the outcomes being assessed and the SES *dynamics* (e.g., stage of childhood). Few studies examine the associations between income, education, and occupation and children's language ability, internalizing and externalizing behaviour across different stages of childhood. With the UK currently focused on addressing language and behavioural inequalities (Childcare Act, 2006; Well-Being of Future Generations Act, 2015; Children's Services Co-operation Act, 2015; The Education Act, 2016) it raises the question of which SES dimensions are most important for different child developmental outcomes in the UK context and where policy should be focussed. This study will add to the literature by examining this whilst considering the *dynamics* of SES which will be discussed in the following section.

2.8. A dynamic view of SES and developmental outcomes

This section will discuss the dynamics of SES (e.g., the stage of childhood, duration of exposure to low SES, and trajectories) and their associations with children's language ability and socioemotional behavioural outcomes. The above literature highlighted that the stage of childhood is an important factor to consider in the associations between SES and children's language and behavioural outcomes (Dickerson & Popli, 2014; 2016; Miller et al., 2021; Whitfield et al., 2021). Theory and longitudinal studies also indicated that the duration of

exposure to SES is also an important factor in the association between SES and children's language and behavioural outcomes (Kiernan & Mensah, 2009; Fitzsimons et al., 2017). Unique exposure to different SES circumstances over time form different SES trajectories that are associated with children's outcomes (Fitzsimons et al., 2017). The following subsections will provide an overview of the theoretical considerations that help researchers understand why SES dynamics are important for children's language and behavioural outcomes and then present the current empirical evidence.

2.8.1 Theoretical considerations

As indicated in the literature, SES dynamics (e.g., stage of childhood, duration of exposure, and trajectories) can influence the association between SES and children's language ability and behavioural outcomes (Fitzsimmons et al., 2017; Miller et al., 2021). As established, family SES is associated with children's developmental outcomes because it can determine the nature of the microsystem environments that children interact with (Bronfenbrenner, 1979; 1986; Conger et al., 2010; Conger & Donnellan, 2007). The family stress model indicates that low SES is associated with poorer outcomes through children's bidirectional interactions with impaired pathways such as poor parenting and conflict (Conger et al., 2010) However, within Bronfenbrenner's bioecological systems theory, the *chronosystem* acknowledges that children's environments can change over time (Bronfenbrenner, 1979; 1986). When environments change, the bidirectional interactions that children have with them are also likely to change which will impact children's outcomes. Therefore, the extent to which SES is associated with children's language and behavioural outcomes is likely to vary based on SES dynamics. Life course epidemiology provides different models to explain why different SES dynamics are associated with children's developmental outcomes (Kuh et al., 2003). Life course models study how exposure to low SES over the life course is

associated with children's developmental outcomes. The different models include the *sensitive period, accumulation of risk, and trajectory models* (Kuh et al., 2003).

2.8.1.1 Sensitive period models

Sensitive period models explain why the association between SES and children's outcomes differ depending on the stage of childhood (Hertzman et al., 2001; Kuh et al., 2003). The sensitive period hypothesis states that there are certain times during the life course when people are more sensitive to risk factors such as low SES (Kuh et al., 2003). We know from family stress and investment models that low SES is associated with poorer developmental outcomes because low SES leads to impaired bidirectional child-parent interactions and less investment in their development (Conger et al., 2010; Conger & Donnellan, 2007). However, the *sensitive period model* argues that children may be more susceptible to the adverse effects of impaired interactions and low investment during certain times during childhood, particularly during early childhood (Kuh et al., 2003).

2.8.1.2 Accumulation of risk models

Accumulation of risk models (Power et al., 1991; Kuh et al., 2003) explain why the association between SES and children's outcomes differ depending on the length of time families are in low SES. These models posit that children's exposure to low SES at several time points each have an association with children's outcomes, but also accumulate to produce a cumulative adverse effect on children's outcomes (Power et al., 1991; Kuh et al., 2003). Therefore, children in low SES households for longer durations will have worse developmental outcomes than their peers because they will have more cumulative impaired bidirectional child-parent interactions and go longer periods with less investment in their

development. This build-up of exposure to stressful and impaired interactions are associated with worse developmental outcomes (Conger et al., 2010; Conger & Donnellan, 2007).

2.8.1.3 Trajectory models

Trajectory models explain that SES is not a static construct that people can have different SES trajectories and that each trajectory can have a different association with children's outcomes. Trajectories highlight that SES and development do not stop after critical or sensitive periods but instead continue from birth to death (Elder et al., 2003). People can have several different trajectories simultaneously that can be independent or associated with each other (e.g., income, educational, occupational, and developmental trajectories) and each trajectory encompasses transitions into and out of states and major life events that occur across the life span. Life course research has generated the social mobility hypothesis which states that individuals can continuously move between different social circumstances over the life course and that these upward and downward trajectories can have an association with children's developmental outcomes (Duncan, 1988; Lynch et al., 1994). Family stress model explains that this is because as family SES changes, then family conflict and parents' interactions with their children are likely to change in the same direction which can increase or decrease the SES association with children's outcomes. Similarly, the investment model states that changes in family SES will be reflected in their ability to invest in their children's development and therefore impact the association between family SES and children's outcomes.

2.8.2 Evidence of SES differences in developmental outcomes by stage of childhood

When following sensitive period models, researchers examine the associations between exposure to risk factors at particular time points and children's developmental outcomes

(Green & Popham, 2017; Green et al., 2018). Exposure to particular factors during these critical periods can have positive or negative effects on the developmental outcomes of interest (Kuh et al., 2003). In the case of SES, it would be expected that exposure to low SES during a critical period would have a negative effect on children's current and future developmental outcomes. These 'sensitive' or 'critical' period can vary depending on the outcome being measured and the external factor that the children are exposed to. This is particularly important as childhood and adolescents are times of significant change for children (Gariepy et al., 2017).

The developmental-contextual model presented by Schoon et al. (2002) proposes that current SES risk is associated with future SES risk, current developmental outcomes, and future developmental outcomes. Testing their model, they found that SES risk during early childhood was more strongly associated with early (current) academic adjustment than late academic adjustment. They also found that late SES risk was more strongly associated with adolescent (future) academic adjustment than late (current) academic adjustment. This indicates that SES risk can have more or less importance on children's outcomes depending on when they experience SES risk. The model indicates that early childhood is a particularly sensitive period to SES risk for academic outcomes. Sensitive periods are not exclusive to early childhood.

It is important to consider the stage of childhood when examining the associations between SES and children's development because evidence indicates that associations differ depending on the stage of childhood (Miller et al., 2021). Few studies have examined the association between family SES at different stages of childhood and children's language ability, internalizing behaviour, and externalizing behaviour. One study by Burchinal et al

(2018) examined how experiencing poverty at 0-2 years and 3-5 years was associated with a variety of children's language and behavioural outcomes. They found that experiencing poverty between 0-2 years was worse for children's problem solving, phonological awareness, and internalizing behaviour problems. However, experiencing poverty for the first time between 3 and 5 years old was worse for children's receptive vocabulary, word identification, and executive functioning. There was no difference regarding externalizing behaviour problems. These findings indicate that family SES at different childhood stages is important, but it does not provide any understanding about whether mid or late childhood are more or less important as the time frame only included early childhood age ranges. It is also difficult to determine at which stage in childhood SES is most important from the broader literature because the studies often focus on a short timeframe or findings are inconsistent.

The broader literature largely focuses on early childhood as being the most important critical period in a child's development (particularly cognitive outcomes) and is the most sensitive to the adverse effects of low SES. This is because the early years of childhood are considered to be a sensitive period for children's development (Sylva 1997**;** Kuhl et al., 2005). It is likely that the early years are particularly sensitive to the adverse effects of low SES because it is when brain development is of critical importance for establishing neural structures and functions that are responsible for future cognitive and behavioural processes (Brummelte et al., 2017). Evidence supports that early SES is most important for later life outcomes (e.g., Brooks-Gunn et al., 1997; Joinson et al., 2017). This assumption tends to hold true for research examining cognitive outcomes where the earlier a child experiences low SES the worse their cognitive outcomes tend to be. For example, in the UK, Schoon et al. (2011; 2013) found that experiencing income poverty during the first year of life had a stronger negative effect on children's cognitive development at 5 years of age than experiencing

poverty at age 3 or 5. Dickerson and Popli (2012; 2016) also compared the effects of experiencing income poverty at birth and at age 7 on children's cognitive outcomes at 7 years old. They found that early income poverty had a larger association with children's cognitive outcomes than current poverty at age 7. Like Burchinal et al. (2018), these studies are limited to early-mid childhood which means they do not help draw conclusions about whether SES during the later years of childhood is also important for children's outcomes.

Emerging evidence suggests that sensitive periods can differ depending on the outcome being considered (e.g., Campbell et al., 2000; Costello et al., 2005). Low SES during earlier years appears to be particularly problematic for cognitive and language outcomes but low SES during later childhood and adolescence is important for socioemotional problems (National Institute of Child Health and Human Development Early Child Care Research Network, 2005; Costello et al., 2011; Gibb et al., 2012; Lai et al., 2019). Evidence indicates that adolescence is a sensitive period for behavioural problems due to new experiences such as being exposed to stressors such as bullying (Blakemore, 2014; Fuhrmann et al., 2015; Efstathopoulos et al., 2018). Support for this assumption can be seen in the literature. Duncan et al. (2010) examined whether there were differences in children's internalizing and externalizing behaviour based on whether they experienced low income during early childhood, mid-late childhood, and adolescence. Both internalizing and externalizing behaviour were only associated with low income during adolescence (Duncan et al., 2010). Lai et al. (2019) found the same when comparing the associations between different patterns of poverty on children's socioemotional behavioural problems. They found that income poverty during late childhood had a stronger association with children's socioemotional behavioural problems than income poverty during early childhood. Tsal et al., (2005) also showed that low income during mid-late childhood (6-12 years) was associated with ADHD (externalizing) problems beyond the effect of low income during early childhood (0-5 years).

This evidence indicates that low SES during later childhood is also important for children's outcomes and that children may be sensitive to the adverse effects of low SES across the entire childhood timeline. However, the behaviour measures used in each of the studies measure different indicators of behaviour making it is difficult to draw comparisons between studies. The findings are also inconsistent with Mazza et al (2017) who examined low SES during early (0-3 years), middle (5-7 year), and late (8-12 years) childhood and found that being exposed to poverty during early childhood had the strongest association with externalizing behaviour problems (hyperactivity, physical aggression, and oppositional behaviour). This was closely followed by experiencing poverty between 8-12 years indicating that proximal or most recent experiences of poverty were also associated with behavioural outcomes. This contradicts Burchinal et al. (2018) findings that low SES during early childhood was not associated with externalizing problems and differs from research stating that there was no association at all between SES and externalizing problems. These inconsistencies are problematic for policymakers and research is required to make these associations clearer.

Overall, the literature examining the associations between family SES at different childhood stages and children's language ability, internalizing problems, and externalizing problems is limited. At present, the evidence indicates that SES at different times has different associations with children's development, but it is unclear which childhood stage is most important for language ability, internalizing problems, and externalizing problems. Since these outcomes are a focus of current UK policy (The Childcare Act, 2006; Well-Being of Future Generations Act, 2015; Children's Services Co-operation Act, 2015; The Education Act, 2016), this study will address this gap in the literature by expanding on Burchinal et al's (2018) study by examining the SES associations with these outcomes at all stages of childhood. The literature also largely focuses on the associations between income at sensitive

periods and children's developmental outcomes and neglects to consider that children may be more sensitive to their parents' education or occupation at different stages of childhood. For example, children's language development is sensitive to mothers' education during early childhood as this provides scaffolding to build upon as they age (Vygotsky, 1978; Carr & Pike, 2012), however, mothers' education is also associated with children's behaviour problems during later childhood and adolescence (Miller et al., 2021). This indicates that different SES dimensions can be important at different stages of childhood.

Study 1 will address this gap by examining the associations that each SES dimension (income, education, and occupation) has on children's language, internalizing, and externalizing outcomes at different stages of childhood. Current policy is in place to improve family income, education, and occupation at different times (e.g., Child Payment is available when children are under 6 years old and the Best Start Grant ends when the child enters schooling). Similarly, free early learning and childcare ends when the child is 4 years old which places stress on parents' availability to work. This would reduce their income from employment which is counterintuitive to the policy goal of maximizing family income through employment. Evidence (e.g., Blakemore, 2014) indicates that there are likely to be more sensitive periods at different stages of childhood for different outcomes which could mean that when policy support ends it could have a negative effect on children's sensitive periods. Therefore, examining when children are most sensitive to different SES dimensions will help policymakers understand the effect that current policies have and indicate at what time policy could be most beneficial.

2.8.3.1 Evidence of SES trajectories and developmental outcomes

Life course theories explain that trajectories are formed by the dynamic sequence of events and experiences that individuals go through over the course of their lives and represent the

longitudinal patterns of change and stability in any given sphere of a person's life and can follow them from birth to death (Elder 2003). In terms of SES, trajectories could be formed by encompassing an individual's educational milestones, occupational job loss or gain, and fluctuations in income over time. Depending on the individual's experiences of SES over the life course they may have stable SES trajectories meaning nothing has changed over time, increasing SES trajectories meaning their SES has improved over time or decreasing SES trajectories meaning their SES has worsened over time. These different trajectories have different associations with children's developmental outcomes (Duncan, 1988; Lynch et al., 1994). Bronfenbrenner (1986) tells us that the different trajectories are associated with children's outcomes due to the long-term bidirectional interactions between children and their parents. The accumulation of risk models and family stress and investment models also tell us that cumulative low SES over time is worse for children's development because families with low SES for longer will experience more familial conflicts, more impaired parent-child interactions, and longer durations of low investment, than families who are in low SES for less time (Conger & Donnellan, 2007: Conger et al., 2010).

In general, the literature supports the accumulation of risk models as persistent poverty (e.g., accumulated poverty over several time points) usually has larger negative associations with children's cognitive outcomes than episodic or transitory poverty (Kiernan & Mensah, 2009; 2011; Schoon et al., 2010; 2012; Holmes & Kiernan, 2013; Dickerson & Popli, 2012; 2014; 2016). For example, Schoon et al. (2012) found persistent poverty (poor from birth through to age 5) had the largest negative association with children's age 5 language ability (B = -10.314) followed by being poor twice (B = -7.064), being poor once at birth (B = -6.195) and being poor once at age 5 (B = -2.929). In addition to supporting the accumulation of risk model, the study also indicates that poverty trajectories could be worse if the onset of poverty

begins earlier in life, which is a finding echoed in a series of studies by Dickerson and Popli (2012; 2014; 2016).

Not all studies find that persistent poverty is the worst for children's developmental outcomes as some studies suggest that transitioning into poverty is more important for children's cognitive (e.g., Guo, 1998) and behavioural (Fitzsimons et al., 2017) outcomes. Fitzsimons et al. (2017) found that only persistent poverty between 9 months and 5 years was associated with children's age 5 internalizing and externalizing behaviours. However, transitioning into poverty between 5-11 years old had a stronger association than persistent poverty with children's age 11 peer problems (B = .044 versus .0386), conduct problems (B = .0721 versus .0474), and hyperactivity (B = .0274 versus .0117). Guo (1998) drew similar conclusions as longer exposure to poverty did not result in greater adverse associations with cognitive outcomes. Instead, later onset poverty was associated with adverse cognitive outcomes. The National Institute of Child Health and Human Development Early Child Care Research Network (2005) also found that persistent poverty had the largest negative association with children's age 5 language outcomes, while later onset poverty had the largest negative association with children's externalizing and internalizing behaviour. These studies indicate that while persistent poverty is consistently associated with children's outcomes, particularly during early childhood, it does not always have the largest association. Therefore, it is important to consider other trajectories as findings may vary by the outcome and the stages of childhood being examined.

While the above evidence supports the accumulation of risk models indicating that accumulated and transitory exposure to poverty is both associated with children's outcomes and that accumulated poverty is generally worse, the studies are limited in the number of trajectories that can be examined due to poverty status being dichotomous and can only

measure whether a family had entered, left, or remained in poverty which is less dynamic than other SES dimensions. For example, family income can increase or decrease without changing one's poverty status which provides the opportunity to identify more trajectories and examine their associations with children's outcomes. There is a small literature examining different family income trajectories and their associations with children's developmental outcomes which will be presented next.

The literature examining SES trajectories is relatively small but has identified between three- and five-income trajectories (e.g., Jackson et al., 2017; Björkenstam et al., 2017; Kendzor et al., 2012) with three trajectory studies finding a variation of always high, always medium, and always low income. Four trajectory studies found a variation of high, low, increasing and decreasing income trajectories, and five trajectory studies found a variation of highest, second highest, lowest, increasing, and decreasing income trajectories. The literature examining the associations between family SES trajectories and children's developmental outcomes is relatively small and is mostly associated with children's health outcomes such as children's weight (Demment et al., 2014), obesity (Kendzor et al., 2012), asthma (Kozyrsky et al., 2010), and oral health (Peres et al., 2011). Some researchers also examined the associations between family income trajectories and children's behaviours such as smoking and drinking (Poonawalla et al., 2014), violence (Mok et al., 2018) and mental health problems (Björkenstam et al., 2017). Some studies examined the association between family income trajectories and children's language ability (Dohoon, 2014; Jackson et al., 2017).

Findings indicate that children belonging to persistently low-income trajectories almost always fare worse than those from high-income, increasing-income, or decreasing-income trajectories (Chen et al., 2007; Peres et al., 2007; Björkenstam et al., 2017; Boe et al., 2016; Mok et al., 2018) indicating that the longer a child experiences low income, the worse their

outcomes will be. *Persistently low* income leads to the poorest language outcomes (Dearing et al., 2001; Schoon et al., 2011; Duncan et al., 2014; Jackson et al., 2017). Children belonging to an *increasing* income trajectory show improved receptive language and expressive language (Dearing et al., 2001), and improved vocabulary (Jackson et al., 2017), and are more likely to graduate compared to their persistently poor peers (Dohoon, 2014). Belonging to a *decreasing* income trajectory leads to poorer language outcomes and are less likely to graduate compared to increasing or high-income trajectories but still better than persistently low income (Dohoon, 2014; Jackson et al., 2017). *Persistently low* income leads to more internalizing and externalizing behavioural problems (Zachrisson and Dearing, 2015; Comeau et al., 2018). Belonging to an *increasing* income trajectory leads to improvements in children's internalizing and externalizing problems (Hoyt et al., 2019) while belonging to a *decreasing* income trajectory leads to an increase in internalizing and externalizing problems (Miller & Votruba-Drzal 2017; Björkenstam et al., 2017; Hoyt et al., 2019) compared to their stable high- and increasing-income peers, but still not as problematic as stable low-income children (Hoyt et al., 2019).

The current SES trajectory literature is limited in three ways. *First*, the literature examining the associations between SES trajectories and children's language ability, internalizing behaviour, and externalizing behaviour is small which makes drawing conclusions difficult. The studies that do focus on these outcomes use different samples, methodologies, and do not include all of the outcomes in a single study (Dearing et al., 2001; Zachrisson and Dearing, 2015; Jackson et al., 2017; Miller & Votruba-Drzal 2017; Björkenstam et al., 2017; Comeau et al., 2018; Hoyt et al., 2019). By examining all these outcomes in the same study, it will provide a better understanding of which SES trajectories are better for each outcome. *Second*, current literature examining associations between SES trajectories and children's language

ability and behavioural development tends to focus on early childhood from age 1-3 years (Dearing et al., 2001; Zachrisson & Dearing, 2015) or 1-5 years (e.g., Jackson et al., 2017) or from mid-childhood to early-adolescence (e.g., Miller & Votruba-Drzal 2017; Comeau & Boyle, 2018). This means families are classified into income trajectories based on short periods of time. Given that trajectories are created over the life course and influenced by life events and life changes (Elder, 2003), it is likely that more family SES variation will be captured if data are used over a longer duration which could identify additional trajectories. This would be beneficial as it would give insight into the different trajectories that exist over the entire childhood timeline rather than specific stages of childhood only. This would also give long-term insight into the efficacy of policy long-term. *Third*, the SES trajectory literature almost exclusively focuses on income trajectories and neglects to consider that the other SES dimensions can have their own unique trajectories. Evidence in the next paragraph indicates that parents' occupations and education can change over time and are likely to have several unique trajectories that will have associations with children's language development, externalizing behaviour and internalizing behaviour.

The social mobility theories indicate that occupational change is likely which is supported by recent research that found over a 12-year period 51% of people experienced occupational mobility with 31% increasing and 20% decreasing their occupational level (Jonsson et al., 2017). The family stress model tells us that decreases in occupational level would result in financial pressures, parental distress, impaired family interactions and parenting and impact child development. This would suggest that decreasing occupation trajectories would be associated with poorer developmental outcomes. However, theory also suggests that occupational movements in either direction generate stress in parents (Sorokin, 1959; Newman, 1999) and it is well documented that parental stress has a negative effect on

children's cognitive outcomes (Coddington et al, 2014; Lohndorf et al., 2017), internalizing behaviour (Rijlaarsdam et al., 2013), and externalizing behaviour (Sun et al., 2015). Theoretically then it is unclear which occupation trajectory would have the strongest association with children's outcomes.

Parents can also increase their level of education over time (Harding, 2015). Since higher levels of education have better quality interactions with their children (Huttenlocher et al., 2010; Zauche et al., 2016) it is possible that if parents increase their level of education, then their quality of interactions will continue to improve and benefit children's language development (Conger et al., 2010). Some evidence shows that when mothers gain additional qualifications over the first 3 years of their life their children's vocabulary comprehension and expressive language improved (Magnuson et al., 2009), and children's age 3 and 4 cognitive scores continued to improve as their mother's education level increased (Harding, 2015). Children are more likely to do well in education if their mothers graduated high school, enrolled in college, and earned a bachelor's degree indicating that as mothers' education increases their children's developmental outcomes improve simultaneously (Monaghan, 2017). However, other evidence indicates that improvements in mothers' education do not improve children's age 14 cognitive skills or reduce behavioural problems (Augustine & Negraia, 2018). This finding could be due to the different outcome measures or the children's ages. Harding (2015) and Magnuson (2009) show the positive effects of improving education for early childhood outcomes while Augustine and Negraia, (2018) show that there is no association with late childhood outcomes suggesting long-term mother educational improvements are not significant for child development. However, these studies use cross-sectional data, so to further understand the long-term associations between mothers'

education and children's outcomes study 2 of this thesis will examine the educational trajectories.

Theoretically, because each SES dimension represents a family's access to different resources and each dimension can operate via different pathways, the trajectories of each dimension will represent the longitudinal access to these unique resources (Weber, 1968; Conger et al., 2010; Davis-Kean et al., 2021). Therefore, by examining the associations that income, education, and occupation trajectories have with children's language and behavioural outcomes, findings will provide insight into whether longitudinal access to each resource is associated with children's different trajectories of language development, internalizing behaviour, and externalizing behaviour. This will allow researchers and policymakers to be more confident about the long-term impact of their policies addressing the SES gap in children's outcomes.

Overall, trajectories of income, education, and occupation are likely associated with children's developmental outcomes. Although there is evidence that income, education, and occupation can change over time the trajectory literature almost exclusively focuses on how income trajectories are associated with children's developmental outcomes. This is likely due to income being the most prone to change and showing short-term trajectories while education may take years to improve. Income was also the focal point of policy whereas UK policy is now increasingly focussing on the importance of improving occupation and education so it will be beneficial to examine how their different trajectories are associated with children's outcomes (Welfare Reform and Work Act, 2016). Similarly, improving children's language development and socio-emotional behavioural outcomes are key components of UK policy but since few studies examine the associations between SES

trajectories and children's language and behavioural outcomes it is currently difficult to draw conclusions confidently.

Study 2 will address these limitations by examining family income, education, and occupation trajectories over the first 14 years of their child's life and their associations with children's language ability and internalizing and externalizing behaviours. Current policies such as No One Left Behind and Restart (Scottish Government, 2020; Department for Work and Pensions, 2020) aim to improve parents' occupations and education and although there is large uptake in these programmes (Scottish Government, 2023), it is unclear whether improvements are likely to benefit children as the data are not collected. This study would allow policymakers to be more confident in understanding how their decisions to improve family SES dimensions will affect children's later language and behaviour outcomes. This will also benefit life course research by examining trajectories of different SES indicators in line with the theory that states several different trajectories exist simultaneously.

2.8.3.2 Evidence of developmental outcome trajectories

As discussed, life course theories explain that individuals can have several different trajectories in any given sphere of life simultaneously (Elder 2003). Like SES dimensions, children's developmental outcomes are not static constructs, and they can change over time to form developmental trajectories. The different developmental trajectories are likely to have different associations with family SES (Duncan, 1988; Lynch et al., 1994). Accumulation of risk, family stress, and family investment models suggest that children with longer exposure to low SES will belong to poorer developmental trajectories due to more impaired parent-child interactions and lower parental investment (Kuh et al., 2003; Conger & Donnellan, 2007; Conger et al., 2010).

The child development literature supports the life course theory as several language trajectories (Mangin et al., 2017; Yaari et al., 2018) and behavioural trajectories (Miller & Votruba-Drzal, 2017; Comeau, 2018; Gutman, 2019; Tamura et al., 2020) have been identified in the literature. Evidence has identified between three and five language development trajectories in the literature (Landa et al., 2012; Ukoumunne et al., 2012; Brian et al., 2014; Longard et al., 2017; McKean et al., 2017; Nguyen et al., 2018; Hentges et al., 2019; Jin et al., 2020; Riva et al., 2021). Studies normally find a variant of low-decreasing, stable low, stable mid, high-decreasing, and stable high language trajectories (Nguyen et al., 2018). Researchers have also identified between three and six internalizing behaviour trajectories, but most find 4 trajectories labelled as a variant of stable low, stable high, increasing, and decreasing (Melchior et al., 2014; Korhonen et al., 2014; Hauser-Cram & Woodman; 2016; Miller and Votruba-Drzal, 2017; Gutman & McMaster, 2020; Kuang & Flouri, 2020; Tamura et al., 2020). Studies that have examined externalizing behaviour trajectories have identified between three and five trajectories (Thompson et al., 2011; Hauser-Cram & Woodman, 2016; Kjeldsen et al., 2016; Lee et al., 2016; Miller and Votruba-Drzal 2017; Gerstein et al., 2017; Olsen et al., 2017; Figge, 2018; Min et al., 2018; Perry et al., 2018; Gutman et al, 2019; Tamura et al., 2020). They typically find a variant of stable low, stable high, stable mid, increasing, and decreasing trajectories in children between 6-11 (Miller & Votruba-Drzal, 2017).

Since SES is associated with children's developmental outcomes in later life it is likely that different levels of family SES are associated with children's membership to particular developmental trajectories. Looking specifically at language development outcomes, Hentges et al., (2019) found that low income was associated with children's membership to lower

language communication trajectories and was not associated with high or increasing language communication trajectories. Ukoumunne et al., (2012) found that children with mothers with higher levels of education were more likely to belong to higher language development trajectories while those with low-educated parents were more likely to belong to an impaired language development trajectory. Armstrong et al (2017) found that children were twice as likely to belong to a decreasing language trajectory if their parents did not complete secondary education compared to children whose parents did complete secondary education. They also found that children were more than twice as likely to belong to a deteriorating language trajectory if their family income was below the poverty line compared to those that had income above the poverty line. McKean et al (2017) found that children are more likely to belong to poorer language trajectories if they have social disadvantage and if their mothers have less time spent in education.

Research has also focussed on the associations between SES and children's membership of internalizing and externalizing trajectories. Flouri and Sarmadi (2015) found children living in low-income areas were most likely to belong to the highest behavioural problem trajectory. Flouri and Midouhas (2017) also found that those with the highest levels of socioeconomic disadvantage belonged to the highest externalizing problem trajectory and found that children of families that experienced more adverse life events (parental job loss or decreased income) belonged to the highest internalizing and externalizing problem trajectories but were unable to determine which life events had the largest association with outcome trajectories. Comeau (2018) found that children who experienced poverty between 5 and 14 years old were most likely to belong to the highest internalizing and externalizing problem trajectories and that never being poor meant that children were more likely to belong to lower internalizing and externalizing problem trajectories. They also found that children experiencing intermittent

poverty were most likely to belong to the middle internalizing and externalizing problem trajectory. Similarly, Miller and Votruba-Drzal (2017) found that children from stable income families were most likely to belong to the lowest internalizing and externalizing problem trajectories, while those who experienced income loss were more likely to be in the increasing problems or high behavioural problems groups compared to those with income gains or stable income.

Overall, these studies provide an overview of the associations between SES and children's membership to different trajectories of language ability, internalizing behaviour, and externalizing behaviour. However, there are several limitations with the current literature examining the association between SES and children's language and behavioural trajectories. *First,* the studies all use static measures of SES from single time points to examine their associations with children's developmental trajectories. Since SES is not static over time and has its own trajectories, it raises the question of whether different SES trajectories are associated with children's different outcome trajectories. If children's membership in language and behavioural trajectories is associated with their family's SES trajectories, then it provides useful information in terms of policy. For example, do policies that target short-term income support benefit children's language and behavioural trajectories? Or is long-term income support required for sustained membership to beneficial language and behavioural trajectories? If membership to the best outcome trajectories is most likely for stable high-income families, then it is unlikely that short-term income support policies will help reduce the developmental inequality gap over the life course.

Second, current literature also mainly focuses on the associations between income and children's developmental trajectories. This does not provide information about whether

education and occupation trajectories are associated with children's language and behavioural trajectories. Since parents' level of education and occupation are both associated with their children's later life outcomes (Magnuson, 2009; Harding, 2015; Flouri & Midouhas, 2017; Miller & Votruba-Drzal, 2017; Perry-Jenkins et al., 2020), it is worthwhile to examine if different education and occupation trajectories are associated with children's membership to language and behavioural trajectories. Examining this will provide evidence about whether long-term support for improving education or occupation would be beneficial for children's membership to language and behavioural trajectories, especially since policy is increasingly focussing on improving occupation and education. *Third*, current studies also examine children's outcome trajectories from early childhood to middle childhood (Ukoumunne et al., 2012; Hentges et al., 2019) or middle childhood to late childhood and adolescence (e.g., Miller & Votruba-Drzal, 2016; Comeau, 2018). This is problematic as outcome trajectories beginning from later childhood may miss key events from earlier sensitive periods. For example, children with poor language ability during early childhood but good language ability during late childhood would be assigned to a stable high language ability trajectory when they should really be categorised into increasing language development if the full childhood timeline was examined. By using data over a longer timeframe research is more likely to find more outcome trajectories that incorporate more life events and transitions (Cavanagh et al., 2016; Oshio et al., 2018). This will help identify which outcome trajectories children are likely to be in based on their SES trajectories.

Study 3 will address these limitations by examining whether income, education, and occupation trajectories are associated with children's language ability, internalizing behaviour, and externalizing behaviour trajectories from birth until 14 years old. Current policy is interested in reducing the developmental inequality gaps in children's language

ability and socio-emotional behavioural development and one of the primary method of doing so is by reducing socioeconomic inequalities (Well-Being of Future Generations Act, 2015; Children's Services Co-operation Act, 2015; The Education Act, 2016). This study will provide useful insights into whether improving family SES dimensions is likely to improve the trajectory of children's language and behavioural outcomes and whether policy focused on improving SES dimensions is likely to help disadvantaged children 'catch up' and reduce inequality gaps. This would be useful information for policies such as Job Entry Targeted Support (National Audit Office, 2022), Restart Scheme (Department for Work and Pensions, 2020), and No One Left Behind (Scottish Government, 2020) which aim to improve family income, education and training, and occupation.

2.9 Research Aims

This study aims to examine the associations between family SES dynamics and children's language and socioemotional behavioural outcomes. These outcomes were selected as they are critical in unlocking access to areas of the education curriculum (Hulme et al, 2015; Chow & Jacobs, 2016; Hulme et al., 2020), improving well-being, generating human capital and maintaining social relationships (Britto et al., 2017; Hukkelberg et al., 2019), and are predictors of future socioeconomic status (Johnson et al, 2010; Wade et al., 2018; Pedersen et al., 2019). For these reasons improving children's language and socioemotional outcomes has gained attention from policymakers who aim to reduce the socioeconomic gap in these outcomes (e.g., The Childcare Act, 2006; The Education (Scotland) Act, 2016). As discussed in section 2.3 this study conceptualised SES as a multidimensional construct and will measure family income, parents' level of education and occupation consistent will theory (Weber, 1968; Bourdieu, 1986; Coleman, 1988) and in line with current UK policy interests (Department for Work and Pensions, 2011;2022; Department for Education, 2021). Family

income was chosen to represent the financial resources that families can access to purchase goods and services (Galobardes, 2006; Miller et al., 2021; Hällsten & Thaning, 2022). Parent education is measured because this represents the human resources, skills, and knowledge that people have (Galobardes, 2006; Alan et al., 2008). Occupation was measured as it represents social class (Goldthorpe, 1997; Muntaner et al., 2010; Meanley et al., 2020). To achieve these aims, three studies were conducted.

First, study 1 will examine whether the stage of childhood influences the associations between SES dimensions and children's language and behavioural outcomes during early, middle, and late childhood. At present, the evidence is unclear about at which stage of childhood SES is most important for language ability, internalizing problems, and externalizing problems as studies focus on short time frames (e.g., Schoon et al., 2011; 2013; Dickerson and Popli; 2012; 2016; Burchinal et al., 2018). The literature is also unclear about whether different dimensions of SES are important for children's language ability, internalizing problems, and externalizing problems at different stages of childhood as studies tend to examine family income (Schoon et al., 2011; 2013; Burchinal et al., 2018; Lai et al., 2019). Examining when children are most sensitive to different SES dimensions will help policymakers understand the effect that current policies have and indicate at what time policy could be most beneficial. The Specific research questions being addressed in study 1 are:

1a. To what extent are dimensions of family SES (income, education, and occupation) uniquely associated with children's developmental outcomes (language development, internalizing, and externalizing behaviours)?

1b. Are some SES indicators more strongly associated with children's language and behavioural outcomes and is this consistent through to adolescence?

2. To what extent does the association between family SES and children's outcomes vary by stage of development?

Second, study 2 will examine family income, education, and occupation trajectories over the first 14 years of their child's life and their associations with children's language ability and internalizing and externalizing behaviours. At present, research tends to focus on income trajectories meaning that it is unclear whether different education and occupation trajectories are associated with children's language and behavioural outcomes (Dearing et al., 2001; Schoon et al., 2011; Duncan et al., 2014; Zachrisson and Dearing, 2015; Jackson et al., 2017). Research also tends to focus on short timeframes which limit the potential to identify more SES trajectories as more data from longer timeframes can encompass more key life stages and events (Cavanagh et al., 2016; Oshio et al., 2018). Examining the association between different SES trajectories and children's language and behavioural outcomes will allow policymakers to understand how their decisions to improve family SES dimensions might affect children's later language and behaviour outcomes. The Specific research questions being addressed in study 2 are:

1. To what extent does family income, parents' education, and parents' occupation change or remain stable from childbirth through late childhood?

2. To what extent are family income, parent's education, and parent's occupation trajectories associated with children's language and behavioural outcomes during late childhood?

Third, study 3 will examine whether income, education, and occupation trajectories are associated with children's language ability, internalizing behaviour, and externalizing behaviour trajectories from birth until 14 years old. Prior research focuses on the association between static measures of SES and children's developmental trajectories (Flouri & Sarmadi, 2015; Flouri & Midouhas, 2017; McKean et al., 2017; Hentges et al., 2019) or associations between SES trajectories and children's developmental trajectories (Zachrisson and Dearing, 2015; Miller & Votruba-Drzal 2017; Björkenstam et al., 2017; Hoyt et al., 2019) which does not provide information on the associations between trajectories of SES and trajectories of language and behaviour. Examining this will provide information about the likelihood of children belonging to language ability, internalizing behaviour, and externalizing behaviour trajectories based on their family SES trajectories. The Specific research questions being addressed in study 3 are:

1. To what extent do children belong to different developmental (language, internalizing and externalizing behaviour) trajectories?

2. To what extent does the likelihood of belonging to different developmental (language ability, internalizing and externalizing behaviour) trajectories differ by family SES trajectory (stable, increasing, or decreasing SES)?

2.10 **Summary**

This chapter provided a literature review explaining why the associations between SES dynamics and children's language ability and socioemotional behaviour were examined in this study. The context of the study and the reason why children's language ability and socioemotional behaviour were outcomes of interest were presented. Definitions of SES were

discussed and the conceptualisation of SES that was used in this study was presented. Theoretical considerations that help explain why and how SES is associated with children's language ability and socio-emotional behaviour were outlined followed by empirical research showing that different SES dimensions (income, education, and occupation) and SES dynamics (stage of childhood, SES trajectories, and developmental trajectories) are important factors to consider in the relationship between SES and children's language ability and socioemotional behaviour. Finally, the research aims section provided a brief recap of the chapter and presented the research questions that were examined in each study. The next chapter will discuss the methodology.

Chapter 3 - Methodology

3.1 Aim of this chapter

This chapter provides an overview of the methodology underpinning the three studies in this thesis. It details the design, data, and sample used in this thesis followed by a discussion of the key variables, and covariates. I then describe the recoding of variables and how I chose to handle the missing data for the thesis. Last, an overview is provided of the statistical techniques that were used to address the thesis research questions.

3.2 Design

A longitudinal secondary data analysis design was followed using the Millennium Cohort Study (MCS). This design benefits from being able to follow individuals across multiple time points meaning that more comprehensive and detailed information is available for each individual (Caruana et al., 2015) than would be available in other designs (e.g., cross-sectional designs). At the time of writing the MCS provides data on families across seven waves collected at ages 9 months, 3, 5, 7, 11, 14, and 17 years (Fitzsimons, 2020). Data on this scale would be unobtainable without longitudinal secondary data. This design allows the examination of the association between early circumstances and later outcomes. It also allows for examining dynamic concepts (e.g., SES dynamics) rather than static concepts (Caruana et al., 2015) and places information and events in chronological order so that timing, stability, and change can be examined (Gustafsson, 2010). Longitudinal prospective designs also benefit from reduced recall bias as respondents are asked about their current circumstances rather than being asked to remember past information (Caruana et al., 2015).

Longitudinal secondary data analysis design also comes with inherent problems and the primary issue is sample attrition. In the MCS attrition occurs when respondents are

uncontactable at a known address, cannot be located, or refuse to continue (Plewis, 2007). Attrition leads to reduced sample size and power as well as potential attrition bias. Attrition adds to the complexity of longitudinal secondary data analysis as additional steps must be taken to account for attrition (e.g., applying non-response weights; Mostafa, 2014). Other potential issues are that the data may be collected and stored differently to what the researcher may have preferred which could add additional steps to preparing the data such as recoding (Boslaugh, 2007). Since cohort studies follow a selected sample rather than representative of the population, conclusions drawn can only be applied to the cohort (Gustafsson, 2010).

3.3 Data and sample

The Millennium Cohort Study (MCS) is the most recent UK longitudinal national cohort study that follows the lives of 18851 families who have children that were born in the UK between 2000 and 2002 (Fitzsimons, 2020). At the time, national cohort studies did not include UK wide samples, so the MCS was designed to represent the population of the UK by providing data about children and their families in each of the four UK countries (Plewis, 2007). The MCS was also designed with the goal to provide a sufficient amount of usable data about advantaged and disadvantaged subgroups, ethnic subgroups, and children living in Scotland, Northern Ireland, and Wales (Plewis, 2007).

To ensure the design goals were met, children living in disadvantaged areas, children with ethnic minority backgrounds, and children living in Scotland, Northern Ireland, and Wales were oversampled. To achieve this, within each country (Scotland, England, Ireland, Wales) electoral wards were stratified into *ethnic minority strata*, *disadvantaged strata*, and *advantaged strata* (Plewis, 2007; Ipsos MORI, 2017). Electoral wards were used because at the time there was no individual level ethnic and family disadvantage information available

to the researchers, but area level information was readily available (Plewis, 2007; Hansen, 2014). Ethnic minority strata were wards that contained an ethnic minority population greater than 30% (Plewis, 2007; Hansen, 2014). Disadvantaged strata contained children who lived in the poorest 25% of wards that were not already included in the ethnic minority strata (Plewis, 2007; Hansen, 2014). The advantaged strata contained children living in any ward not part of the ethnic minority or disadvantaged strata (Plewis, 2007; Hansen, 2014). Scotland, Ireland, and Wales only had two strata (disadvantaged and advantaged) because the number of ethnic minority groups were too small (approximately 1% of the population; Plewis, 2007; Hansen, 2014).

A total of 398 electoral wards were selected for the MCS sample (Plewis, 2007; Ipsos MORI, 2017). Disadvantaged and ethnic minority electoral wards were oversampled, as were wards in Scotland, Wales, and Northern Ireland to ensure that an adequate sample size for each stratum could be achieved while accounting for attrition (Plewis, 2007; Ipsos MORI, 2017). Table 3.1 below presents the number of wards and expected sample sizes by country and strata. As can be seen, the expected sample size was generally oversampled for disadvantage and ethnic minority.

Table 3.1. Strata, electoral wards, and expected sample size from the MCS

Country - Ward Strata	Number of Electoral Wards	Expected Sample Size
England – Disadvantaged	71	5258
England – Advantaged	110	5511
England – Ethnic Minority	19	2606
Scotland – Disadvantaged	30	1285
Scotland – Advantaged	32	1243
Wales – Disadvantaged	50	2219
Wales – Advantaged	23	897
Northern Ireland – Disadvantaged	40	1322
Northern Ireland – Advantaged	23	762
Total UK	398	21103

Note. Source: Plewis (2007).

At the time of writing, the MCS had collected seven waves of data when children were aged 9 month, 3, 5, 7, 11, 14, and 17 years (Connelly & Platt, 2014) with data from age 17 children (MCS 7) recently made available (Fitzsimons et al, 2020). This thesis did not use age 17 data as they were not available in time to be included. To be eligible for inclusion, babies from England and Wales had to be born between September 1st 2000 and August 31st 2001 (52 weeks of births). Babies from Scotland and Northern Ireland had to be born between November 23rd 2000 and November 22nd 2001 (52 weeks of births) to avoid overlap with families taking part in an infant feeding survey that was ongoing during September and October 2000 (Plewis, 2007; Connelly & Platt, 2014). Where there was a shortfall in eligible children, the eligible weeks of birth for taking part were extended from 52 weeks to 59 weeks making the latest possible eligible date of birth January 11th 2002 (Plewis, 2007). Eligible

children were identified based on birthdate from the Child Benefit register, and if they were living in one of the selected electoral wards across the UK (Plewis, 2007).

3.4 Data collection procedure

Data from families and children were collected from parents during face-to-face interviews and self-report questionnaires. A total of 324 interviewers were recruited across the UK to collect data from eligible families. When children were approximately 7 months old, the Department for Work and Pensions send out information sheets and opt out forms to eligible families prior to interviews being conducted. Families that did not opt out were then contacted and interviewed when the child was approximately 9.5 months old (Hansen, 2014). At all data collection waves the interviews included a household questionnaire, main respondent interview, and a partner interview. (NatCen, 2003). When children were 3, 5, 7, 11, and 14 years old, a cognitive assessment was administered, and a physical health assessment was completed (NatCen, 2003; Fitsimmons, 2020).

Before the main and partner interviews began the household survey was administered. The household survey included questions such as who lives in the home, the relationship between the adults and the child member of the cohort, and the working status of the adults in the home etc. (Fitzsimons, 2020). The main respondent and partner interviews contained several modules about the cohort child (e.g., modules on child behaviour and child health) and personal questions about themselves (e.g., modules on education and occupation, the family context, parents' health) (Fitzsimons, 2020). Children's cognitive assessments (detailed below) were performed on the interviewer's tablet (Fitzsimons, 2020). Children's physical health (e.g., height, weight, and body fat were taken by the interviewers if consent was given (Fitzsimons, 2020).

3.5 Sample achieved by the MCS at each wave

As seen in table 2 below the initial issued sample was 19,243 families. However, during wave 1 692 families were not identified soon enough to participate meaning the sample was 18,551 families (Plewis, 2007). The reason the 692 families were not identified soon enough was due to delays in the Department for Work and Pensions identifying them as receiving child benefits (Plewis, 2007). Since the child benefit register was used to identify eligible families this means that the 692 families could not take part (Plewis, 2007). Attrition occurred at each wave of the MCS due to a family being categorised as either *ineligible, uncertain eligibility, unproductive* (Hansen, 2014). *Ineligible* refers to families who have moved to an ineligible address, those who had an error in the Child Benefit record, or if the baby had died. *Uncertain eligibility* includes families that were not issued to an interviewer or were untraceable (e.g., could not establish if the resident lived at an address within a sample ward; unable to confirm that the child lived at an eligible address; moved home and address could not be ascertained). *Unproductive* refers to; non-contact with families; refusal to take part; other non-response reasons (e.g., sensitive family circumstances). Families that were categorised as ineligible, uncertain eligibility, or unproductive in two consecutive waves were not issued in the proceeding waves (Hansen, 2014; Ipsos MORI, 2017; Fitzsimons, 2020). To account for panel attrition the MCS provides non-response weights (Plewis, 2007) which are described further in the missing data section 3.8.

Table 3.2. MCS productive sample and reason for attrition at each wave

	MCS1 Age 9 months	MCS2 Age 3 years	MCS3 Age 5 years	MCS4 Age 7 years	MCS5 Age 11 years	MCS6 Age 14 years
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Productive	18,551 (96.4)	15,590 (81)	15,246 (79.2)	13,857 (72)	13,287 (69)	11,726 (60.9)
Refusal		1,739 (9)	2,315 (12)	1,811 (9.4)	2,195 (11.4)	3,029 (15.7)
Ineligible		167 (0.9)	300 (1.6)	126 (0.7)	78 (0.4)	45 (0.2)
Untraceable		686 (3.6)	546 (2.8)	706 (3.7)	388 (2)	428 (2.2)
Non-contact		930 (4.8)	546 (2.8)	123 (0.6)	438 (2.3)	75 (0.4)
Not issued	692 (3.6)			2,212 (11.5)	2,851 (14.8)	3,828 (19.9)
Unproductive		131 (0.7)	290 (1.5)	408 (2.1)	6 (0.1)	112 (0.6)
Total	19,243 (100)	19,243 (100)	19,243 (100)	19,243 (100)	19,243 (100)	19,243 (100)

Note. Source: Millennium Cohort Study: User Guide (Fitzsimons, 2020).

3.5.1 Analytic sample

Data from all 6 waves of the MCS were used in this thesis. The productive samples at each wave were 18,551, 15,590, 15,246, 13,857, 13,287, and 11,726 families (Ketende 2010; Mostafa, 2014; Fitzsimons, 2020). The sample used in this thesis was the productive sample from wave 6 (N = 11,726) to ensure that the sample only included participants with longitudinal weights which were used to account for attrition. From the wave 6 productive sample 947 cases were excluded as they did not have any data points from any wave as missing data was handled by Full Information Maximum Likelihood (discussed further in missing data section 3.8) which requires at least one valid value to include a case into the estimation (Muthén et al., 2017). As discussed by Enders (2010) Full Information Maximum Likelihood can only produce estimates by "borrowing" information from observed values. A

further 96 cases were identified as having extreme outlier values on the dependent variables (discussed further in data cleaning section 3.7). This process left a final analytic sample of 10,683 families.

3.6 Measures

The dependent variables in this thesis are children's language ability, internalizing behaviour, and externalizing behaviour. Data on the dependent variables were obtained when children were three (MCS 2), five (MCS 3), seven (MCS 4), eleven (MCS 5), and fourteen (MCS 6) years old. The independent variables were family SES (i.e., family income, maternal education, and maternal occupation). The covariates used were age, gender, ethnicity, birth weight, single or dual parent household. Data on the independent variables and covariates apart from birth weight were available at all six data collection waves when children were 9 months old (MCS1), three (MCS 2), five (MCS 3), seven (MCS 4), eleven (MCS 5), and fourteen (MCS 6) years old. Birth weight was recorded at wave 1.

3.6.1 Language Ability

Children's language ability was measured by testing their verbal vocabulary knowledge when they were 3, 5, 7, 11, and 14 years old (Moulton et al., 2020; McElroy et al 2021). Different measures were used to measure language ability as the children got older. At ages 3, 5, 7, and 11, British Ability Scale (BAS) subscales are used to measure language ability and at age 14 Applied Psychology Unit (APU) Vocabulary Test (Closs, 1976) was used. To allow meaningful comparison across all of the different language measures children's scores were standardised (e.g., Pereyra-Elias et al., 2022). For each British Ability Scale subscale (at 3, 5, 7, and 11 years old) age adjusted standardised T-scores are used to account for children's different ages when the tests were administered. T-scores were used at age 14 but were not

age standardised as the Applied Psychology Unit Vocabulary test was a self-completion test conducted online when children were the same age. The following section provides a description of each language ability measure at age 3, 5, 7, 11, and 14.

3.6.2 Age 3 (MCS2) language ability

Children's language ability was tested when they were 3 years old using the BAS Naming Vocabulary subscale. The Naming Vocabulary subscale was designed to assesses the verbal vocabulary knowledge (both spoken and expressive) of children aged between 2 years and 6 months to 7 years and 11 months. The BAS-NV comprised 36 pictures of objects that children were asked to identify and name when shown. The pictures were numbered 1 through 36 with 1 being the easiest and 36 being the most difficult. Children were presented with a first tranche of 16 pictures and only asked to go further if they made fewer than 3 mistakes. If the children progressed to the second tranche, then they saw items 17 through 30. If they made fewer than 3 mistakes, they were then presented with the third tranche containing items 31-36. The precise starting point for each child was dependent on their age and ability which meant that they were not presented with items too easy or difficult for them in order to protect their self-esteem and avoid frustration. This means that children's raw scores (summing the total correct responses) were not comparable. As a result, the raw scores were adjusted for item difficulty and age. Children's raw scores were a minimum of 0 and maximum of 30 correct answers to the naming vocabulary test with a mean of 16.62 (SD=4.811). Previous analyses have found the measure to be reliable (alpha = .81; Elliott, 1997).

3.6.3 Age 5 (MCS3) language ability

The BAS Naming Vocabulary subscale was used again to measure language ability children were 5 years old, so the procedure was the same as above when children were age 3. Children scored a minimum of 0 and maximum of 25 correct answers to the naming vocabulary test with a mean of 14.14 (SD=3.826).

3.6.4 Age 7 (MCS4) language ability

The BAS Word Reading subscale was used to measure children's language ability when they were 7 years old. The BAS word reading subscale assesses children's reading vocabulary knowledge between the ages of 5 and 17 years and 11 months, so was suitable for the current study when children were 7 years old. The child is presented with a series of words on a card. There is a total of 90 words divided into 9 blocks of 10 words. Each block of words increased in difficulty as the child progressed through block 1 to 10. Children were asked to read each word aloud with correct pronunciation. The number of blocks the child was asked to attempt was dependant on their performance in the previous block (e.g., if the child struggled with their current block, they would not be asked to attempt the next more difficult block. Example words from the easiest block of words (block 1) are "box", "fish", "jump" and from the most difficult block (block 10) "catastrophe", "regurgitate", and "archaic". Children's raw scores on the word reading task were calculated by summing the total number of correct responses ranging from 0-90 with a mean score of 44.4 (SD=19.278). This scale has been shown to have good reliability in previous studies (Stuart, 1999; Hatcher et al, 1994).

3.6.5 Age 11 (MCS5) language ability

The BAS Word Similarities subscale assesses children's verbal vocabulary knowledge at age 11. There are a total of 21 items with each item containing 3 words that shared a common theme. The task was that upon hearing the 3 words, the child would be asked to provide a 4th word that matched the theme and then state what the theme was. For example, the interviewer would say "apple, orange, banana" and the child could say "strawberry" as the 4th item and "fruit" as the theme. Children only score one point if they provide both the correct word and the correct theme. Therefore, children could get a maximum of 21 points. The data show that the raw scores range from 0- 20 with a mean of 8.69 (SD=3.637).

3.6.6 Age 14 (MCS6) language ability

The Applied Psychology Unit Standardised Vocabulary Test was used to assess children's verbal vocabulary knowledge at age 14. The vocabulary test is designed to measure respondents understanding and meaning of words and is suitable for those aged 14 and over. The word activity involved presenting respondents with a list of 20 target words. For each target word, 5 additional words were presented. Children were asked to identify which of the 5 additional words had the same meaning as the target word. The words used were subsets of those used in the vocabulary test from the 1970 British Cohort Study which were originally from the standardised vocabulary test designed by the Applied Psychology Unit at the University of Edinburgh in 1976. Children were given 1 point for each correct answer and total scores were a sum of all correct answers meaning 20 was the maximum score. In the current sample, the raw scores ranged from 0-19 with a mean of 7.09 (SD= 2.625). Previous analyses have found the measure to be reliable (alpha = .83 - .95; Levy & Goldstein, 1984).

Previous studies using the abovementioned measures of language ability have found small to moderate correlations (r = .2 - .56) indicating a small to moderate degree of association

between the measures which provides confidence that the different measures are recording the same underlying construct (Girard et al., 2017; Hernández-Alava & Popli 2017; Forrest et al 2018; Toseeb & St Clair 2020; Kromydas et al.,2022; Pereyra-Elias et al., 2022). The correlation between the APU vocabulary test and the BAS naming vocabulary test is similar to the correlations observed between the BAS subscales at *r* = .36 (Hill, 2005; Girard et al., 2017; Sullivan et al., 2017). Correlations were run between the measures to ensure that the data used in this thesis had similar correlations with the literature. This was found to be the case as correlations ranged between .247 and .496 which is within the expected range (see table 1).

Table 3.3. Descriptive statistics and bivariate correlations for language ability at all data collection points

	Age 3 BAS Naming Vocabulary	Age 5 BAS Naming Vocabulary	Age 7 Word Reading Task	Age 11 Word Similarities Task	Age 14 Vocabulary Test
Age 3 BAS Naming Vocabulary	-				
Age 5 BAS Naming Vocabulary	**.496*** **	-			
Age 7 Word Reading Task	**.278*** **	**.386*** **	-		
Age 11 Word Similarities Task	**.271*** **	**.378*** **	**.358*** **	-	
Age 14 Vocabulary Test	**.247*** **	**.317*** **	**.410*** **	**.354*** **	-
N	10683	10683	10683	10683	10683
M	49.971	49.894	49.767	49.431	49.248
SD	9.766	9.840	9.841	9.536	9.831

*Note. Standardised T-scores used to generate these statistics. *** = p <.001.*

3.6.7 Internalizing and Externalizing behaviour

The Strength and Difficulties Questionnaire (SDQ; Goodman, 1997) was used to measure children's internalising and externalizing behaviours at ages 3, 5, 7, 11, and 14 years old and was completed by the parents. The SDQ contains 25 items measuring five dimensions of behavioural development in children aged between 3 and 16. The five dimensions are emotion symptoms, conduct problems, hyperactivity, peer problems, and pro-social behaviour. Each item in the subscales is answered on a 3-point scale ("not true" = 0, "somewhat true" = 1, "certainly true" = 2). Total score on each subscale can range from 0-10. Goodman provides information and syntax for scoring the SDQ and deriving internalizing and externalizing behaviour scales on his website (Goodman: SDQ Info, 2023).

The internalizing behaviour scale is derived by summing the items from the emotional subscale ("*often complains of headaches, stomach aches or sickness*", "*many worries, often seems worried*", "*often unhappy, down-hearted or tearful*", "*nervous or clingy in new situations, easily loses confidence*", and "*many fears, easily scared*") and the peer problems subscale ("*rather solitary, tends to play alone*", "*has at least one good friend*", "*generally liked by other children*", "*picked on or bullied by other children*", and "*gets on better with adults than with other children*"). Normal internalizing scores range from 0-4, borderline problems scores range from 5-7, and abnormal scores range from 8-20 (Maurice-Stam et al., 2018).

The externalizing behaviour scale is derived by summing the items from the hyperactivity subscale ("*restless, overactive, cannot stay still for long*", "*constantly fidgeting or squirming*", "*thinks things out before acting*", "*sees tasks through to the end, good attention span*", and "*easily distracted, concentration wanders*") and the conduct problems subscale

("*often has temper tantrums or hot tempers*", "*generally obedient, does what adults request*", "*often fights with other children or bullies them*", "*can be spiteful to others*", and "*often argumentative with adults"*). Normal externalizing scores range from 0-5, borderline scores range from 6-8, and abnormal scores range from 9-20 (Maurice-Stam et al 2018).

Confirmatory factor analysis indicates that three-factor model (internalizing behaviour, externalizing behaviour, and prosocial behaviour) and a five-factor model (all five subscales) have similar model fit but the 5-factor model was slightly better (CFI = .901; TLI = .954; RMSEA = .049) than the three-factor model (CFI = .900; TLI = .953; RMSEA = .049) (Goodman et al., 2010). Sosu & Schmidt (2017) found a similar result when comparing the three-factor model and five-factor model. They found the five-factor model to be a better fit (CFI = .95: TLI = .94: RMSEA = .02) than the three-factor model (CFI = .921; TLI = .92: RMSEA = .02) but the three-factor model was an adequate fit in both Goodman et al. (2010) and Sosu and Schmidt (2017). However, Goodman et al., (2010) also found substantial overlap between the emotion and peer problems subscales (*r* between .66 - .71) and between the hyperactivity and conduct problems subscales (*r* between .71 - .81). Consequently, the convergent and discriminant validity of the internalizing and externalizing model was better than that of the 5-subscale model (e.g., Goodman et al., 2010; Croft et al., 2015) meaning that differentiating between internalizing and externalizing behaviour is clearer than differentiating between each of the 5 individual subscales. As a result, Goodman et al. (2010) suggest that the internalizing and externalizing behaviour scales may produce greater explanatory power than in low-risk non-clinical populations while the 5 subscales are better at identifying specific problem behaviour in high-risk populations (e.g., with mental health problems) (Goodman et al., 2000; Fitzsimmons et al., 2017). Supporting the above suggestion, when Sosu and Schmidt (2017) tested a two-factor model (internalizing and

externalizing behaviour without the prosocial subscale) they found good model fit (CFI = .94; TLI = .94) and suggested that research focusing on problem behaviour use a two factor model.

Research indicates that there is good reliability for both the internalizing behaviour scale with α ranging from .73 - .82, and the externalizing behaviour scale with α ranging from .78 - .83 (Palmieri & Smith 2007; Goodman et al., 2010; Hessel, et al., 2017). Sosu and Schmidt (2017) also indicate that the SDQ is an appropriate measure for longitudinal research as they tested a metric invariance model to determine whether the relationship between items in the SDQ remained the same over time. Their metric invariance model showed a good fit (CFI = .95: TLI = .94: RMSEA = .01) meaning that SDQ items measure the same intended constructs across time. This suggests that any changes in children's SDQ outcomes over time is genuine change and not due to changes in the respondents interpretation of the measure or the measure itself.

3.6.8 Measures of socio-economic status

3.6.9 Family income

Information on family household income was gathered at every data collection wave during the face-to-face interviews by asking respondents to state their take home income after tax and other deductions (net income). Responses were then equivalised using the Organisation for Economic Cooperation and Development (OECD) equivalisation scales to generate net equivalised weekly income variables. Equivalising is a method of adjusting household income based on the financial requirements of the household (e.g., adjusts for the size and composition of the household). For equivalization to be done, each family's needs are assigned a value relative to a couple with no children. In the MCS, a couple with no children

is given a value of 1. The assigned value of each type of person is as follows: Main respondent = .67, partner = .33, each child between 14 and 18 = .33, each child under 14 = .20. For example, a family of one parent and one child under 14 would be assigned a value of .87 (.67 + .20). Table 3.4 below presents the average household income at each data collection wave. As seen the average household income increased from £317.51 when children were 9 months old to £417.44 when children were 14 years old.

Table 3.4. Average household weekly income (£) at each wave

Child age	N	M	SD
9 months	10,683	317.51	204.608
3 years	10,683	343.89	223.367
5 years	10,683	364.98	222.884
7 years	10,683	398.86	232.388
11 years	10,683	418.07	178.661
14 years	10,683	417.44	178.067

3.6.10 Education

Parents' highest level of education was measured by asking parents to indicate their highest level of academic or vocational education at every data collection wave. Parents who had qualifications could select from thirteen categories of qualifications which are mapped onto National Vocational Qualification (NVQ) system ranging from NVQ 1 (lowest level of qualification) – NVQ 5 (highest level of qualification). The following outlines the guidance on NVQ1-NVQ5:

1. *NVQ 1* comprises: NVQ level 1, Scottish Vocational Qualification (SVQ) Level 1, General National Vocational Qualification (GNVQ) Foundation Level, General Scottish Vocational Qualification (GSVQ) Level 1; Business and Technology Education Council (BTEC) qualification, Scottish Vocational Educational Council (SCOTVEC) first or general certificate/SCOTVEC modules; City & Guilds part 1/ Royal Society of Arts (RSA) Stage 1, 2, 3/Junior certificate.

2. *NVQ 2* comprises: NVQ or SVQ Level 2/GNVQ Intermediate or GSVQ Level 2; BTEC, SCOTVEC first or general diploma; City & Guilds Craft or Part II/RSA Diploma.

3. *NVQ 3* comprises: NVQ or SVQ Level 3/GNVQ Advanced or GSVQ Level 3; Ordinary National Diploma, Ordinary National Certificate, BTEC National, SCOTVEC National Certificate; City & Guilds advanced craft, Part III/RSA Advanced Diploma.

4. *NVQ 4* comprises: Nursing or other medical qualifications (below degree level); NVQ or SVQ level 4 or 5; Higher National Diploma (HND), Higher National Certificate (HNC), BTEC Higher Level, RSA Higher Diploma.

5. *NVQ 5* comprises professional qualifications at degree level (e.g., graduate member of professional institute, chartered accountant, or surveyor).

Since each category of the NVQ contains several different qualifications, they are further clustered. Studies often summarise the content of the NVQ levels as follows: *NVQ 1* = GCSE/ O Level below grade C; *NVQ 2* = GCSE/ O Level grade A-C; *NVQ 3* = A Levels/

Highers; *NVQ 4* = Teaching qualification, higher education, or first degree; and *NVQ 5* = Higher degree/ postgraduate qualification (e.g., Quigley et al., 2012). Similar to previous studies (e.g., Quigley et al., 2012; Cheng & Furnham 2012; Furnham & Cheng, 2019) when responses were mapped onto the NVQ, the results were coded such that larger scores indicated higher level of qualification where 0= no qualification 1= GCSE/ O Level below grade C, 2 = GCSE/ O Level grade A-C, 3 = A Levels/ Highers, 4 = Teaching qualification, higher education, or first degree, 5 = Higher degree/ postgraduate qualification (e.g., Quigley et al., 2012). On average, parent's level of parent's education increased from 2.87 at 9 months to 3.252 at age 14 indicating that education increased a classification from GCSE/ O Levels to A Levels/ Highers. Table 3.5 below shows the percentage of parents in each NVQ level at each time point.

Table 3.5. Parent's level of education at each wave (N=10,683).

Child age	Parent's level of education	%
9 months		
	NVQ1	6.1
	NVQ2	25.5
	NVQ3	17.9
	NVQ4	41.9
	NVQ5	8.6
3 Years		
	NVQ1	5.9
	NVQ2	25.2
	NVQ3	17.5
	NVQ4	42
	NVQ5	9.4
5 Years		
	NVQ1	5.8
	NVQ2	24.9
	NVQ3	17.4
	NVQ4	42.4
	NVQ5	9.4
7 Years		
	NVQ1	4.8
	NVQ2	23
	NVQ3	17.3
	NVQ4	41.7

NVQ5	13.2
11 Years	
NVQ1	4.8
NVQ2	20.6
NVQ3	16.2
NVQ4	40.9
NVQ5	17.6
14 Years	
NVQ1	4.8
NVQ2	19.6
NVQ3	15.7
NVQ4	40.3
NVQ5	19.7

3.6.11 Occupation (parental class)

Information about parental class was gained by measuring the highest level of household occupation at every data collection wave and was measured on a categorical scale by asking parents to indicate their occupation. Occupations are recorded by the National Statistics Socio-economic Classification (NS-SEC) which has a total of 41 possible responses which is used to derive occupational classes (Office of national statistics, 2016). The MCS collapses the 41 possible responses of the NS-SEC into the 7-class, 5-class, and 3-class versions. The NS-SEC 7-class analytical version was used in this thesis over the 5- and 3-class versions as it may provide more detailed information due to the extra categories and has been found to

categorise people's employment circumstances accurately during face-to-face interviews (Birch & Beerten, 2002).

The 7-class NS-SEC contains the following categories: (1) Large employers and higher managerial and professional occupations, (2) Lower managerial and professional occupations, (3) Intermediate occupations, (4) Small employers and own account workers, (5) Lower supervisory and technical occupations, (6) Semi-routine occupations, (7) Routine occupations. The data from the NS-SEC 7 were recoded such that the larger scores indicated increasingly professional categories of employment where 1= routine occupation, 2= Semi-routine occupations, 3= Lower supervisory and technical occupations, 4= Small employers and own account workers, 5= Intermediate occupations, 6= Lower managerial and professional occupations, and 7 = Large employers and higher managerial and professional occupations. On average parents' level of occupation decreased from 4.639 at 9 months to 4.378 at age 14. Although the average level of occupation decreased the average remains in the same category (small employers and own account workers). Table 3.6 below shows the percentage of parents in each NS-SEC class at each time point.

Table 3.6. Parent's level of household occupation at each wave (N=10,683)

Child age	Parent's level of occupation	%
9 months		
	Routine	**4.3**
	Semi routine	**19.2**
	Lower supervisory	**12.6**
	Small employers	**9.2**
	Intermediate occupations	**10.6**
	Lower managerial and professional	**22.7**
	higher managerial and professional	**21.3**
3 Years		
	Routine	**3.6**
	Semi routine	**18.7**
	Lower supervisory	**13.7**
	Small employers	**11.6**
	Intermediate occupations	**9.2**
	Lower managerial and professional	**22.9**
	higher managerial and professional	**20.4**
5 Years		
	Routine	**3.8**
	Semi routine	**19.4**
	Lower supervisory	**14.4**
	Small employers	**11.5**
	Intermediate occupations	**9**
	Lower managerial and professional	**22.5**

	higher managerial and professional	**19.3**
7 Years		
	Routine	**4.1**
	Semi routine	**20.3**
	Lower supervisory	**14**
	Small employers	**12.2**
	Intermediate occupations	**8.8**
	Lower managerial and professional	**22.7**
	higher managerial and professional	**18**
11 Years		
	Routine	**4**
	Semi routine	**20**
	Lower supervisory	**15.4**
	Small employers	**14.8**
	Intermediate occupations	**7.6**
	Lower managerial and professional	**20.9**
	higher managerial and professional	**17.4**
14 Years		
	Routine	**4.6**
	Semi routine	**19.9**
	Lower supervisory	**15.2**
	Small employers	**15**
	Intermediate occupations	**7.6**
	Lower managerial and professional	**21.6**
	higher managerial and professional	**16.2**

3.6.12 Covariates

Several covariates known to be associated with family SES and children's outcomes were included in the analyses. *Mothers age at birth* was measured by asking mothers to state their age in years when they gave birth. Mothers age at birth is controlled for as it is associated with family SES (Knipe 2016). Data from the Office of National Statistics show that older mothers are more likely to have higher SES than younger mothers (Knipe 2016). Similarly, younger mothers are more likely to have low SES at the time of birth while older mothers at the time of birth are likely to have higher SES (van Roode et al., 2017). In the analytic sample (N = 11,630), mothers' average age when they gave birth was 28.92 years old (SD = 5.796).

The *number of parents living in the household* was specified by the main respondent during the interview when asked whether they lived in a one or two-parent household. The number of parents living in the household is often controlled for in the SES literature as it has been found to covary with SES but has also been found to be a mediator between the between SES and child development (e.g., Sarsour et al., 2011; Flouri et al., 2016). It also has been found to have a direct association with children's cognitive ability across childhood (Harkness et al., 2019). Children also experience fewer behavioural problems when they live in a dual-parent household compared to when their father does not live with them (Booth, Scott, & King, 2009). There were 10,065 (86.54%) two-parent households and 1,565 (13.46%) one-parent households in the analytic sample.

Ethnicity is measured by asking the main respondent to indicate the child's ethnicity during the interviews. Ethnicity options in the MCS are white, black, Indian, Pakistani and Bangladeshi, Chinese, and mixed (NatCen, 2003). Ethnicity is controlled for as child

developmental differences are often seen between ethnicities (e.g., Kremer et al., 2016; Khaliq, 2020; Sullivan et al., 2021). People from ethnic minorities disproportionately live in deprived areas, have lower SES and are more likely to be poor (Noble et al., 2019). Ethnicity has also been found to influence the way in which others interact with the individual (e.g., Smith et al, 2016) meaning that their experience of their social world may be different and impact development. In the analytic sample, there were 9844 (84.64%) white, 362 (3.11%) black, 295 (2.54%) Indian, 821 (7.06%) Pakistani and Bangladeshi, 107 (0.92%) mixed, and 201 (1.73%) Chinese (or 'other') children.

Gender was measured by asking the main respondent to specify whether the child was male or female. Research indicates that there are gender differences in development are seen such as females scoring higher than males in cognitive tasks (Mous et al., 2017). It has also been found that males exert more problematic externalizing behaviours than their female counterparts (Kremer et al., 2016). Moreover, girls are reportedly more likely to present internalizing problems whereas boys have higher risks for externalizing tendencies (Rescorla et al., 2007; Zahn-Waxler et al., 2008). Therefore, gender will be controlled for in this study. There were 6027 (51.82%) males and 5603 (48.18%) females.

Data on children's *weight at birth* were measured by asking the main respondent for the information during the interview. Children's birth weight has been studied in several context and it has consistently been shown that lower birth weight can have a negative impact on children's cognitive and behavioural development (e.g., Bromley, 2009). Recent longitudinal studies (e.g., Stalnacke et al, 2019) found that low birth weight is associated with poor cognitive ability at 18 months and that the effects persisted into late childhood at age 11.

Since the present study will be using longitudinal data, it will control for children's birth weight. The average weight of children at birth was 3.355kg (or 7.4lbs) (SD = 0.587).

3.7 Data Screening

To prepare the dataset for analysis in Mplus, Tabachnick and Fidell (2007) data cleaning recommendations were followed. *Outliers* can be problematic as they can introduce bias into results estimates. Tabachnick and Fidell (2007) advise that a z-score of less than -3.29 or greater than 3.29 indicates an outlier. This criterion was applied to the data set and found 96 (<1%) outliers with extreme values on the outcome variables which were removed from the sample to avoid producing biased estimates.

It is recommended by Tabachnick and Fidell (2007) that *multicollinearity* be assessed. I ran bivariate correlations between income, education, and occupation at each of the 6 data collection points. The bivariate correlations between income, education, and occupations for all waves are presented in table 3.7 below. The largest correlation between all of the SES dimensions r=.636 and it was between wave 3 education and wave 5 income. A correlation of r=.636 indicates that there are no concerns about multicollinearity as correlations around r=.8 between SES dimensions would be needed to suggest multicollinearity may be an issue (Belinda & Peat, 2014; Young 2017). Further examination of this data was done and found that multicollinearity was not a concern (income, *Tolerance* = .625, *VIF* = 1.601; Education, *Tolerance* +.624, *VIF* = 1.603; Occupation *Tolerance* = .604, *VIF* = 1.655). For multicollinearity to be a problem the variance inflation factor (VIF) would need to be between 5 and 10 and Tolerance closer to 0.1 (Belinda & Peat, 2014). The Durbin-Watson statistic is generated to determine whether there is independence of errors. It ranges between 0 and 4 and it is desirable to have a score close to 2 to indicate independence of errors

(Kramer, 2014). In this case, the Durbin-Watson statistic = 1.982. Overall, multicollinearity was not a problem for this thesis.

Tabachnick and Fidell (2007) advise assessing *normality* with skewness and kurtosis statistics. Skewness observes the symmetry of the distribution around the mean and observes the peak of the mean. Both Skewness and Kurtosis indicate non-normality of data for age 3 and 5 language outcomes, which were left skewed, and for age 5, 7, 11, and 14 internalizing behaviour and age 14 externalizing behaviour which were right skewed. Non-normal data are to be expected due to the sample size of the MCS as real data tend to follow non-normal distributions (Blanca et al., 2013; Bono et al., 2017). It is also expected on the SDQ measures of internalizing and externalizing behaviour as the majority of responses would be expected to cluster on the lower end of the scale. Examining histograms confirms this is the case. No data transformations were carried out for two reasons. First, Central Limit Theorem (CLT: Le Cam, 1986) outlines that non-normal distributions are not problematic when using a large sample as the sample means approximate a normal distribution even when a normal distribution is not seen in the data (Anderson, 2010). CLT shows that sample means will be normally distributed irrespective of the initial distribution (Pek et al., 2017). Therefore, Pek et al. (2017) do not recommend data transformation in large samples. Second, Mplus estimations are capable of handling non-normal data in addition to missing data (Muthén & Muthén, 2017

Table 3.7. Bivariate correlations between SES dimensions at each wave

Table 3.7. Bivariate correlations between SES dimensions at each wave (N=10,683).

	Wave 1 income	Wave 2 income	Wave 3 income	Wave 4 income	Wave 5 income	Wave 6 income	Wave 1 education	Wave 2 education	Wave 3 education	Wave 4 education	Wave 5 education	Wave 6 education
Wave 1 education	.543	.553	.523	.525	.630	.609	-					
Wave 2 education	.527	.548	.522	.523	.630	.608	-	-				
Wave 3 education	.531	.549	.531	.530	.636	.616	-	-	-			
Wave 4 education	.496	.516	.502	.518	.629	.605	-	-	-	-		
Wave 5 education	.459	.477	.463	.478	.636	.610	-	-	-	-	-	
Wave 6 education	.433	.452	.436	.451	.596	.616	-	-	-	-	-	-
Wave 1 occupation	.541	.547	.527	.514	.520	.494	.524	.522	.524	.500	.467	.446
Wave 2 occupation	.514	.533	.511	.499	.499	.476	.516	.513	.516	.496	.468	.450
Wave 3 occupation	.508	.528	.501	.489	.488	.465	.513	.512	.510	.492	.465	.448
Wave 4 occupation	.485	.506	.483	.481	.462	.441	.495	.494	.494	.479	.460	.444
Wave 5 occupation	.449	.467	.456	.458	.444	.430	.470	.473	.474	.469	.464	.451
Wave 6 occupation	.447	.469	.454	.461	.450	.440	.465	.468	.469	.464	.462	.458

3.8 Missing data

Missing data are problematic in longitudinal research with attrition often ranging between 30-70% attrition Gustavson et al. (2012). Panel attrition is problematic since too much can weaken estimates and introduce bias (Vannette et al., 2018). In the MCS there is both *panel attrition* and *item non-response* to deal with. At wave 6 the panel attrition is 39.1% with a productive sample of 60.9% of the initial sample. To account for panel attrition in the MCS, non-response weights have been generated and must be applied for analysis. The MCS non-response weights were generated by identifying predictors of non-response via logistic regression (Plewis, 2007; Mostafa, 2014). The largest predictors of non-response in the MCS were *family income, the child's gender, mothers age at birth, whether the child was breastfed, ethnicity, housing tenure* (e.g., homeowner, renter), *type of accommodation* (e.g., house, flat), *number of parents in the household, highest level of parent's education, highest level of parent's occupation, whether the main respondent was in work* (Fitzsimons, 2020). Once these predictors of non-response were identified, predicted probabilities were generated to indicate the probability of a family responding or not responding. The final step involves using inverse probability weighting (IPW; Hofler et al., 2005) to generate the inverse of the predicted probabilities. IPW assigns more weight to families who have a low probability of responding (Plewis, 2007).

A missing values analysis was run to determine the extent of item non-response from the analytic sample (N = 10,683). A stringent percentage (1%) of missing values was used to identify the smallest of omissions and found that the total missing values in the dataset were 5.016%. In terms of cases, 6,658 (62.32%) families had complete data at all waves and 4,025 (37.68%) had at least one missing value. Table 3.8 below presents the missingness for each

variable in the dataset in descending order. Wave 4 occupation had the most missing data at 1416 (13.3%) cases.

Table 2.8. Missing values from highest to lowest

Variable	N Missing	% Missing	N Valid
Wave 4 Occupation	1416	13.30%	9267
Wave 3 Occupation	1246	11.70%	9437
Wave 4 Language Ability	1021	9.60%	9662
Wave 5 Occupation	989	9.30%	9694
Wave 4 Internalizing	964	9.00%	9719
Wave 4 Externalizing	962	9.00%	9721
Wave 1 Occupation	913	8.50%	9770
Wave 4 Income	884	8.30%	9799
Wave 4 Education	852	8.00%	9831
Wave 6 Language Ability	842	7.90%	9841
Wave 5 Internalizing	810	7.60%	9873
Wave 5 Externalizing	810	7.60%	9873
Wave 2 Occupation	797	7.50%	9886
Wave 6 Occupation	790	7.40%	9893
Wave 3 Externalizing	781	7.30%	9902
Wave 3 Internalizing	780	7.30%	9903
Wave 5 Language Ability	688	6.40%	9995
Wave 3 Education	652	6.10%	10031
Wave 5 Education	637	6.00%	10046

Wave 3 Income	581	5.40%	10102
Wave 1 Education	532	5.00%	10151
Wave 1 Income	524	4.90%	10159
Wave 2 Internalizing	514	4.80%	10169
Wave 2 Externalizing	513	4.80%	10170
Wave 5 Income	509	4.80%	10174
Wave 3 Language Ability	494	4.60%	10189
Birth Weight	439	4.10%	10244
Mother age	421	3.90%	10262
Wave 6 Externalizing	334	3.10%	10349
Wave 6 Internalizing	333	3.10%	10350
Wave 6 Education	169	1.60%	10514
Wave 2 Education	151	1.40%	10532
Wave 2 Income	147	1.40%	10536

Missing data can take one of three forms: missing completely at random (MCAR), missing at random (MAR), and missing not at random (MNAR) (Muthén & Muthén, 2017). MCAR means that the missing data are independent of any observed values in the dataset. MAR means that there is a systematic relationship between the missing data and the observed data in the dataset. The probability of missing values under MAR depends on the observed data rather than the unobserved data. MNAR is the most problematic type of missing data to deal with as it is predicted by unobserved variables (Muthén & Muthén, 2017). To assess the nature of the missing data in this thesis Little's (1988) Missing Completely at Random (MCAR) test was conducted. Chi square test found that the data were MAR as the results reject the null hypothesis X^2=29140.138 (*df*=18636; *p*= <.001).

There are several methods for dealing with missing data. Listwise deletion is the default setting in most statistics software which deletes cases with missing data so that analyses are conducted on complete cases only. Listwise deletion was not used as it would have resulted in 4,025 families being removed from the analytic sample as they had at least one missing value. Other methods are able to maintain the sample size to avoid this bias. Some longitudinal panel surveys like the MCS provide longitudinal weights to account for attrition and non-response. However, recent research has indicated that using weights on their own can bias estimates due to how they are generated (Lee et al., 2019). Lee et al., (2019) compared the performance of non-response weights, multiple imputation (MI), and full information maximum likelihood (FIML). They found that MI and FIML performed comparably, and both outperformed the longitudinal non-response weights on their own by producing less biased estimates. They recommend applying the longitudinal attrition and non-response weights provided in the dataset (in this case the Millennium Cohort Study) followed by FIML or MI (Lee et al., 2019) which is a common approach in the literature (Flouri et al., 2018).

Multiple imputation involves generating several datasets and imputing missing values into each new dataset (called imputations). It is recommended that anywhere from 2-20 imputations be run (von Hippel, 2018) but more is generally better. This can become demanding due to hardware limitations and becomes less efficient than FIML (Myung, 2003). This is because FIML uses the available observed data to generate unbiased estimates in the analysis rather than imputing values. It does this by generating a likelihood function for each case based on the observed data and then accumulating the likelihood functions of each case to generate unbiased estimates (Enders & Bandalos, 2001). However, both MI and FIML

assume that the missing data are missing at random (MAR) so they cannot be used in all cases, but since the missing data in this study are MAR they can be used. Research comparing the performance of MI and FIML indicates the difference between them is negligible (Lee et al., 2019; Lim & Cheung, 2022) highlighting that they are both good options for addressing missing data while retaining cases. They have both been found to be effective for missing data over 50% and up to 80% (Todd et al 2013; Kontopantelis et al., 2017; Nelson et al., 2021). However, Larsen (2011) concluded that FIML was superior to MI as it correctly estimated standard errors. Item non-response in this thesis is therefore handled using FIML because it is recommended in the literature.

3.9 Data Analysis procedures

In study 1, multiple regression models were run to examine the association between family SES dimensions and children's language ability, internalizing behaviour and externalizing behaviour during early, middle, and late childhood when children were 3, 7, and 14 years old. Model 1 regressed *early* family income, level of education, and level of occupation on children's outcomes controlling for covariates. Model 2 regressed *middle* family income, level of education, and level of occupation on children's age 7 outcomes controlling for previous income, education, occupation, and covariates. Model 3 regressed *late* family income, level of education, and level of occupation on children's age 14 outcomes. Controlling for previous income, education, and occupation, and covariates. This process was repeated for language ability, internalizing behaviour, and externalizing behaviour.

To examine whether the strength of the associations between different SES dimensions and children's outcomes were significantly different I calculated t-values for each pair of variables and then the level of significance was drawn from the *t* statistic using the *t*

distribution (Clogg et al., 1995). The following formula was used to calculate the *t* statistic such that the difference in coefficients (*b*) were divided by the square root of the pooled standard errors (*s*) squared:

$$t = (b_1 - b_2) / \sqrt{(s_{b1}^2 + s_{b2}^2)}$$

Once the *t* statistic was calculated the value was mapped onto the *t* distribution chart. For quick reference a *t* statistic of 1.96 = $p < .05$, *t* statistic of 2.58 = $p < .01$, and *t* statistic of 3.09 = $p < .001$ (Wheeler, 2015).

In study 2, Latent Class Growth Analyses (LCGA) were run followed by multiple hierarchical linear regressions to examine the different SES dimensions in the data and their associations with children's language ability, internalizing behaviour, and externalizing behaviour. LCGA is a type of Growth Mixture Modelling (GMM) used to examine trajectories of SES in study two. GMM itself is an extension of Growth Curve Modelling (GCM). Growth Curve Modelling takes a person-centred approach to analysis and examines the between person (or between group) differences in within person (or within group) change (Muthén & Muthén, 2000; Ram & Grimm, 2009). GMM expands on this as it aims to describe the longitudinal patterns of change between and within *latent* subgroups (Ram & Grimm, 2009; Reinecke & Seddig, 2011). Latent groups are unobserved groups that are not directly measured in the data (Jung & Wickrama, 2008). Individuals are assigned to latent groups (sometimes referred to as latent classes) based on patterns of their observed responses (Jung & Wickrama, 2008). For example, family income trajectories are not measured directly but people can be assigned to a latent income trajectory based on the income data that they provide across several time points.

The utility of GMM comes from its flexibility. Conventional growth models assume that the different intercepts and slopes from each person in the sample can be represented by a single trajectory using a single set of growth parameters (Jung & Wickrama, 2008). GMM differs in that it assumes different latent trajectories are present in the group and assigns people into different latent trajectories based on similar intercepts and slopes (Jung & Wickrama, 2008; Berlin et al., 2013). This essentially allows each latent trajectory in the sample to have its own growth parameters and estimates rather than assuming the entire sample can be described by a single trajectory (Berlin et al., 2013). GMM also allows for within class variation meaning that within each latent group there can be differences (Jung & Wickrama, 2008; Berlin et al., 2013). Latent Class Growth Analysis (LCGA) is a type of GMM that does not allow within class variation and only allows across class variation (Berlin et al., 2013). This means that it is able to identify several latent trajectories but assumes that the people categorised into the same latent trajectories are homogenous (Berlin et al., 2013). This allows for easier interpretation of classes as they will be clearer due to no within class variation but also accounts for any unobserved heterogeneity that could be missed if GMM was used (Jung & Wickrama, 2008; Berlin et al., 2013). This is useful when the goal is to identify different latent groups and compare their associations with outcomes.

To assess the latent class growth analysis model fit, goodness of fit indices were used to explain how well each specified model explained the relationship between variables (Maydeu-Olivares & Garcı´a-Forero, 2010). In the case of LCGA, it can help determine how many latent classes (or trajectories) best fit the observed data by comparing the model fit of two or more different models (Jung & Wickrama, 2008). The following paragraphs will discuss the goodness to fit indices and table 3.9 below will present a summary of them.

The two most commonly used indices are the Akaike's information criterion (AIC; Akaike, 1974) and the Bayesian information criterion (BIC; Schwarz, 1978). They both assesses model fit based on the likelihood estimates within given parameters (Burnham & Anderson 2002). The AIC and BIC estimates essentially reward a model for two reasons: being uncomplex and fitting the data well (Burnham & Anderson 2002). As more parameters are added to the model, the more complex the model becomes and the more it is penalised in the estimates (Burnham & Anderson 2002). On the other hand, the better a model fits the data the more it is rewarded in the estimates (Burnham & Anderson 2002). For example, AIC is denoted below where k is the number of parameters, log is the natural logarithm, and $(\hat{L})$ is a measure of goodness of fit:

$$AIC = 2k - 2\log(\hat{L})$$

As the number of parameters increase (k increases) the model is penalised us for becoming more complicated. As the model fits the data better (log $(\hat{L})$ decreases), the model is rewarded. AIC estimate is given for each model and the best model will generally have a lower estimate indicating that it strikes a better balance between complexity and model fit than other competing models (Nylund et al., 2007). BIC is essentially the same as AIC but adds an additional penalty as the sample size increases as seen in the formula: $BIC = klog(n) - 2\log(\hat{L})$ where $log(n)$ accounts for the sample size. Again, the lower the BIC the better the model fits the data (Nylund et al., 2007).

Entropy was assessed as it is a measure of the overall accuracy of the latent class separation and helps researchers determine the best model for their data by indicating the extent to which latent classes are 'separate' from each other or 'less fuzzy' (Weiss & Dardick, 2016). Entropy values range from 0-1 where 0 = no separation between classes and 1 = complete separation between classes (Weiss & Dardick, 2016). The closer the entropy value is to 1 the

better as this indicates that the classes in the model are distinct from each other and indicates that the model likely fits the data well. Entropy values >.8 indicate that individuals are assigned to different groups with a good level of accuracy (Celeux & Soromenho, 1996).

Likelihood ratio tests were assessed as they are designed to compare the model fit of two models. They assess whether the current model is a better fit than a model with one less class in it. For example, it assesses whether a 4-class model is a significant improvement over a 3-class model. These tests are sometimes called K-1 tests. Two of these tests provided by Mplus are the Vong-Lo-Mendell-Rubin test (LMR; Lo, Mendell, & Rubin, 2001) and the bootstrapped likelihood ratio test (BLRT; McLachlan & Peel, 2000). In both cases if the *p*-value is significant (<.05) then it means that the current model is a significantly better fit than the previous model with one less class. The difference between LMR and BLRT is that BLRT uses bootstrapped samples to generate estimate whether the difference between class models is significant (Nylund et al., 2007).

The steps to conducting the analysis is as follows. First, latent class growth analysis models were created for family income, parents' occupation, and parents' education to examine whether different trajectories of each SES dimension could be found in the sample. This was done by using the income, education, and occupation data from each timepoint in the MCS. It is recommended that two classes be examined first so that each progressive model can be assessed to check if it offers a better fit over the previous model (Jung & Wickrama, 2008). Starting with the smallest model and working up is the most efficient way to assess whether or not increasing the complexity of the model gave a better representation of the data. Second, each model was assessed by examining the output of the abovementioned criteria (AIC, BIC, Entropy, LMR and BLRT). Third, once the appropriate latent class growth analysis model had been selected to indicate the number income, education, and occupation

trajectories, the latent class probabilities were exported into a separate file. Dummy variables were then created for the latent class probabilities so that multiple regressions could be performed using each of the income, education, and occupation trajectories. A series of hierarchical regressions were then performed to assess the associations between each of the generated latent class trajectories and children's age 14 language ability, internalizing behaviour, and externalizing behaviour.

Table 3.9. Summary of the goodness of fit indices

Indicator	**Suggested interpretations**
AIC	Value less than model with one less class suggests improved model fit
BIC	Value less than model with one less class suggests improved model fit
Entropy	Value greater than 0.8 suggests participants assigned to class accurately
LMR	$p <$ 0.05 suggests improved model fit over model with one less class
BLRT	$p <$ 0.05 suggests improved model fit over model with one less class

In paper 3, latent class growth analysis was run to examine the different trajectories of children's language ability, internalizing behaviour, and externalizing behaviour followed by multinomial logistic regression and the generation of predicted probabilities to examine the likelihood of children belonging to particular outcome trajectories based on their family SES trajectories. The same trajectories that were identified in the latent class growth analysis in paper two were used in paper one as the same process would have to have been carried out. Further latent class growth analysis models were then created for children's language ability, internalizing behaviour, and externalizing behaviour to examine whether different trajectories of each child outcome could be found in the sample. The same process of starting with the

smallest model and working up to more latent classes was used. Each model was assessed by examining the output of the abovementioned criteria (AIC, BIC, Entropy, LMR and BLRT). Once the appropriate latent class growth analysis models had been selected to indicate the number language ability, internalizing behaviour, and externalizing behaviour trajectories, the latent class probabilities were exported into a separate file. Dummy variables were then created for the outcome latent class probabilities so that multinomial logistic regression could be run. A series of multinomial logistic regressions were then performed to examine the likelihood that membership to SES trajectories was associated with the likelihood of belonging to a particular outcome trajectory. Multinomial logistic regressions were required as there were several levels of dependent and independent variables. The predicted probabilities of belonging to outcome trajectories based on membership to SES trajectories were plotted on graphs to improve interpretability of the results. Multiple regression models and latent class growth analysis were conducted in Mplus version 8 and multinomial logistic regression, and predicted probabilities were conducted in R.

3.10 Summary

This chapter presented the overall methodology that was used to conduct the three studies in this thesis. Each of the studies draw on different aspects of the outlined methodology. In each of the following three results chapters (chapters 4, 5, and 6) the specific measures and analyses that were used will be highlighted. The results will then be presented, and the implications discussed.

Chapter 4 - Associations between family SES dimensions and children's language ability, internalizing and externalizing behaviours at different stages of childhood

4.1 Aim of this chapter

This chapter presents the results of study one. An introduction to the study is provided, followed by the research questions that will be addressed. The methodology used to address the research questions is presented. The findings are then presented, followed by a discussion of the findings and their implications.

4.2 Introduction

Familial socio-economic status (SES) is consistently associated with children's language ability, and internalizing and externalizing behaviours with children from lower SES families showing poorer language outcomes (Violato et al.,2011; Waldfogel 2013; Platt et al. 2014; Kiernan & Mensah, 2009, 2011; Dickerson & Popli, 2014, 2016; Zachrisson & Dearing, 2015; Hernandez-Alava & Popli, 2017), and internalizing and externalizing outcomes (Bøe et al., 2014; Hosokawa & Katsura, 2017; Hernandez-Alava & Popli, 2017; Fitzsimons et al., 2017; Tamura et al., 2020). Children with language and socioemotional problems disproportionally belong to disadvantaged families (Information Services Division, 2019).

Although the associations between family SES and children's developmental outcomes are well documented, there remain complexities about the relationship that needs to be examined. The stage of childhood during which children experience low SES and the conceptualisation of SES are two things that can impact the association between SES and children's outcomes

(Schoon et al., 2012; Burchinal et al., 2018; Miller et al., 2021). Evidence indicates that family SES at specific stages of childhood may lead to different effects on children's outcomes (Schoon et al., 2012; Burchinal et al., 2018; Lai et al., 2019). For instance, both Duncan et al. (2010) and Lai et al. (2019) found that family income and poverty measures were more strongly associated with children's behaviour during late childhood than during early childhood, while other studies found that SES had a stronger association with children's cognitive outcomes during the earlier years of life (Schoon et al., 2011; 2013; Dickerson & Popli, 2012; 2016). However, there is a lack of clarity about which stage of childhood SES is most important for children's language ability, internalizing behaviour, and externalizing behaviour. This is because previous studies tend to focus on short periods of time such as early- to mid-childhood, or mid- to late childhood (Schoon et al., 2012; Burchinal et al., 2018). To better understand at which time SES is most important for children's developmental outcomes the different stages of childhood must be examined in a single study.

SES refers to an individual's social position based on their ability to access and deploy financial, human, and cultural resources (APA, 2007). SES is most commonly represented by income, education, and occupation (APA, 2007; Ryan et al., 2015). Most current literature examining the associations between SES and child development operationalise SES either as a composite measure (Dearden et al., 2011; Hanscombe et al., 2012; Poulain et al., 2019; Judd et al., 2020; Jerrim, 2020; Schoon et al., 2021; Britton et al., 2021) or use only one of the dimensions such as family income as a proxy measure of SES (Dohoon, 2014; Shaw & Shelleby, 2014; Shelleby et al., 2014; Jackson et al., 2017; Miller & Votruba-Drzal 2017; Comeau et al., 2018; Hoyt et al., 2019). However, composite measures of SES are limited by the fact that they do not differentiate between the individual associations that each SES

dimension has with children's outcomes. In other words, the associations that each SES dimension may have with children's outcomes could be masked when a combined measure of SES dimensions is used (Cowan et al., 2012; Eriksson et al., 2021; Pearson et al., 2022). On the other hand, using only one dimension such as income may overestimate the association between income and children's outcomes if other SES dimensions are not included in the model (Cowan et al., 2012). This is because income alone may capture the overlapping effect of education and occupation due to their correlations (Cowan et al., 2012). To capture more accurate associations research should include the different SES dimensions in the model.

This study aims to address these gaps in the literature by examining the unique associations that family income, parent's education, and parent's occupation have with children's language ability, externalizing and internalizing behaviours at different stages of childhood. The stages of childhood that will be examined are early, middle, and late. The goal is to find out whether there are different stages of childhood during which children are particularly sensitive to the adverse effects of low SES and whether different SES dimensions are important at different times. It will also enable us to evaluate which stage of SES in childhood is more important for language ability, externalizing behaviour, and internalizing behaviour.

4.2.1 Theoretical framework for understanding the role of SES in children's development

Developmental theories illustrate how and why SES is associated with children's developmental outcomes. Bioecological Systems Theory (Bronfenbrenner, 1986) proposes child development takes place due to complex bidirectional interactions between children and their proximal and distal environments. Interactions with proximal environments (e.g., the

family and home) are more influential for children's development because they are most frequently exposed to these contexts (Bronfenbrenner, 1979; 1999; 2006). Family SES is important because it can determine the nature of the environments that children interact with as higher SES families are likely to have more frequent and higher quality interactions with their children and show more positive parenting behaviours than lower SES families (Rowe, 2008; Conger et al., 2010; Huttenlocher et al., 2010; Weisleder & Fernald, 2013; Zauche et al., 2016; Cote et al., 2018; Zhu et al., 2019). The specific mechanisms by which family SES can influence developmental outcomes are outlined by the family stress and investment models (Conger et al., 2010; Conger & Donnellan, 2007).

The family stress model proposes that SES is associated with children's development through parental distress and impaired family interactions (Conger et al., 2010). It states that economic pressures such as being unable to pay bills, buy nutritious food, clothing or other material needs lead to parental stress which causes increased conflict between parents (e.g., arguments and separations), harsh or inconsistent parenting, child neglect, and poorer parent-child interactions. Family stress research has found each of these impaired pathways lead to poorer developmental outcomes (Kiernan & Manesh, 2009; 2011; Avan et al., 2010; Micklewright et al., 2012; Azzi-Lessing, 2013; Shelleby et al., 2014; Sun et al., 2015; Neppl et al., 2016; Sosu & Schmidt 2017; Ahun et al., 2017). The *family investment model* states that family income is associated with children's development because it determines parents' ability to invest in the resources required for good child development such as nutritious food, educational materials, activities, and a good environment (Conger & Donnellan, 2007). Low SES families have fewer resources to invest and must concentrate on providing the basic requirements to children (e.g., food and shelter) while high SES families can provide developmental support (e.g., extra tuition and educational experiences). Family SES,

therefore, determines the environments that children have access to and interact with which ultimately shapes their development (Bronfenbrenner, 1986). Research indicates the more families invest in their children the better their language ability and behavioural outcomes are (Kalil, et al., 2012; Sohr-Preston et al., 2013; Prevoo et al., 2014; Sosu & Schmidt, 2017; Longo et al., 2017; Jeong et al., 2017; Vasilyava et al., 2018; Fomby & Musick, 2018).

Although the family stress and investment models focus primarily on the associations that family income has with children's development, the literature highlights that other dimensions of SES can also influence children's developmental outcomes (Sullivan & Brown, 2013; Coddington et al., 2014; Gonzalez et al., 2020; Miller et al., 2021). This makes sense as theory indicates that SES is a multidimensional construct (Weber, 1968; Bourdieu, 1986; Coleman, 1988). For instance, Weber's (1968) theory of social class argues that people's SES is based on their positions across several different indices and proposed three dimensions: classes, status groups, and parties. Classes refer to economic resources (e.g., income or occupation), status groups refer to the level of prestige in the community and skills (e.g., level of occupation or education), and parties refer to access to power (e.g., income and occupation) (Liberatos et al., 1988). Further theories (e.g., Bourdieu, 1986; Coleman, 1988) also argue that SES is a multidimensional construct based on one's access to, and ability to deploy, different forms of capital (e.g., economic, human, and social) to their benefit. Economic capital refers to purchasing power (e.g., income), social capital refers to formal (e.g., occupations) and informal (e.g., peer groups) social networks that individuals accrue over time, and human capital refers to the education, skills, and knowledge that people have gained. Weber argues that SES is determined by one's ability to utilise education, skills, networks, and other qualities to their advantage to navigate their social environment (Weber, 1968). Therefore, given that there are different dimensions of SES representing distinct

constructs it is likely that they have different associations with children's developmental outcomes due to shared and unique pathways as suggested by the stress and investment models.

4.2.2 Evidence of SES dimensions and children's development

Although theory suggests that SES is a multidimensional construct, relatively few studies have examined the unique associations that income, education, and occupation as individual dimensions have with children's outcomes as most of the literature focuses on income measures (Letourneau et al., 2011; Cooper & Stewart, 2017; Fitzsimons et al., 2017). However, there is evidence that the SES dimensions operate via overlapping pathways outlined in the family stress and investment models. For instance, income and occupation are both associated with parental stress and family conflict pathways which are associated with children's development (Ponnet, 2014; Shelleby et al., 2014; Dockery et al., 2016; Sosu & Schmidt, 2017; Cho, 2018; Moreira et al., 2019). Similarly, income and education are both associated with the home environment, standards of living, and parenting practices which are associated with children's development (Rijlaarsdam et al., 2013; Coddington et al., 2014; Longo et al., 2017; Jeong et al.,2017; Sosu & Schmidt, 2017; Fomby & Musick, 2018). Finally, education and occupation both operate via parental expectation pathways which are associated with children's development (Dubow et al., 2009; Kalil et al., 2012; Irwin & Elley, 2013; Plenty & Jonsson, 2020; Davis-Kean et al., 2021). There are also several unique pathways through which different SES dimensions are associated with children's developmental outcomes. Parents' education for example was found to operate via cognitive and linguistic stimulation and early childcare and education pathways, while income operated via purchasing power (Coddington et al., 2014). The different SES dimensions and the resources they represent are therefore likely to have unique associations with children's

language and behavioural outcomes via both unique and overlapping pathways (Sullivan & Brown, 2013; Coddington et al., 2014; Hosokawa & Katsura, 2018).

However, evidence comparing the strength of associations between different SES dimensions and children's development is limited. Some studies indicate parent's level of education has a stronger association with children's language outcomes than family income (Davis-Kean, 2005; Sullivan & Brown 2013; Coddington et al., 2014; Gonzaleza et al., 2020) while income has the largest association with children's internalizing and externalizing behaviour (Bøe et al., 2014; Hosokawa & Katsura, 2018). Two studies examine the associations that income, education and occupation have with children's language ability and came to different conclusions (Sullivan & Brown, 2013; Miller et al., 2021). Sullivan and Brown (2013) found that education had the strongest association with children's language ability at age 16 followed by income, but occupation was not significantly associated with children's language. Miller et al. (2021) on the other hand found that parents' occupation had larger associations with children's language ability compared to family income and parents' education for children aged 5-6 years old, 9-10 years old, and 13-14 years old. Miller et al. (2021) also found that occupation had the largest association with children's externalizing behaviour at all stages of childhood and internalizing behaviour at ages 13-14. Parents' education had the largest association with children's internalizing behaviour at ages 5-6 and 9-10. These studies indicate that associations between SES and children's language and behavioural development may differ based on the SES dimensions being considered and the stage of childhood being examined, but few studies have examined this.

4.2.3 Family SES and child development at different stages of childhood

Prior research mostly focuses on associations between early childhood SES and children's future developmental outcomes because early childhood is considered a sensitive period for children's development where they are particularly vulnerable to adverse environmental factors such as low SES (Sylva 1997**;** Kuhl et al., 2005). Research tends to support the assumption that early childhood is a sensitive period for children as this is when the brain has been found to develop the neural structures and functions that are responsible for future cognitive and behavioural processes (Zeanah 2011; Brummelte et al., 2017; Gilkerson et al 2018; Nelson & Gabard-Durnam 2020). Findings generally show that experiencing low SES during the earliest years of life has larger negative associations with children's developmental outcomes compared to low SES during later childhood (Schoon et al., 2012; Burchinal et al., 2018). For instance, family income at birth has a stronger association with children's mid-childhood language outcomes than family income at age 3, 5, or 7 (Schoon et al., 2012; Dickerson & Popli, 2012; Burchinal et al., 2018). Similarly, family income at birth has a stronger association with children's mid-childhood internalizing and externalizing behaviour than family income at age 3 or 5 (Schoon et al., 2013). However, evidence suggests that sensitive periods can differ depending on the outcome being considered (e.g., Campbell et al., 2000; Costello et al., 2005). For example, low SES appears to have larger negative associations with cognitive outcomes during early childhood while low SES during later childhood and adolescence is important for behavioural problems (Gibb et al., 2012; Lai et al., 2019; Reynolds et al, 2019).

Evidence indicates that adolescence is a sensitive period for behavioural problems due to new experiences such as being exposed to stress such as bullying (Blakemore2014; Fuhrmann et al., 2015; Efstathopoulos et al., 2018). SES in late childhood is found to be more important

than early childhood SES, particularly for internalizing and externalizing behaviour (e.g., Duncan et al., 2010; Gibb et al., 2012; Lai et al., 2019; Reynolds et al 2019). Some studies have found that early childhood income had no association with late childhood internalizing and externalizing behaviour and only late childhood income was associated with their behaviour (Duncan et al., 2010; Lai et al., 2019). Similarly, mid-childhood income has been found to have larger associations with children's internalizing and externalizing behaviour than early childhood income. Although the literature favours early childhood SES as being the most important for children's developmental outcomes, evidence indicates that other stages of childhood can be equally or more important, but few studies look at early, middle, and late childhood in a single study.

4.2.4 The current study

The current study aims to extend the existing literature in two ways. First, the evidence indicates that SES at different stages of childhood has different associations with children's development but it is unclear which childhood stage is most important for language ability, internalizing problems, and externalizing problems. Since these outcomes are a focus of current UK policy (The Childcare Act, 2006; Well-Being of Future Generations Act, 2015; Children's Services Co-operation Act, 2015; The Education Act, 2016), this study will address this gap in the literature by examining the SES associations with these outcomes at all stages of childhood. Second, the literature largely focuses on the associations between income at sensitive periods and children's developmental outcomes and neglects to consider that children may be more sensitive to their parents' education or occupation at different stages of childhood. For example, children's language development is sensitive to parents' education during early childhood but children's behaviour problems are sensitive to parents' education during later childhood and adolescence (Sullivan & Brown, 2013; Miller et al.,

2021). This indicates that different SES dimensions can be important at different stages of childhood yet several UK policies that are designed to support family SES end after early childhood (e.g., Child Payment ends after 6 years and free early childcare ends after 4 years). Consequently, family income and parents' availability to work may be reduced which is counterintuitive to the policy goal of maximizing family income through employment (Welfare Reform Act, 2016) and could have a negative effect on children's development. Therefore, examining when children are most sensitive to different SES dimensions will help policymakers understand the effect that current policies have and indicate at what time policy could be most beneficial. This study will address these two points by examining the associations that each SES dimension (income, education, and occupation) has on children's language, internalizing, and externalizing outcomes during early, middle, and late childhood. The following research questions will be addressed:

- 1a) To what extent are dimensions of family SES (income, education, and occupation) uniquely associated with children's developmental outcomes (language development, internalizing, and externalizing behaviours)?
- 1b) Are some SES indicators more strongly associated with children's language and behavioural outcomes and is this consistent through to adolescence?
- 2) To what extent does the association between family SES and children's outcomes vary by stage of development?

4.3 Methodology

4.3.1 Sample

The data used in this study come from the first six waves of the Millennium Cohort Study (MCS). The MCS is a longitudinal national cohort study in the UK that follows the lives of 18851 families with a child that was born in the UK between 2001 and 2002 when children were 9 months old (Fitzsimons, 2017). The data were collected when children were aged, 9 months, 3, 5, 7, 11, and 14 years old and the productive samples at each wave were 18,551, 15,590, 15,246, 13,857, 13,287, and 11,726 families (Ketende 2010; Mostafa, 2014; Fitzsimons, 2020). The sample was obtained from 398 electoral wards across the UK and families from disadvantaged and ethnic minority electoral wards were oversampled to ensure that adequate sample sizes for each stratum could be achieved while accounting for attrition (Plewis, 2007; Ipsos MORI, 2017). As discussed in chapter 3, the productive sample from wave 6 (N = 11,726) was used in this study to ensure that all families included had longitudinal weights assigned to them which were used to account for attrition. 947 cases were removed for having no valid information for any of the variables of interest at any data collection wave and a further 96 cases were identified as having extreme outlier values. This process left a final analytic sample of 10,683 families.

4.3.2 Measures

The dependent variables in this study were children's language ability, internalizing behaviour, and externalizing behaviour. Data on the independent and dependent variables were obtained when children were three (MCS 2), seven (MCS 4), and fourteen (MCS 6) years old. The independent variables were family SES (i.e., family income, maternal education, and maternal occupation). The covariates used were age, gender, ethnicity, birth

weight, single or dual parent household. Data on the independent variables and covariates apart from birth weight were available at all data collection waves when children were three (MCS 2), seven (MCS 4), and fourteen (MCS 6) years old. Birth weight was recorded at wave 1.

4.3.3 Language Ability

Children's language ability was measured by testing their vocabulary knowledge when they were 3, 7, and 14 years old (Moulton et al., 2020, McElroy et al 2021). Different language ability measures were used as the children got older. British Ability Scale (BAS) subscales are used to measure language ability when children were 3 and 7 years old, and the Applied Psychology Unit (APU) Vocabulary Test (Closs, 1976) was used at age 14. To allow meaningful comparison across all of the different language measures children's scores were standardised (e.g., Pereyra-Elias et al., 2022). For each British Ability Scale subscale (at 3 and 7 years old) age-adjusted standardised T-scores are used to account for children's different ages when the tests were administered. Standardised T-scores were used at age 14 but were not age-adjusted as the Applied Psychology Unit Vocabulary test was a self-completion test conducted online when children were the same age. The following section provides a description of each language ability measure at age 3, 7, and 14.

4.3.4 Age 3 (MCS2) language ability

The BAS Naming Vocabulary subscale was used to measure children's language ability when they were 3 years old. The Naming Vocabulary subscale comprised 36 pictures of objects that children were asked to identify and name when shown. The pictures were numbered 1 through 36 with 1 being the easiest and 36 being the most difficult. Children were presented with a first tranche of 16 pictures and were only asked to go further if they made fewer than 3

mistakes. If the children progressed to the second tranche, then they saw items 17 through 30. If they made fewer than 3 mistakes, they were then presented with the third tranche containing items 31-36. The precise starting point for each child was dependent on their age and ability which meant that they were not presented with items too easy or difficult for them in order to protect their self-esteem and avoid frustration. This means that children's raw scores (summing the total correct responses) were not comparable. As a result, the raw scores were adjusted for item difficulty and age. Children scored a minimum of 0 and a maximum of 30 correct answers to the naming vocabulary test with a mean of 16.62 (SD=4.811). The MCS uses this data to generate T-scores for researchers to use. Previous analyses have found the measure to be reliable (alpha = .81; Elliott, 1997).

4.3.5 Age 7 (MCS4) language ability

The BAS Word Reading subscale was used to measure children's language ability when they were 7 years old. The BAS word reading subscale assesses children's reading vocabulary knowledge between the ages of 5 and 17 years and 11 months, so was suitable for the current study when children were 7 years old. The child is presented with a series of words on a card. There is a total of 90 words divided into 9 blocks of 10 words. Each block of words increased in difficulty as the child progressed through blocks 1 to 10. Children were asked to read each word aloud with the correct pronunciation. The number of blocks the child was asked to attempt was dependent on their performance in the previous block (e.g., if the child struggled with their current block, they would not be asked to attempt the next more difficult block. Example words from the easiest block of words (block 1) are "box", "fish", and "jump" and from the most difficult block (block 10) "catastrophe", "regurgitate", and "archaic". Children's raw scores on the word reading task were calculated by summing the total number of correct responses ranging from 0-90 with a mean score of 44.4 (SD19.278). This scale has

been shown to have good reliability in previous studies (Stuart, 1999; Hatcher, Hulme & Ellis, 1994).

4.3.6 Age 14 (MCS6) language ability

The Applied Psychology Unit Standardised Vocabulary Test was used to assess children's verbal vocabulary knowledge at age 14. The vocabulary test is designed to measure respondents understanding and meaning of words and is suitable for those aged 14 and over. The word activity involved presenting respondents with a list of 20 target words. For each target word, 5 additional words were presented. Children were asked to identify which of the 5 additional words had the same meaning as the target word. The words used were subsets of those used in the vocabulary test from the 1970 British Cohort Study which were originally from the standardised vocabulary test designed by the Applied Psychology Unit at the University of Edinburgh in 1976. Children were given 1 point for each correct answer and total scores were a sum of all correct answers meaning 20 was the maximum score. In the current sample, the scores ranged from 0-19 with a mean of 7.09 (SD= 2.625). Previous analyses have found the measure to be reliable (alpha = .83 - .95; Levy & Goldstein, 1984).

Table 4.1. Descriptive statistics and Bivariate Correlations for language ability at all data collection points

	Age 3 BAS Naming Vocabulary	Age 7 word reading task	Age 14 vocabulary test
Age 3 BAS Naming Vocabulary	-		
Age 7 word reading task	**.278*** **	-	
Age 14 vocabulary test	**.247*** **	**.410*** **	-
N	10683	10683	10683
M	50.418	50.523	50.022
SD	9.81	9.84	10

*Note. Standardised T-scores used to generate these statistics. *** = p <.001.*

4.3.7 Internalizing and Externalizing behaviour

The Strength and Difficulties Questionnaire (SDQ; Goodman, 1997) was used to measure children's internalising and externalizing behaviours at ages 3, 7, and 14 years old and was completed by the parents. The SDQ contains 25 items measuring five dimensions of behavioural development in children aged between 3 and 16. The five dimensions are emotional symptoms, conduct problems, hyperactivity, peer problems, and pro-social behaviour. Each item in the subscales is answered on a 3-point scale ("not true" = 0, "somewhat true" = 1, "certainly true" = 2). The total score on each subscale can range from 0-10. Goodman provides information and syntax for scoring the SDQ and deriving internalizing and externalizing behaviour scales on his website (Goodman: SDQ Info, 2023).

The internalizing behaviour scale is derived by summing the items from the emotional subscale ("*often complains of headaches, stomach aches or sickness*", "*many worries, often*

seems worried", "*often unhappy, down-hearted or tearful*", "*nervous or clingy in new situations, easily loses confidence*", and "*many fears, easily scared*") and the peer problems subscale ("*rather solitary, tends to play alone*", "*has at least one good friend*", "*generally liked by other children*", "*picked on or bullied by other children*", and "*gets on better with adults than with other children*"). Normal internalizing scores range from 0-4, borderline problems scores range from 5-7, and abnormal scores range from 8-20 (Maurice-Stam et al., 2018). The externalizing behaviour scale is derived by summing the items from the hyperactivity subscale ("*restless, overactive, cannot stay still for long*", "*constantly fidgeting or squirming*", "*thinks things out before acting*", "*sees tasks through to the end, good attention span*", and "*easily distracted, concentration wanders*") and the conduct problems subscale ("*often has temper tantrums or hot tempers*", "*generally obedient, does what adults request*", "*often fights with other children or bullies them*", "*can be spiteful to others*", and "*often argumentative with adults"*). Normal externalizing scores range from 0-5, borderline scores range from 6-8, and abnormal scores range from 9-20 (Maurice-Stam et al 2018). The two-factor model (internalizing and externalizing behaviour) has been shown to have a good model fit (CFI = .94; TLI = .94) (Sosu &Schmidt, 2017). There is good reliability for both the internalizing behaviour scale with α ranging from .73 - .82 and the externalizing behaviour scale with α ranging from .78 - .83 (Palmieri & Smith 2007; Goodman et al., 2010; Hessel, et al., 2017). The convergent and discriminant validity of the internalizing and externalizing model has been found to be good (e.g., Goodman et al., 2010; Croft et al., 2015; Kersten et al., 2016) and the measurement invariance has shown good model fit (Sosu & Schmidt, 2017) indicating that the SDQ measures the intended constructs over time.

4.3.8 Measures of socio-economic status

Information on *family household income* was measured using net equivalised weekly income gathered at every data collection wave during the face-to-face interviews by asking respondents to state their take-home income. During early childhood, the average family income ranged from £14.39 - £1326.46 with an average of £343.89 (SD.= £223.37). During middle childhood, the average family income ranged from £14.93 - £1282.54 with an average of £398.86 (SD.= £232.38). During late childhood, the average family income ranged from £80.02 - £1153.52 with an average of £417.44 (SD.= £178.07). Parents' *level of education* was measured at each time point by asking parents to indicate their highest level of academic or vocational education which was mapped onto the National Vocational Qualification (NVQ). The NVQ ranges from NVQ 1 (lowest level of qualification) – NVQ 5 (highest level of qualification). Parents' *occupational class* was measured at every data collection wave by asking parents to indicate their occupation which was mapped onto the 7-class National Statistics Socio-economic Classification (NS-SEC). The NS-SEC ranges from 1 (routine occupations) to 7 (higher managerial and professional occupations). Table 4.2 below shows the percentage of parents in each education and occupation category during early, middle, and late childhood.

Table 4.2. Parent's level of education and occupation at each time point (N=10,683)

Child age	Parent's level of education	%	Parent's level of occupation	%
3 Years				
	NVQ1	**5.9**	Routine	**3.6**
	NVQ2	**25.2**	Semi routine	**18.7**
	NVQ3	**17.5**	Lower supervisory	**13.7**
	NVQ4	**42**	Small employers	**11.6**
	NVQ5	**9.4**	Intermediate occupations	**9.2**
			Lower managerial and professional	**22.9**
			higher managerial and professional	**20.4**
7 Years				
	NVQ1	**4.8**	Routine	**4.1**
	NVQ2	**23**	Semi routine	**20.3**
	NVQ3	**17.3**	Lower supervisory	**14**
	NVQ4	**41.7**	Small employers	**12.2**
	NVQ5	**13.2**	Intermediate occupations	**8.8**
			Lower managerial and professional	**22.7**
			higher managerial and professional	**18**
14 Years				
	NVQ1	**4.8**	Routine	**4.6**

NVQ2	**19.6**	Semi routine	**19.9**
NVQ3	**15.7**	Lower supervisory	**15.2**
NVQ4	**40.3**	Small employers	**15**
NVQ5	**19.7**	Intermediate occupations	**7.6**
		Lower managerial and professional	**21.6**
		higher managerial and professional	**16.2**

4.3.9 Covariates

Several covariates were identified in the literature as being associated with family SES and children's outcomes so were included in the analyses. *Mothers' age at birth* (Knipe 2016) was measured by asking mothers to state their age in years when they gave birth. The *number of parents living in the household* (Flouri et al., 2016) was specified by the main respondent during the interview when asked whether they lived in a one or two-parent household. *Ethnicity* (Sullivan et al., 2021) is measured by asking the main respondent to indicate the child's ethnicity during the interviews. *Gender* (Mous et al., 2017) was measured by asking the main respondent to specify whether the child was male or female. Children's *birth weight* (Bromley, 2009) was measured by asking the main respondent for information during the interview. Table 4.3 below presents the descriptive statistics of each covariate.

4.3.10 Analytic strategy

Data were analysed using multiple regression to examine the association between family SES dimensions and children's language ability, internalizing behaviour and externalizing behaviour during early, middle, and late childhood when children were 3, 7, and 14 years old. Model 1 examined the associations between *early* family income, level of education, and level of occupation on children's outcomes controlling for covariates. Model 2 examined the associations between *middle* family income, level of education, and level of occupation on children's age 7 outcomes controlling for previous income, education, occupation, and covariates. Model 3 examined the associations between *late* family income, level of education, and level of occupation on children's age 14 outcomes. Controlling for previous income, education, occupation, and covariates. This process was repeated for language ability, internalizing behaviour, and externalizing behaviour. To examine whether the associations between different SES dimensions and children's outcomes were significantly different I calculated t-values for each pair of variables and then the level of significance was drawn from the *t* statistic using the *t* distribution (Clogg et al., 1995). The following formula was used to calculate the *t* statistic such that the difference in coefficients (*b*) was divided by the square root of the pooled standard errors (*s*) squared:

$$t = (b_1 - b_2) / \sqrt{(s_{b1}^2 + s_{b2}^2)}$$

Once the *t* statistic was calculated the value was mapped onto the *t* distribution chart. For quick reference a *t* statistic of 1.96 = $p < .05$, *t* statistic of 2.58 = $p < .01$, and *t* statistic of 3.09 = $p < .001$ (Wheeler, 2015). MCS non-response weights were applied to account for sample design and panel attrition (Plewis, 2007). Missing value analysis on early, middle, and late

childhood (ages 3, 7, and 14) found item level missingness of 4.008%. Item missingness was handled by full information maximum likelihood estimation (FIML) under the missing at random assumption which is a common approach in the literature (Muthén & Muthén, 2017; Flouri et al., 2018; Lee et al., 2019).

4.4 Results

4.4.1 Descriptive statistics

Table 4.3 below presents the descriptive statistics of the analytic sample. On average, children's language ability did not fluctuate much over the different stages of childhood, but children's internalizing behaviour increased over time while externalizing behaviour decreased. Suggested cut-off points for internalizing behaviour are 0-4 for normal scores, 5-7 for borderline problems, and 8-20 for abnormal scores (Maurice-Stam et al., 2018). As seen in table 4.3 below, the majority of children fall within the normal range across childhood. Suggested cut-off points for externalizing behaviour are 0-5 for normal scores, 8-6 for borderline problems, and 9-20 for abnormal scores (Maurice-Stam et al 2018). Table 4.3 shows that children on average reduced from borderline externalizing behaviour problems to a normal range as they got older. Looking at SES dimensions, income on average continues to increase over time and the average level of education increased from A levels/ Highers to teaching qualification/degree. Little change was seen with parents' level of occupation which remained in the same category on average small employers/own account workers.

Table 4.3. Descriptive statistics of all variables in the analyses (n = 10683)

	M	SD	%	Range
Language ability				
Early childhood	50.418	9.81	-	20 - 80
Middle childhood	50.523	9.84	-	20 - 80
Late childhood	50.022	10	-	20 - 80
Internalizing behaviour				
Early childhood	2.824	2.45	-	0 - 16
Middle childhood	2.64	2.69	-	0 - 18
Late childhood	3.711	3.35	-	0 - 19
Externalizing behaviour				
Early childhood	6.549	3.76	-	0 - 20
Middle childhood	4.551	3.48	-	0 - 19
Late childhood	4.323	3.51	-	0 - 19
Family income				
Early income (£)	343.89	223.37	-	14.39 - 1362.46
Middle income (£)	398.86	232.38	-	14.93- 1282.54
Late income (£)	417.44	178.07	-	80.02- 1153.52
Parent's level of education				
Early childhood	2.929	1.406	-	0 - 5
Middle childhood	3.041	1.387	-	1 - 5
Late childhood	3.263	1.4	-	2 - 5
Parent's level of occupation				
Early childhood	4.614	1.945	-	1-7
Middle childhood	4.517	1.94	-	1-8

Late childhood	4.378	1.913	-	1-9
Covariates				
Mother's age at birth	29.11	5.751	-	14-51
Birth weight (lbs)	7.41	.586	-	.86 - 14.44
Parents in household				
Two parents			87.5	
One parent			12.5	
Gender				
Male			51.9	
Female			48.1	
Ethnicity				
White			86.41	
Mixed			0.09	
Indian			2.5	
Pakistani & Bangladeshi			6.5	
Black British			2.8	
Chinese/ other			1.7	

Note. Early = when children were 3 years old. Middle = when children were 7 years old.

Late = when children were 14 years old.

4.4.2 Associations between family SES and children's language ability during early, middle, and late childhood

Table 4.4 presents the results of the associations that income, education, and occupation have with children's language ability at different stages of childhood. For *early* childhood language ability, income, education, and occupation each had significant independent associations with children's language ability. Education had the strongest association with children's language ability (β = .188, p = <.001) and is significantly stronger than income (t = 5.755, p <.01) and occupation (t = 5.087, p <.01). For *middle* childhood language ability, all early and middle childhood SES dimensions were associated with children's language ability with parents' middle education having the strongest association (β = .081, p = <.05). However, this association was not significantly stronger than income or occupation associations. For *late* childhood language ability, late family income, parents' early education, and parents' early occupation were all associated with children's language ability. Parents' level of education during early childhood had the strongest association with children's late childhood language ability (β = .128, p = <.001) and was significantly stronger than early occupation (t = 2.068, p = <.05) but was not significantly stronger than late income (t = 1.51, p = n.s). Overall, for children's language ability parents' education was the most important SES dimension at all stages of childhood. Parents' level of education during the early stages of childhood in particular appears to be more important than the other SES dimensions even during later childhood stages.

Table 4.4 Regression models examining the associations between SES and children's language ability in early, middle, and late childhood

Table 4.4. Regression models examining the associations between SES and children's language ability in early, middle, and late childhood.

N = 10683	Early childhood language		Middle childhood language		Late childhood language	
	β (95%CI)	*SE*	*β* (95%CI)	*SE*	*β* (95%CI)	*SE*
Early family income	**0.067 (0.04, 0.093)*** **	**.013**	**0.058 (0.024, 0.093)*** **	**.018**	0.007 (-0.031, 0.044)	.019
Mid family income			**0.065 (0.026, 0.104)*** **	**.020**	**0.045 (0.007, 0.082)***	**.019**
Late family income					**0.074 (0.035, 0.112)*** **	**.020**
Early education	**0.188 (0.155, 0.221)*** **	**.017**	**0.071 (0.006, 0.136)***	**.033**	**0.128 (0.064, 0.191)*** **	**.032**
Mid education			**0.081 (0.017, 0.145)***	**.033**	0.009 (-0.064, 0.082)	.037
Late education					0.004 (-0.055, 0.047)	.026
Early occupation	**0.077 (-0.104, -0.05)*** **	**.014**	**0.068 (-0.11, -0.026)** **	**.022**	**0.054 (-0.099, -0.01)***	**.023**
Mid occupation			**0.071 (-0.114, -0.028)*** **	**.022**	0.029 (-0.075, 0.018)	.024
Late occupation					0.03 (-0.065, 0.005)	.018
Birth Weight	**0.048 (0.022, 0.074)*** **	.013	**0.045 (0.018, 0.071)*** **	**.014**	0.006 (-0.018, 0.031)	.013
Gender	**0.117 (0.095, 0.139)*** **	.011	**0.07 (0.046, 0.094)*** **	**.012**	0.003 (-0.02, 0.027)	.012
Parents in household	0.019 (-0.008, 0.046)	.014	-0.033 (-0.067, 0.002)	.017	-0.014 (-0.044, 0.016)	.015
Mother age at birth	-0.016 (-0.043, 0.01)	.013	0.003 (-0.027, 0.032)	.015	**0.041 (0.012, 0.07)** *	**.015**
Mixed Heritage	**-0.031 (-0.055, -0.006)***	**.012**	-0.001 (-0.027, 0.025)	.013	0.009 (-0.015, 0.033)	.012
Indian	**-0.074 (-0.095, -0.052)*** **	**.011**	**0.059 (0.038, 0.08)*** **	**.011**	0.001 (-0.024, 0.025)	.013
Pakistani & Bangladeshi	**-0.218 (-0.243, -0.194)*** **	**.013**	**0.066 (0.043, 0.089)*** **	**.012**	-0.005 (-0.025, 0.015)	.010
Black British	**-0.13 (-0.165, -0.096)*** **	**.018**	0.035 (-0.002, 0.073)	.019	-0.004 (-0.029, 0.02)	.013
Other ethnic group	**-0.151 (-0.186, -0.115)*** **	**.018**	0.023 (-0.003, 0.05)	.014	0.001 (-0.02, 0.022)	.011

*Note. Significant estimates are in bold. $p < .05$ = *, $p < .01$ = **, $p < .001$ = ***. Early = when children were 3 years old. Middle = when children were 7 years old. Late = when children were 14 years old. Gender reference category = male. Parents in household reference category = two parents. Ethnicity reference category = white.*

4.4.3 Associations between family SES and children's internalizing behaviour during early, middle, and late childhood

Table 4.5 presents the results of the associations that income, education, and occupation have with children's internalizing behaviour at different stages of childhood. For *early* childhood internalizing behaviour, income, education, and occupation had significant independent associations with children's internalizing behaviour. Parent's education had the strongest association with early childhood internalizing behaviour (β = -.11, p = <.001) and was significantly different from the family income (t = 2.428, p <.05), but not parent's occupation (t = .544 p = n.s). For *middle* childhood internalizing behaviour, only family income and parents' education were associated with children's internalizing behaviour. Parental education had the strongest association (β = -.79, p = <.05) but was not significantly different from family income (t = 1.102, p = n.s). For *late* childhood internalizing behaviour, family income from early, middle, and late childhood were associated with children's internalizing behaviour. Late family income had the strongest association (β = -118, p = <.001) and was significantly different from early family income (t = 2.485, p = <.05) and middle family income (t = 3.059, p = <.01). Overall, family income and education are the most important SES dimensions for children's internalizing behaviour depending on the stage of childhood. During early and middle childhood parents' education is more important however family income becomes increasingly important over time and is the only SES dimension significantly associated with children's internalizing behaviour during late childhood.

Table 4.5 Regression models examining the associations between SES and children's internalizing behaviour in early, middle, and late childhood

Table 4.5. Regression models examining the associations between SES and children's internalizing behaviour in early, middle, and late childhood.

N = 10683	Early internalizing behaviour		Middle internalizing behaviour		Late internalizing behaviour	
	β (95%CI)	*SE*	*β* (95%CI)	*SE*	*β* (95%CI)	*SE*
Early family income	**-0.054 (-0.082, -0.027)*** **	.014	**-0.041 (-0.073, -0.008)***	.017	**-0.053 (-0.088, -0.018)***	.018
Mid family income			**-0.059 (-0.094, -0.024)*** **	.018	**-0.038 (-0.073, -0.003)***	.018
Late family income					**-0.118 (-0.156, -0.08)*** **	.019
Early education	**-0.11 (-0.147, -0.073)*** **	.019	-0.016 (-0.085, 0.052)	.035	-0.003 (-0.071, 0.065)	.035
Mid education			**-0.079 (-0.148, -0.01)***	.035	-0.001 (-0.077, 0.074)	.038
Late education					-0.035 (-0.092, 0.021)	.029
Early occupation	**-0.097 (0.068, 0.126)*** **	.015	-0.034 (-0.011, 0.079)	.023	-0.01 (-0.035, 0.056)	.023
Mid occupation			-0.035 (-0.009, 0.08)	.023	-0.037 (-0.009, 0.084)	.024
Late occupation					-0.001 (-0.036, 0.038)	.019
Birth Weight	-0.026 (-0.053, 0)	.014	**-0.046 (-0.073, -0.019)*** **	.014	**-0.051 (-0.079, -0.023)*** **	.014
Gender	**-0.049 (-0.074, -0.025)*** **	.012	**-0.035 (-0.06, -0.01)***	.013	**0.049 (0.024, 0.074)*** **	.013
Parents in household	0.023 (-0.011, 0.056)	.017	0.034 (-0.003, 0.071)	.019	0.022 (-0.012, 0.055)	.017
Mother age at birth	**-0.059 (-0.089, -0.029)*** **	.015	**-0.045 (-0.077, -0.013)***	.016	-0.008 (-0.039, 0.024)	.016
Mixed Heritage	-0.006 (-0.038, 0.026)	.016	0.023 (-0.004, 0.05)	.014	0.002 (-0.026, 0.03)	.014
Indian	**0.036 (0.013, 0.06)***	.012	0.018 (-0.006, 0.041)	.012	**-0.031 (-0.048, -0.014)*** **	.009
Pakistani & Bangladeshi	**0.128 (0.097, 0.159)*** **	.016	**0.07 (0.044, 0.096)*** **	.013	-0.005 (-0.026, 0.016)	.011
Black British	0.028 (-0.003, 0.06)	.016	0.015 (-0.017, 0.046)	.016	**-0.031 (-0.062, -0.001)***	.016
Other ethnic group	**0.039 (0.004, 0.074)***	.018	0.016 (-0.005, 0.037)	.011	-0.011 (-0.037, 0.016)	.013

*Note. Significant estimates are in bold. p < .05 = *, p < .01 = **, p < .001 = ***. Early = when children were 3 years old. Middle = when children were 7 years old. Late = when children were 14 years old. Gender reference category = male. Parents in household reference category = two parents. Ethnicity reference category = white.*

4.4.4 Associations between family SES and children's externalizing behaviour during early, middle, and late childhood

Table 4.6 below presents the results of the associations that income, education, and occupation have with children's externalizing behaviour at different stages of childhood. For *early childhood* externalizing behaviour, income, education, and occupation had significant independent associations with children's externalizing behaviour. Parents' education had the strongest association with children's early internalizing behaviour (β = -.112, p = <.001) and was significantly stronger than family income (t = 2.254, p <.05), but not parents' occupation (t = .335 p = n.s). For *middle* childhood externalizing behaviour, parents' middle education, early family income, and early parent occupation were associated with children's externalizing behaviour. Middle education had the strongest association (β = -.116, p = <.001) but was not significantly stronger than early family income (t = 1.848, p = n.s) or early occupation (t = 1.549, p = n.s). For *late* childhood externalizing behaviour, parents' middle education, late family income, and late parent occupation were associated with children's externalizing behaviour. Late family income had the strongest association (β = -141, p = <.001) and was significantly stronger than late occupation (t = 3.744, p = <.01), but not significantly stronger than middle education (t = 1.03, p = n.s). Overall, family income and education are the most important SES dimensions for children's externalizing behaviour depending on the stage of childhood. During early and middle childhood parents' education is most important while family income becomes the most important SES dimension during late childhood.

Table 4.6 Regression models examining the associations between SES and children's externalizing behaviour in early, middle, and late childhood

Table 4.6. Regression models examining the associations between SES and children's externalizing behaviour at early, middle, and late childhood.

N = 10683	Early externalizing behaviour		Middle externalizing behaviour		Late externalizing behaviour	
	β (95%CI)	*SE*	*β* (95%CI)	*SE*	*β* (95%CI)	*SE*
Early family income	**-0.06 (-0.088, -0.032)*** **	.014	**-0.056 (-0.09, -0.023)*** **	.017	-0.013 (-0.048, 0.022)	.018
Mid family income			-0.029 (-0.064, 0.005)	.017	-0.014 (-0.049, 0.021)	.018
Late family income					**-0.141 (-0.175, -0.107)*** **	.017
Early education	**-0.112 (-0.149, -0.075)*** **	.019	-0.01 (-0.052, 0.073)	.032	-0.006 (-0.077, 0.065)	.036
Mid education			**-0.116 (-0.177, -0.055)*** **	.031	**-0.103 (-0.181, -0.025)** **	.040
Late education					-0.029 (-0.024, 0.082)	.027
Early occupation	**-0.104 (0.075, 0.133)*** **	.015	**-0.055 (0.007, 0.104)***	.025	-0.019 (-0.024, 0.062)	.022
Mid occupation			-0.017 (-0.031, 0.064)	.024	0 (-0.043, 0.044)	.022
Late occupation					**-0.051 (0.018, 0.085)** **	.017
Birth Weight	**-0.036 (-0.062, -0.01)** **	.013	**-0.066 (-0.092, -0.041)*** **	.013	-0.056 (-0.084, -0.027)***	.015
Gender	**-0.116 (-0.14, -0.091)*** **	.012	**-0.164 (-0.188, -0.141)*** **	.012	-0.141 (-0.165, -0.118)***	.012
Parents in household	**0.041 (0.007, 0.075)***	.017	0.033 (-0.002, 0.067)	.018	0.035 (0, 0.069)*	.018
Mother age at birth	**-0.128 (-0.159, -0.097)*** **	.016	**-0.103 (-0.133, -0.073)*** **	.015	-0.091 (-0.121, -0.06)***	.016
Mixed Heritage	-0.014 (-0.047, 0.019)	.017	-0.012 (-0.045, 0.021)	.017	-0.024 (-0.053, 0.004)	.015
Indian	-0.002 (-0.023, 0.019)	.011	0.004 (-0.018, 0.027)	.011	-0.034 (-0.049, -0.018)***	.008
Pakistani & Bangladeshi	0.007 (-0.019, 0.032)	.013	-0.013 (-0.033, 0.007)	.010	-0.05 (-0.07, -0.03)***	.010
Black British	-0.022 (-0.055, 0.011)	.017	-0.019 (-0.05, 0.011)	.016	-0.028 (-0.056, -0.001)*	.014
Other ethnic group	-0.005 (-0.031, 0.021)	.013	**-0.027 (-0.052, -0.002)***	.013	-0.024 (-0.049, 0.001)	.013

*Note. Significant estimates are in bold. p < .05 = *, p < .01 = **, p < .001 = ***. Early = when children were 3 years old. Middle = when children were 7 years old. Late = when children were 14 years old. Gender reference category = male. Parents in household reference category = two parents. Ethnicity reference category = white*

4.5 Discussion

Using data from the millennium cohort study, this study aimed to examine whether the associations between family SES and children's language ability, internalizing behaviour, and externalizing behaviour differ depending on the stage of childhood (early, middle, and late). This expanded previous literature that was largely limited to examining early and middle childhood. In addition, this study examined whether the different dimensions of SES (family income, parent's education, and parent's occupation) had unique associations with children's outcomes at each stage of childhood. This builds on the previous literature which normally focuses on composite measures of SES or a single dimension of SES. The current findings indicate that SES was important at all stages of development and differed depending on the outcome being examined. Early SES was more important for language ability, while a family's SES at the stage of development (rather than previous SES) was more important for internalizing and externalizing behaviour. The findings also indicated that the different SES dimensions had independent unique associations with children's outcomes and that the associations differed depending on the outcome being examined and the stage of childhood.

In terms of children's language ability, it was found that SES in early childhood had the largest association with children's language ability at all time points. This is in line with previous research that the earlier children experience low SES the worse their cognitive outcomes would be later in life (Schoon et al., 2011; 2013; Dickerson & Popli, 2012; 2016; Mollborn et al., 2014). However, the previous studies only examined data until middle childhood, so this study expanded on the previous findings by showing that earlier SES was still important for language ability during late childhood. A possible reason why early SES has the strongest association with children's language ability is that children are generally limited to interactions with their parents during the earliest years of life and since children's

language development occurs through exposure to language and interacting with people with better language knowledge it means their language development at this stage is reliant on their parents (Vygotsky 1978). This could be problematic as low-SES children have more negative low quality interactions with their parents compared to their peers (Conger et al., 2010). However, as children get older and interact with other people (e.g., teachers) where they are exposed to additional language knowledge they become less reliant on their parents which could be why early SES had stronger associations with children's language ability in this study. Research tends to support this as a recent meta-analysis concluded that teacher-child interactions can improve children's language development, especially for low SES children (Kharitonova et al., 2021).

For internalizing and externalizing behaviour family's most recent SES was consistently more important than their previous SES. For example, during middle childhood, SES in middle childhood had a stronger association with children's internalizing and externalizing behaviour than SES in early childhood. Similarly, during late childhood, late SES had a stronger association with children's internalizing and externalizing behaviour than early and middle SES. The results were in line with previous literature which found that SES during late childhood had stronger associations with children's internalizing and externalizing behaviour than their previous SES (Duncan et al., 2010; Lai et al., 2019). These findings indicate that later childhood is a sensitive period for internalizing and externalizing behaviour. This possibility has been discussed in previous literature which proposed that late childhood is a particularly stressful time for children as they experience social change (Sirin et al., 2013; Fuhrmann et al., 2015) and are particularly sensitive to new social stressors (Andersen & Teicher, 2008; Takizawa et al., 2013; Fuhrmann et al., 2015). For example, low SES children are more likely to experience bullying (Blakemore2014; Fuhrmann et al., 2015;

Efstathopoulos et al., 2018) social exclusion (Hills et al., 2002) and discrimination (Walker, 2014) during late childhood and adolescence which can impact their behavioural development.

Evidence also indicates that children become more aware of their SES during late childhood (Blumenshine et al., 2010; Bannink et al., 2016; McLoyd, 2019) possibly because they cannot participate in social events, and do not have the same material possessions as their peers due to a lack of economic resources (Hjalmarsson & Mood, 2015). Evidence indicates that children's behavioural outcomes are more likely to be impacted if they become aware and perceive their SES to be low (Quon & McGrath, 2014 Rivenbark et al., 2019). Low SES children are more likely to be bullied, be bullies themselves, have poor peer relationships, be discriminated against by their peers, and excluded by their peers if they are perceived to be low SES (Jansen et al., 2011; 2012; Moore et al., 2016; Hjalmarsson; 2018; Elenbaas, 2019; Li et al 2020; Bai et al., 2021). The bioecological model highlights that peer relationships are a microsystem within which children's interactions shape development (Bronfenbrenner, 1979; 1986). If peer interactions are poor then this likely leads to poor behavioural outcomes. Evidence supports this as being bullied or excluded is associated with internalizing and externalizing behavioural problems (Taylor et al., 2018; Bai et al., 2021). It is therefore possible that children's internalizing and externalizing behaviour is particularly sensitive to SES during late childhood.

The findings indicate that family income, parents' education, and parents' occupation each have independent associations with children's language ability and externalizing behaviour at all stages of childhood. Results for internalizing behaviour were different as all SES dimensions were associated with internalizing behaviour during early childhood, but only

income and education (not occupation) were associated during middle childhood, and only family income was associated during late childhood.

Parent's level of education was found to have the largest association with children's language ability during early, middle, and late childhood. This was to be expected for children's language ability as the literature consistently finds parents' education to have the largest SES association with language outcomes when compared to family income and parent's occupation (Davis-Kean, 2005; Sullivan & Brown, 2013; Coddington et al., 2014; Gonzalez et al., 2020). A possible explanation is that parents' education operates through unique pathways in relation to children's language abilities. Harding et al. (2015) theoretical model proposes that parents' level of education is associated with children's cognitive outcomes due to the quality and quantity of language used in the household and through the quality and quantity of stimulating parenting practices (e.g., reading with the child). Better educated parents use better quality speech with their children (Huttenlocher et al., 2010; Zauche et al., 2016) and speak with their children more frequently (Rowe, 2008; Weisleder & Fernald, 2013), both of which are associated with children's language ability (Rowe, 2012; Weisleder & Fernald, 2013; Cartmill et al., 2013).

Family income was found to become increasingly important as children got older and by late childhood had the largest association with children's internalizing and externalizing behaviour. This could be due to children becoming increasingly aware of their economic situations as they get older and miss out on social events or being unable to have the same material goods as their peers due to a lack of economic resources (Hjalmarsson & Mood, 2015). This causes children to feel stress and shame (Conger et al., 2010; Walker, 2014) which could cause additional conflict and impaired interactions between parents and children

leading to increased behavioural problems as outlined in the family stress model. Aside from children becoming more aware of their family's financial circumstances, the parents themselves could be feeling increased stress during later childhood as children generally become more expensive to raise as they get older (Twenge et al., 2003). This again could increase conflict in the home and impact children's behaviour outcomes (Conger et al., 2010). Similarly, as a family's costs of raising a child increase as they get older, the income available to invest in their children could decrease which the family investment model states could have a negative effect on children's outcomes. These findings highlight why it is important to examine all stages of childhood and multiple SES dimensions where possible because if this study only examined early and middle childhood as is common in the literature (Davis-Kean, 2005; Sullivan & Brown, 2013; Coddington et al., 2014; Bøe et al., 2014; Hosokawa & Katsura, 2018; Gonzalez et al., 2020) then it would have concluded that education was the most important SES dimension for internalizing and externalizing behaviour. However, the current findings show that income becomes more important during later childhood rather than earlier childhood.

These findings differ from some studies which have found that income poverty during early childhood has the largest association with children's later behavioural outcomes (Joinson et al., 2016). However, one difference between Joinson et al's study and the current study is that it did not consider the other dimensions of SES in their models meaning that the income associations could be overestimated which is likely why the current findings are different. The current findings also differ from other studies comparing the associations of family income and parents' education on children's internalizing and externalizing behaviour. For example, Miller et al. (2021) found mothers' education to be more important than family income. It is likely that the current results differ from Miller et al. (2021) due to different

measurements of SES dimensions between studies. Miller et al. (2021) focus on mothers' education in years of education completed and mothers' occupation measured in the length of time being unemployed. The current study used the highest level of household education and occupation. These measurement differences are potentially why differences are found between all studies.

4.5.1 Strengths and weaknesses of the study

The results must be interpreted in light of their limitations. This study examines the associations between SES dimensions and children's language and behavioural outcomes which means that causation cannot be determined. While there may be different underlying mechanisms between the different SES dimensions and children's outcomes, this study did not examine this. However, this study provides further evidence for future research to examine these possible mechanisms. The use of different language ability measures at each time point must be acknowledged as a potential limitation. The British Ability Scale subscales were used to measure language ability during early and middle childhood, but not during late childhood. Instead, the Applied Psychology Unit Standardised Vocabulary Test was used during late childhood. Given that the British Ability Scales were appropriate for use during late childhood, it may have been beneficial to use the same tests over time as it would provide more confidence that the desired constructs are being measured over time. Despite this, previous studies show that correlations between the British ability scales and the Applied Psychology Unit Standardised Vocabulary Test were adequate for use together (Hill, 2005; Girard et al., 2017; Sullivan et al., 2017). This study also found that the language ability measures were correlated in line with previous research.

4.5.2 Implications of the study

The results of this study have useful implications for policy. First, the findings that income, education, and occupation each have unique associations with children's developmental outcomes provide useful information for policymakers who are interested in improving children's outcomes via family SES interventions as it indicates that each SES dimension has a unique association with outcomes. This is particularly useful in the current context as UK policy is focussing on family income, level of education, and occupation (Welfare Reform Act, 2016). Current policies largely focus on increasing family income, but these findings indicate that it could be beneficial to also support parents' education and occupation. Second, considering the stage of childhood could benefit policy which currently focuses resources on reducing the SES inequalities in children's outcomes during the earliest years of life. The current results indicate that family SES is important for children's language and socioemotional behavioural development at all stages of childhood showing that children are sensitive to the adverse effects of SES beyond early childhood. It, therefore, may be beneficial for children if intervention to support family SES was provided at all stages of childhood as opposed to a lot of support being focused on the earlier years only such as Healthy Start, free childcare schemes, and the Scottish Child Payment.

Third, the findings also show that parents' education is important for children's developmental outcomes at all time points and is most important for children's language ability and early to middle childhood externalizing behaviour. Intervention to improve parents' education is therefore likely to benefit children at all stages of development but findings suggest that the earlier education is improved the better it will be for children's outcomes. While policy exists to improve parents' education such as the Fair Start programs, the funding and attention paid to parents' education is relatively low compared to family

income. If the goal of policymakers is to improve children's outcomes, then it would be beneficial to support parents in improving their education at all stages of childhood. Combined, the findings indicate that the socio-economic gap in children's language ability and socioemotional behaviour would be benefitted by a prolonged multidimensional approach.

In summary, this study extended prior research on the timing of SES which has previously focused on early and middle childhood. It has done this by examining the associations between SES and children's language ability, internalizing behaviour, and externalizing behaviour during late childhood. Further, in line with theory, this study conceptualized SES as a multidimensional construct and is one of the few to examine the unique associations that family income, parents' education, and parents' occupation had with children's outcomes at each stage of childhood. These findings may provide useful insights to policymakers and researchers concerned with reducing SES-related developmental inequalities.

4.6 Summary

This chapter examined the importance of different stages of childhood in the association between family income, parents' education, parents' occupation and children's language ability, internalizing behaviour, and externalizing behaviour. The next chapter will examine the associations between SES trajectories and children's outcomes.

Chapter 5 – Associations between family SES trajectories and children's language ability, internalizing behaviour, and externalizing behaviour

5.1 Aims of this chapter

This chapter builds on the findings from chapter 4 by examining the associations between family income, parents' education, and parents' occupation trajectories and children's language ability, internalizing behaviour, and externalizing behaviour. The chapter begins by presenting an introduction to the study, a brief overview of the literature based on chapter 2, and the research questions being addressed. The methodology used is then presented followed by the findings and a discussion of their implications.

5.2 Introduction

Associations between family socioeconomic status (SES) and children's language ability, internalizing behaviour, and externalizing behaviour are well documented (Sirin, 2005; Letourneau et al., 2011; Cooper & Stewart, 2013; 2017). However, there remain gaps in our understanding of how different dynamics of SES, such as family SES trajectories, are associated with children's developmental outcomes. Much of the previous literature examining the associations between SES and children's development is cross-sectional (Berger et al., 2009; Violato et al., 2011; Buckingham et al., 2013; Flouri & Midouhas, 2016; Fuller et al., 2022) and most longitudinal studies treat SES as a static construct measured at one time point (Kiernan & Mensah, 2009, 2011; Dickerson & Popli, 2014, 2016; Hernandez-Alava & Popli, 2017; Fitzsimons et al., 2017; Hosokawa & Katsura, 2018; Tamura et al., 2020). However, SES is not static, and each dimension of SES has the capacity to change

over time (Liu & Guo, 2015; van Roode et al., 2017). It is important to examine these SES trajectories as evidence shows that when children enter or exit poverty their developmental outcomes improve or worsen in line with their new SES (Kiernan & Mensah, 2011; Dickerson & Popli, 2012; 2016), therefore SES trajectories are likely differentially associated with children's development.

Aside from poverty status and composite measures of SES, income changes have also been found to influence changes in children's developmental outcomes (Milligan & Stabile, 2011; Dahl & Lochner, 2012). Natural experiments indicate that family income increases improve children's cognitive outcomes, particularly for low-income families (Loken, Mogstad, & Wiswall, 2010). The improved family income continues to have a positive effect on children's outcomes throughout middle and late childhood (Raffington et al, 2018). Similarly, when income is increased through policy measures (e.g., welfare and tax benefits) children's cognitive outcomes improve (Duncan et al, 2011; Milligan & Stabile, 2011; Dahl & Lochner, 2012). Evidence indicates that for every $1000 increase in family income children's educational outcomes improve by 6-7.3%. On the other hand, when income decreases, children's behavioural problems can worsen (Choi, Shin, Cho & Park, 2017).

Despite this, limited research has examined the associations between longitudinal SES trajectories and children's language ability, internalizing behaviour, and externalizing behaviour. Some studies examine SES trajectories formed during early childhood (e.g., birth until five years; Dearing et al., 2001; Kendzor et al., 2010; Zachrisson & Dearing, 2015; Bøe et al., 2016; Jackson et al., 2017), middle to late childhood (Comeau & Boyle, 2018), or late childhood to adulthood (McLeod, 1996), but there is little evidence of the associations between family SES trajectories across the entire childhood timeline in relation to language

ability, internalizing behaviour, and externalizing behaviour. Since evidence indicates the importance of early, middle, and late childhood (Dohoon, 2014; McFarland, 2017; McFarland & Hayward, 2014; Dickerson & Popli, 2016), and that SES is not a static construct, research should examine the association between SES trajectories across the entire childhood timeline and children's outcomes.

Current SES trajectory literature focuses on family income, poverty, and composite SES measures but neglects to examine trajectories of other SES dimensions of parent's education and occupation (Kendzor et al., 2012; Jackson et al., 2017; Björkenstam et al., 2017). This is problematic as SES is a multifaceted construct comprised of different dimensions such as income, wealth, poverty, education, and occupation (APA, 2007; Ryan et al., 2014). Research shows that each SES dimension has unique associations with children's language ability, internalizing behaviour, and externalizing behaviour (Sullivan & Brown, 2013; Miller et al., 2021) and this was also established in chapter 4 (study 1). Like family income, evidence also shows that education and occupation can change over time (Magnuson et al., 2009; Harding, 2015; Jonsson et al., 2017), but it is unclear whether different education and occupation trajectories can be identified and whether they have differential associations with children's language ability and behavioural outcomes.

Current UK policy aims to reduce socioeconomic differences in children's language ability and socioemotional behaviour outcomes by improving family income, levels of education, and levels of occupation (Welfare Reform Act, 2016). Research examining the long-term association between different SES trajectories and children's outcomes can provide information about the potential long-term effects that policy decisions could have on children's outcomes. This study aims to address these research gaps by examining whether

different income, education, and occupation trajectories can be identified over early, middle, and late childhood and then testing whether there are differential associations between each SES trajectory and children's language ability, internalizing behaviour, and externalizing behaviour.

5.2.1 Theoretical framework for understanding the role of SES trajectories in children's development

Bioecological Systems Theory explains child development takes place due to complex bidirectional interactions between children and their proximal and distal environments (Bronfenbrenner, 1986). Interactions in proximal environments (e.g., the family and home) are more influential for children's development because they are exposed to them most frequently (Bronfenbrenner, 1979; 1999; 2006). Family SES is associated with children's development because it can determine the nature of the environments that children interact with via several pathways (Conger et al., 2010). The pathways through which this process occurs are outlined by the family stress and investment models (Conger et al., 2010; Conger & Donnellan, 2007). *Family stress model* proposes that SES is associated with children's development because economic pressure leads to parental stress which causes increased conflict between parents, poor parenting practices, and poorer parent-child interactions. Evidence indicates each of these impaired pathways lead to poorer developmental outcomes (Kiernan & Manesh, 2009; 2011; Avan et al., 2010; Micklewright et al., 2012; Azzi-Lessing, 2013; Shelleby et al., 2014; Sun et al., 2015; Neppl et al., 2016; Sosu & Schmidt 2017; Ahun et al., 2017). *Family investment model* states that SES is associated with children's development because it determines parents' ability to invest in the resources required for good child development (e.g., nutritious food, educational materials and activities, safe environment) (Conger & Donnellan, 2007). Low SES families are less able to invest as much

in their children's development while high SES families can invest more. Research indicates the more families invest in their children the better their language ability and behavioural outcomes are (Kalil, et al., 2012; Sohr-Preston et al., 2013; Prevoo et al., 2014; Sosu & Schmidt, 2017; Longo et al., 2017; Jeong et al., 2017; Vasilyava et al., 2018; Fomby & Musick, 2018).

Life Course Theory explains that SES is not a static construct and can remain stable or continuously move up or down forming trajectories from birth to death (Elder, 2003). People have several different trajectories simultaneously that can be independent or associated with each other (e.g., income, educational, occupational trajectories). Life course research proposes the accumulation of risk and social mobility models to explain how different SES trajectories are associated with children's development. Social mobility models hypothesise that the stable, upward, and downward trajectories have differential associations with children's developmental outcomes such that an upward trajectory leads to better outcomes, and downward trajectories lead to worse outcomes (Duncan, 1988; Lynch et al., 1994). Family stress model explains this occurs is because as family SES changes, then family conflict and parents' interactions with their children are likely to change in the same direction which can lead to improvement or worsening of children's outcomes. The investment model states that changes in family SES will be reflected in their ability to invest in their children's development and therefore impact the association between family SES and children's outcomes. The accumulation of risk models hypothesise that the longer children remain in a low SES trajectory, the more detrimental it will be for their development because continued exposure to low SES at several time points produces a cumulative adverse effect (Kuh et al., 2003). According to the stress and investment models, this is because they will have more

cumulative impaired bidirectional child-parent interactions and go longer periods with less investment in their development.

Combining life course trajectory models with the family stress model it is likely that SES trajectories are differentially associated with children's development because each trajectory exerts its own level of economic pressure on the family. Therefore, parental distress, family conflict, and parents' interactions with their children will be higher or lower depending on the SES trajectory which ultimately influences children's development. Similarly, the investment model states that changes in family SES will be reflected in their ability to invest in their children's development which will impact their development.

5.2.2 Evidence of SES trajectories and children's development

The literature examining associations between family SES trajectories and children's language and behavioural outcomes tends to focus on income trajectories. Evidence supports the theory that families have different income trajectories, and that each trajectory has a differential association with children's development. The literature examining trajectories is relatively small but has identified between three- and five-income trajectories (e.g., Jackson et al., 2017; Björkenstam et al., 2017; Kendzor et al., 2012). Three trajectory studies find a variation of stable high, stable medium, and stable low income (Jackson et al., 2017). Four trajectory studies find a variation of high, low, increasing and decreasing income trajectories (Kendzor et al., 2012), and five trajectory studies find a variation of highest increasing, second highest increasing, lowest, second lowest, and decreasing income trajectories (Björkenstam et al., 2017). Research examining the associations between family SES trajectories and children's developmental outcomes is relatively small and is mostly associated with children's health outcomes such as children's weight (Demment et al., 2014),

obesity (Kendzor et al., 2012), asthma (Kozyrsky et al., 2010), and oral health (Peres et al., 2011). However, some researchers have examined the associations between family income trajectories and children's language ability (Dearing et al., 2001; Schoon et al., 2011; Jackson et al. (2017) and internalizing and externalizing behaviour (Poonawalla et al., 2014; Björkenstam et al., 2017; Mok et al., 2018).

Overall, findings indicate that children belonging to persistently low-income trajectories almost always fare worse than those from high-income, increasing-income, or decreasing-income trajectories (Chen et al., 2007; Peres et al., 2007; Séguin et al., 2012; Björkenstam et al., 2017; Boe et al., 2017; Mok et al., 2018) indicating that the longer a child experiences low income, the worse their outcomes will be. *Stable low* income trajectories are associated with the leads to the poorest language ability outcomes (Dearing et al., 2001; Schoon et al., 2011; Jackson et al., 2017), and internalizing and externalizing behavioural problems (Zachrisson & Dearing, 2015; Comeau et al., 2018). Belonging to an *increasing* income trajectory has been associated with improved receptive language and expressive language (Dearing et al., 2001), improved vocabulary (Jackson et al., 2017), and leads to improvements in children's internalizing and externalizing problems (Hoyt et al., 2019). Belonging to a *decreasing* income trajectory is associated with poorer language ability outcomes (Jackson et al., 2017), and a worsening of internalizing and externalizing problems (Miller & Votruba-Drzal 2017; Björkenstam et al., 2017; Hoyt et al., 2019) compared to their stable high- and increasing-income peers, but still not as problematic as stable low-income children (Hoyt et al., 2019).

The literature examining associations between family SES trajectories and children's developmental outcomes tends to focus on SES trajectories during limited timeframes such as early childhood (Dearing et al., 2001; Zachrisson & Dearing, 2015; Jackson et al., 2017) or

from mid-childhood to late-childhood (e.g., Miller & Votruba-Drzal 2017; Comeau & Boyle, 2018). One study examining income trajectories over a longer timeframe between 3-14 years old (Björkenstam et al., 2017) and focused on internalizing behaviour outcomes found that children belonging to low- and decreasing-income trajectories had the most behavioural problems. Björkenstam et al. (2017) also found an additional increasing income trajectory that was not identified in other studies that examined shorter time frames (e.g., Miller & Votruba-Drzal, 2017) which suggests that examining longer timeframes may identify different trajectories to shorter timeframes. It would therefore be beneficial to examine SES trajectories from birth through to late childhood as it is possible that more family SES variation will be captured if data are used over a longer duration which could identify additional trajectories over and above what Björkenstam et al. (2017) found as their SES trajectories began when children were 3 years old. Doing this would provide insight into the different SES trajectories that exist over the entire childhood timeline rather than during specific stages of childhood.

Importantly, the SES trajectory literature primarily focuses on income trajectories and studies have not considered that education and occupation trajectories can equally have unique associations with children's outcomes. Although education and occupation are more stable than family income (Duncan & Magnuson, 2012), life course theory argues that several different education and occupation trajectories are likely to be present over the life course (Elder, 2003). This is supported by evidence that parents' levels of education and occupation are known to change over time (Magnuson et al., 2009; Harding, 2015; Jonsson et al., 2017). There is also evidence that different levels of parent education and occupation are associated with parental stress, family conflict, and parent-child interactions (Brooks-Gunn, et al., 2010; Kalil, et al., 2012; Hadzic et al, 2013; Augustine et al., 2014; Harding et al., 2015; Dockery et

al., 2016; Cho, 2018; Moreira et al., 2019) which could impact children's language ability and behavioural outcomes as outlined in the family stress model (Conger et al., 2010). It is therefore likely that different education and occupation trajectories will have differential associations with children's outcomes. Since policy is concerned with improving family income, education and occupation (Welfare Reform Act, 2012), research needs to examine the trajectories of each SES dimension and examine their unique associations with children's developmental outcomes.

5.2.3 The current study

The current study aims to extend the existing SES trajectory literature in two ways. First, it will use secondary data from birth to late childhood to examine different SES trajectories and examine whether the different SES trajectories are associated with children's rather than language ability, internalizing behaviour and externalizing behaviour. This builds upon the existing literature which is limited to shorter durations when looking at language and behaviour outcomes and therefore includes less information in their trajectory models. While some studies have used data from birth to late childhood, they almost exclusively focus on child health outcomes (Kozyrsky et al., 2010; Peres et al., 2011; Kendzor et al., 2012; Demment et al., 2014) which do not provide information on language or behavioural outcomes. Second, the current study will examine trajectories of family income, parent's education, and parent's occupation since they are each important to current policy but have yet to be examined in relation to children's language ability and behavioural outcomes. Examining the associations between trajectories of different SES dimensions and children's developmental outcomes in later life will benefit policymakers as it will give them a better understanding of the long-term impact that policy decisions could have on children's outcomes. To achieve the aims of this study the following questions will be answered:

1. To what extent does family income, parents' education, and parents' occupation change or remain stable from childbirth through late childhood?

2. To what extent are family income, parent's education, and parent's occupation trajectories associated with children's language and behavioural outcomes during late childhood?

5.3 Methodology

5.3.1 Sample

The data used in this study comes from the first six waves of the Millennium Cohort Study (MCS). The MCS is a longitudinal national cohort study in the UK that follows the lives of 18851 families with a child that was born in the UK between 2001 and 2002 when children were 9 months old (Fitzsimons, 2017). The data were collected when children were aged, 9 months, 3, 5, 7, 11, and 14 years old and the productive samples at each wave were 18,551, 15,590, 15,246, 13,857, 13,287, and 11,726 families (Ketende 2010; Mostafa, 2014; Fitzsimons, 2020). The sample was obtained from 398 electoral wards across the UK and families from disadvantaged and ethnic minority electoral wards were oversampled to ensure that adequate sample sizes for each stratum could be achieved while accounting for attrition (Plewis, 2007; Ipsos MORI, 2017). As discussed in chapter 3, the productive sample from wave 6 (N = 11,726) was used in this study to ensure that all families included had longitudinal weights assigned to them which were used to account for attrition. 947 cases were removed for having no valid information for any of the variables of interest at any data collection wave and a further 96 cases were identified as having extreme outlier values. This process left a final analytic sample of 10,683 families. To account for panel attrition the non-

response weights provided in the MCS were applied (Plewis, 2007; Mostafa, 2014) and missing data were handled using Full Information Maximum Likelihood estimation (Muthén & Muthén, 2017).

5.3.2 Measures

The dependent variables in this study were children's language ability, internalizing behaviour, and externalizing behaviour. Data on the dependent variables were obtained when children were fourteen (MCS 6) years old. The independent variables were family SES (i.e., family income, maternal education, and maternal occupation). The covariates used were age, gender, ethnicity, birth weight, single or dual parent household. Data on the independent variables and covariates apart from birth weight were available at all six data collection waves when children were 9 months old (MCS1), three (MCS 2), five (MCS 3), seven (MCS 4), eleven (MCS 5), and fourteen (MCS 6) years old. Birth weight was recorded at wave 1.

5.3.3 Language Ability

The Applied Psychology Unit Standardised Vocabulary Test was used to assess children's verbal vocabulary knowledge at age 14. The vocabulary test is designed to measure respondents understanding and meaning of words and is suitable for those aged 14 and over. The word activity involved presenting respondents with a list of 20 target words. For each target word, 5 additional words were presented. Children were asked to identify which of the 5 additional words had the same meaning as the target word. The words used were subsets of those used in the vocabulary test from the 1970 British Cohort Study which were originally from the standardised vocabulary test designed by the Applied Psychology Unit at the University of Edinburgh in 1976. Children were given 1 point for each correct answer and total scores were a sum of all correct answers meaning 20 was the maximum score. In the

current sample, the scores ranged from 0-19 with a mean of 7.09 (SD= 2.625). Previous analyses have found the measure to be reliable (alpha = .83 - .95; Levy & Goldstein, 1984).

5.3.4 Internalizing and Externalizing behaviour

The Strength and Difficulties Questionnaire (SDQ; Goodman, 1997) was used to measure children's internalising and externalizing behaviours at ages 3, 7, and 14 years old and was completed by the parents. The SDQ contains 25 items measuring five dimensions of behavioural development in children aged between 3 and 16. The five dimensions are emotional symptoms, conduct problems, hyperactivity, peer problems, and pro-social behaviour. Each item in the subscales is answered on a 3-point scale ("not true" = 0, "somewhat true" = 1, "certainly true" = 2). The total score on each subscale can range from 0-10. Goodman provides information and syntax for scoring the SDQ and deriving internalizing and externalizing behaviour scales on his website (Goodman: SDQ Info, 2023).

The internalizing behaviour scale is derived by summing the items from the emotional subscale ("*often complains of headaches, stomach aches or sickness*", "*many worries, often seems worried*", "*often unhappy, down-hearted or tearful*", "*nervous or clingy in new situations, easily loses confidence*", and "*many fears, easily scared*") and the peer problems subscale ("*rather solitary, tends to play alone*", "*has at least one good friend*", "*generally liked by other children*", "*picked on or bullied by other children*", and "*gets on better with adults than with other children*"). Normal internalizing scores range from 0-4, borderline problems scores range from 5-7, and abnormal scores range from 8-20 (Maurice-Stam et al., 2018). The externalizing behaviour scale is derived by summing the items from the hyperactivity subscale ("*restless, overactive, cannot stay still for long*", "*constantly fidgeting or squirming*", "*thinks things out before acting*", "*sees tasks through to the end, good*

attention span", and "*easily distracted, concentration wanders*") and the conduct problems subscale ("*often has temper tantrums or hot tempers*", "*generally obedient, does what adults request*", "*often fights with other children or bullies them*", "*can be spiteful to others*", and "*often argumentative with adults"*). Normal externalizing scores range from 0-5, borderline scores range from 6-8, and abnormal scores range from 9-20 (Maurice-Stam et al 2018). The two-factor model (internalizing and externalizing behaviour) has been shown to have a good model fit (CFI = .94; TLI = .94) (Sosu &Schmidt, 2017). There is good reliability for both the internalizing behaviour scale with α ranging from .73 - .82 and the externalizing behaviour scale with α ranging from .78 - .83 (Palmieri & Smith 2007; Goodman et al., 2010; Hessel, et al., 2017). The convergent and discriminant validity of the internalizing and externalizing model has been found to be good (e.g., Goodman et al., 2010; Croft et al., 2015; Kersten et al., 2016) and the measurement invariance has shown good model fit (Sosu & Schmidt, 2017) indicating that the SDQ measures the intended constructs over time.

5.3.5 Measures of socio-economic status

Information on *family household income* was measured using net equivalised weekly income gathered at every data collection wave during the face-to-face interviews by asking respondents to state their take-home income. The average income and standard deviations are presented in table 5.1 below. Parents' *level of education* was measured at each time point by asking parents to indicate their highest level of academic or vocational education which was mapped onto the National Vocational Qualification (NVQ). The NVQ ranges from NVQ 1 (lowest level of qualification) – NVQ 5 (highest level of qualification). Parents' *occupational class* was measured at every data collection wave by asking parents to indicate their occupation which was mapped onto the 7-class National Statistics Socio-economic Classification (NS-SEC). The NS-SEC ranges from 1 (routine occupations) to 7 (higher

managerial and professional occupations). Average levels of education and occupation at each time point are presented in table 5.1 below with additional breakdowns of the percentage of parents at each level of education and occupation provided in tables 5.2 and 5.3 below.

5.3.6 Covariates

Several covariates were identified in the literature as being associated with family SES and children's outcomes so were included in the analyses. *Mothers' age at birth* (Knipe 2016) was measured by asking mothers to state their age in years when they gave birth. The *number of parents living in the household* (Flouri et al., 2016) was specified by the main respondent during the interview when asked whether they lived in a one or two-parent household. *Ethnicity* (Sullivan et al., 2021) is measured by asking the main respondent to indicate the child's ethnicity during the interviews. *Gender* (Mous et al., 2017) was measured by asking the main respondent to specify whether the child was male or female. Children's *birth weight* (Bromley, 2009) was measured by asking the main respondent for information during the interview.

5.3.7 Analytic strategy

Latent Class Growth Analyses (LCGA) models were used to examine whether different trajectories of each SES dimension could be found in the sample. This was done by using the income, education, and occupation data from all 6 data collection waves in the MCS (when children were 9 months, 3, 5, 7, 11, and 14 years old). A two-class model was run first so that each progressive model can be assessed to check if it offers a better fit over the previous model (Jung & Wickrama, 2008).

To determine how many trajectories there were for each SES dimension best fit the data, several goodness of fit indices were used (Jung & Wickrama, 2008; Maydeu-Olivares & Garcı́a-Forero, 2010). Akaike's information criterion (AIC; Akaike, 1974) and Bayesian information criterion (BIC; Schwarz, 1978) both assesses model fit based on the likelihood estimates within given parameters (Burnham & Anderson 2002). The AIC and BIC estimates reward a model for being simple and fitting the data well (Burnham & Anderson 2002; Nylund et al., 2007). The better a model fits the data the more it is rewarded but as the model becomes more complex with additional parameters the more it is penalised in the estimates (Burnham & Anderson 2002). Lower AIC and BIC scores indicate better model fit. Entropy was assessed to determine the extent to which latent classes are 'separate' from each other (Weiss & Dardick, 2016). Entropy values range from 0-1 and the closer entropy is to 1 the more the model distinguishes between different classes. Entropy values >.8 indicate that individuals are assigned to different groups with a good level of accuracy (Celeux & Soromenho, 1996). Likelihood ratio and bootstrapped likelihood ratio tests were assessed to determine whether the current model is a better fit than a model with one less class (Lo, Mendell, & Rubin, 2001; McLachlan & Peel, 2000). In both cases, if the *p*-value is significant (<.05) then it means that the current model is a significantly better fit than the previous model with one less class. A summary table of these goodness to fit indicies and their suggested interpretations is presented in table 5.1 below.

Table 5.1. Summary of the goodness of fit indices

Indicator	Suggested interpretations
AIC	Value less than model with one less class suggests improved model fit
BIC	Value less than model with one less class suggests improved model fit
Entropy	Value greater than 0.8 suggests participants assigned to class accurately
LMR	$p <$ 0.05 suggests improved model fit over model with one less class
BLRT	$p <$ 0.05 suggests improved model fit over model with one less class

After the best fitting models for family income, parent's education, and parent occupation were determined using the above criteria, latent class probabilities were generated for each family and exported. A series of hierarchical regressions were then performed to examine associations between each of the generated latent class trajectories and children's language ability, internalizing behaviour, and externalizing behaviour.

5.4 Results

5.4.1 Descriptive statistics

Table 5.2 below presents the descriptive statistics of the analytic sample. On average, children were observed to have normal internalizing and externalizing scores. Normal internalizing scores range from 0-4, and normal externalizing scores range from 0-5 with higher scores becoming problematic (Maurice-Stam et al 2018). Looking at SES dimensions, income on average continues to increase over time and the average level of education increased from A levels/ Highers to teaching qualification/degree. Little change was seen with the average parent level of occupation which remained in the same category on average small employers/own account workers. With income and education increasing on average over the 14 years it would suggest that increasing trajectories could be found. On the other

hand, with occupation remaining stable on average it suggests that only stable trajectories will be found. Additional breakdowns of the percentage of parents at each level of education and occupation are provided in tables 5.3 and 5.4 below.

Table 5.2 Descriptive statistics of all variables in the analyses (n = 10683)

	M	SD	%	Range
Language ability	50	10	-	20 - 80
Internalizing behaviour	3.711	3.35	-	0 - 19
Externalizing behaviour	4.323	3.51	-	0 - 19
Family income				
9 months	317.52	204.61	-	14.45 - 1282.61
3 years	343.89	223.37	-	14.39 - 1362.46
5 years	364.98	222.88	-	17.09 - 1282.94
7years	398.86	232.38	-	14.93 - 1282.54
11 years	418.07	178.66	-	65.85 - 1162.80
14 years	417.44	178.07	-	80.02 - 1153.52
Parent's level of education				
9 months	2.884	1.403	-	0 - 5
3 years	2.929	1.406	-	0 - 5
5 years	2.909	1.4	-	0 - 5
7years	3.041	1.387	-	0 - 5
11 years	3.181	1.388	-	0 - 5
14 years	3.263	1.4	-	0 - 5
Parent's level of occupation				
9 months	4.639	1.975	-	1-7

3 years	4.614	1.945	-	1-7
5 years	4,577	1.941	-	1-7
7years	4.517	1.94	-	1-7
11 years	4.423	1.916	-	1-7
14 years	4.378	1.913	-	1-7
Mother's age at birth	29.11	5.751	-	14-51
Birth weight (lbs)	7.41	.586	-	.86 - 14.44
Parents in household				
Two parents			87.5	
One parent			12.5	
Gender				
Male			51.9	
Female			48.1	
Ethnicity				
White			86.41	
Mixed			0.09	
Indian			2.5	
Pakistani & Bangladeshi			6.5	
Black British			2.8	
Chinese/ other			1.7	

Table 5.3 Parent's level of education at each wave (N=10,683).

Child age	Parent's level of education	%
9 months		
	NVQ1	6.1
	NVQ2	25.5
	NVQ3	17.9
	NVQ4	41.9
	NVQ5	8.6
3 Years		
	NVQ1	5.9
	NVQ2	25.2
	NVQ3	17.5
	NVQ4	42
	NVQ5	9.4
5 Years		
	NVQ1	5.8
	NVQ2	24.9
	NVQ3	17.4
	NVQ4	42.4
	NVQ5	9.4
7 Years		
	NVQ1	4.8
	NVQ2	23
	NVQ3	17.3
	NVQ4	41.7

	NVQ5	13.2
11 Years		
	NVQ1	4.8
	NVQ2	20.6
	NVQ3	16.2
	NVQ4	40.9
	NVQ5	17.6
14 Years		
	NVQ1	4.8
	NVQ2	19.6
	NVQ3	15.7
	NVQ4	40.3
	NVQ5	19.7

Table 5.4 Parent's level of household occupation at each wave (N=10,683)

Child age	Parent's level of occupation	%
9 months		
	Routine	**4.3**
	Semi routine	**19.2**
	Lower supervisory	**12.6**
	Small employers	**9.2**
	Intermediate occupations	**10.6**
	Lower managerial and professional	**22.7**
	higher managerial and professional	**21.3**

3 Years		
	Routine	**3.6**
	Semi routine	**18.7**
	Lower supervisory	**13.7**
	Small employers	**11.6**
	Intermediate occupations	**9.2**
	Lower managerial and professional	**22.9**
	higher managerial and professional	**20.4**
5 Years		
	Routine	**3.8**
	Semi routine	**19.4**
	Lower supervisory	**14.4**
	Small employers	**11.5**
	Intermediate occupations	**9**
	Lower managerial and professional	**22.5**
	higher managerial and professional	**19.3**
7 Years		
	Routine	**4.1**
	Semi routine	**20.3**
	Lower supervisory	**14**
	Small employers	**12.2**
	Intermediate occupations	**8.8**
	Lower managerial and professional	**22.7**
	higher managerial and professional	**18**
11 Years		

	Routine	**4**
	Semi routine	**20**
	Lower supervisory	**15.4**
	Small employers	**14.8**
	Intermediate occupations	**7.6**
	Lower managerial and professional	**20.9**
	higher managerial and professional	**17.4**
14 Years		
	Routine	**4.6**
	Semi routine	**19.9**
	Lower supervisory	**15.2**
	Small employers	**15**
	Intermediate occupations	**7.6**
	Lower managerial and professional	**21.6**
	higher managerial and professional	**16.2**

5.4.2 Trajectories of SES dimensions

LCGA was undertaken to determine the number of family income, parent education, and parent occupation trajectories in the analytic sample (n = 10683) from 9 months to age 14. A six-class model was selected as best fitting for family income, a six-class model was best fitting for the level of parent's education, and a five-class model was best fitting for parent's level of occupation. The trajectories for family income, parents' education, and parents' occupation are presented in figures 5.1, 5.2, and 5.3 below. The reason these models were selected over alternative models will now be discussed.

5.4.3 Trajectories of family income

The six-class family income model was selected over alternate models for the following reasons. The AIC and BIC were lower for the six-class than the five-class model while the entropy remained high. The likelihood ratio test and the bootstrapped likelihood ratio test both indicated that the six-class model was a significant improvement over the five-class model ($p<.001$). When examining the trajectory plots it was evident that the five-class model failed to identify a distinct stable-high income group while the six-class model did identify this group. A seven-class model was run to test whether it would be a better fit than the six-class model. The likelihood ratio test was verging on non-significance ($p = .046$) indicating that it was a slightly better model fit than the six-class model. However, examination of the trajectory plots indicated that the seven-class model had two very similar low-income trajectories which would not add to the interpretation of the result over the single low-income trajectory identified by the 6-class model. The six-class model was therefore the best fitting model for the data that allowed for meaningful interpretation of the results. Table 5.5 presents a full breakdown of the model fit indices for two- to seven-class models.

Table 5.5 Indicators of model fit for family income

Model	AIC	BIC	Entropy	% of sample in each class	Posterior values	LMR-LRT	BLRT
Two-class	784956.236	785036.277	0.904	-	-	<.001	<.001
1				33.3	0.958		
2				66.7	0.978		
Three-class	773672.545	773774.415	0.903	-	-	<.001	<.001
1				51.33	0.941		
2				12.86	0.945		
3				35.81	0.909		
Four-class	769508.977	769632.676	0.885	-	-	<.001	<.001
1				17.38	0.913		
2				5.99	0.948		
3				31.88	0.909		
4				44.75	0.957		
Five-class	767826.813	767972.341	0.89	-	-	<.001	<.001
1				5.8	0.945		
2				4.78	0.84		
3				14.73	0.899		
4				43.77	0.96		
5				30.92	0.903		
Six-class	766131.946	766299.304	0.878	-	-	<.001	<.001
1				4.53	0.855		
2				15.68	0.868		
3				2.77	0.942		
4				41.05	0.954		
5				28.25	0.881		
6				7.72	0.891		
Seven-class	765334.639	765523.825	0.84	-	-	0.046	<.05
1				36.49	0.934		
2				22.78	0.812		
3				2.17	0.937		
4				9.87	0.848		
5				5.1	0.854		
6				5.88	0.878		
7				17.71	0.821		

The following income trajectories were identified in the six-class model: Very high-decreasing (n = 290; 2.77%), stable-high (n = 828; 7.72%), high-decreasing (n = 450; 4.53%), average-increasing (n = 1666; 15.68%), low-increasing (n = 3043; 28.25%), and stable-low (n = 4406; 41.05%).

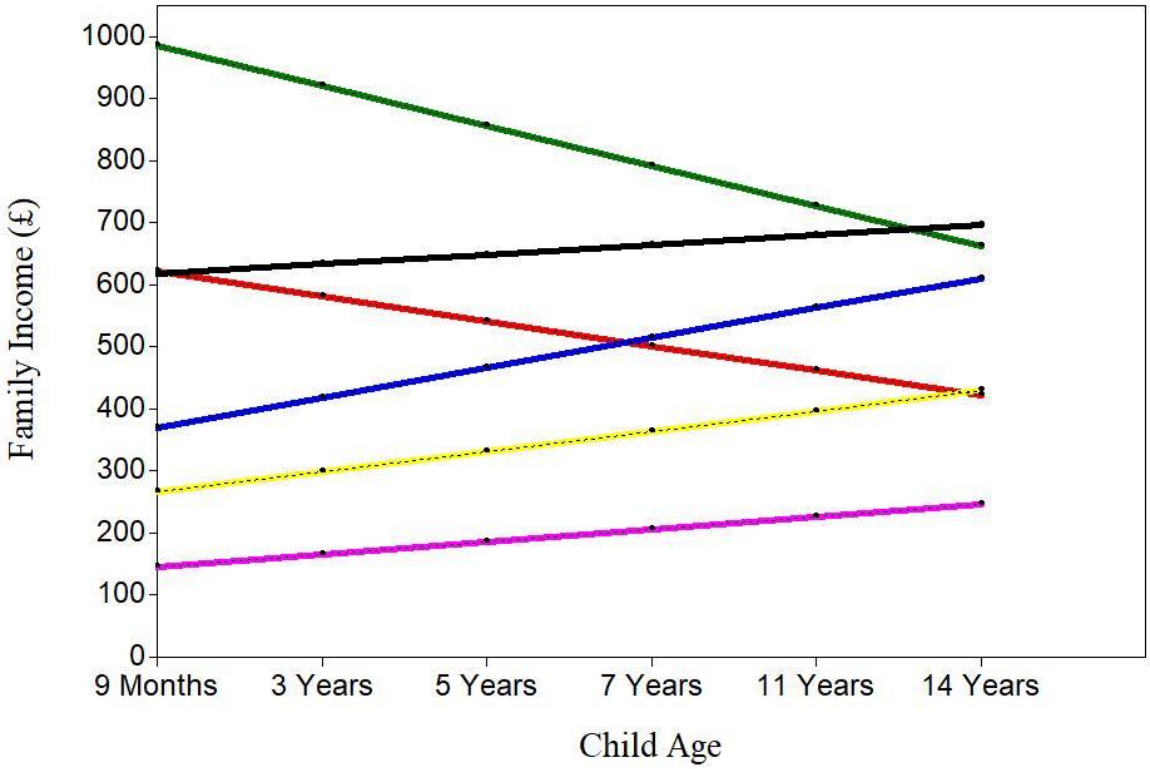

Figure 5.1. Six-class model of income trajectories

Note. Green = Very-high-decreasing. Black = Stable-high. Red = High-decreasing. Blue = Average-increasing. Yellow = low-increasing. Pink = Stable Low.

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5.4.4 Associations between income trajectories and children's outcomes

Multiple regression was carried out to observe the associations that each income trajectory had on children's language ability, externalizing behaviour, and internalizing behaviour. The findings are presented in table 5.6 below. The stable-high income trajectory was used as the reference category. Results show that belonging to the stable-low-income trajectory was associated with the lowest language ability ($\beta = -0.317$, $p<.001$), and highest internalizing behaviour problems ($\beta = 0.325$) and externalizing behaviour problems (0.313, $p<.001$)

followed by the low-increasing, average-increasing, high-decreasing trajectories. There was no significant association between the very-high-decreasing income trajectory and children's outcomes which suggests a cushioning effect at the highest levels of income.

Children belonging to increasing income trajectories had better associations with all outcomes as children from the low-increasing trajectory had a significantly better association with language ability ($\beta = -0.248$, $p<.01$), internalizing behaviour ($\beta = 0.161$, $p<.01$) and externalizing behaviour ($\beta = 0.122$, $p<.01$) compared to those from the stable low income trajectory. Those in the average-increasing trajectory saw further improvements (language ability: $\beta = -0.119$, $p<.01$; internalizing behaviour: $\beta = -0.046$, $p<.01$; externalizing behaviour: $\beta = -0.019$, p = n.s.). The findings also show that falls in income even for high earners can have a negative impact on children's outcomes as the high-decreasing income trajectory has a significant negative association with children's language ability ($\beta = -0.078$, $p<.001$), and a significant association with children's internalizing ($\beta = 0.04$, $p<.001$) and externalizing ($\beta = 0.035$, $p<.001$) behaviour problems.

Table 5.6. Associations between family income trajectories and children's language ability, internalizing and externalizing behaviour

	Age 14 Language Ability		Age 14 Internalizing Behaviour		Age 14 Externalizing Behaviour	
Trajectory	B (95% CI)	S.E.	B (95% CI)	S.E.	B (95% CI)	S.E.
Stable-high (ref)	-	-	-	-	-	-
Very-high-decreasing	-0.007 (-0.033, 0.018)	0.013	-0.004 (-0.021, 0.013)	0.009	0.006 (-0.013, 0.025)	0.01
High-decreasing	**-0.078 (-0.105, -0.05)*** **	0.014	**0.04 (0.02, 0.061)*** **	0.01	**0.035 (0.015, 0.056)*** **	0.01
Average-high increasing	**-0.119 (-0.153, -0.085)*** **	0.017	**0.046 (0.02, 0.073)*** **	0.013	0.019 (-0.005, 0.044)	0.013
Low-increasing	**-0.248 (-0.289, -0.208)*** **	0.021	**0.161 (0.128, 0.194)*** **	0.017	**0.122 (0.091, 0.154)*** **	0.016
Stable-low	**-0.371 (-0.418, -0.324)*** **	0.024	**0.325 (0.285, 0.366)*** **	0.021	**0.313 (0.275, 0.352)*** **	0.02
Birth weight	0.015 (-0.01, 0.04)	0.013	**-0.053 (-0.081, -0.025)*** **	0.014	**-0.059 (-0.088, -0.03)*** **	0.015
Gender	0.004 (-0.02, 0.029)	0.012	**0.049 (0.025, 0.074)*** **	0.013	**-0.14 (-0.164, -0.116)*** **	0.012
Parents in home	-0.03 (-0.06, 0.001)	0.015	0.015 (-0.019, 0.049)	0.017	0.027 (-0.007, 0.061)	0.017
Mother age at birth	**0.053 (0.024, 0.083)*** **	0.015	0 (-0.031, 0.032)	0.016	**-0.088 (-0.119, -0.057)*** **	0.016
Mixed ethnicity	0.013 (-0.012, 0.037)	0.012	0.001 (-0.027, 0.029)	0.014	-0.028 (-0.057, 0.001)	0.015
Indian	0.006 (-0.019, 0.031)	0.013	**-0.034 (-0.051, -0.017)*** **	0.009	**-0.039 (-0.055, -0.023)*** **	0.008
Pakistani & Bangladeshi	-0.015 (-0.036, 0.007)	0.011	-0.005 (-0.026, 0.016)	0.011	**-0.052 (-0.071, -0.032)*** **	0.01
Black British	0 (-0.026, 0.025)	0.013	**-0.033 (-0.065, -0.002)***	0.016	**-0.031 (-0.058, -0.004)***	0.014
Chinese and other	0 (-0.021, 0.021)	0.011	-0.013 (-0.039, 0.012)	0.013	**-0.028 (-0.052, -0.003)***	0.013

Note. $p < .05$ = *, $p < .01$ = **, $p < .001$ = ***. $N = 10,683$.

5.4.5 Trajectories of parent's level of education

The six-class trajectory model for parent's level of education was selected over alternate models because the AIC and BIC were lower for the six-class than all previous models, entropy remained high, and the likelihood ratio test and the bootstrapped likelihood ratio test both indicated that the six-class model was a significant improvement over the five-class model ($p<.001$). When examining the trajectory plots the six-class model identified parents that improved their education over time while the five-class model did not. A seven-class model was not a significantly better model fit than the six-class model. The six-class model was therefore the best fitting model for the data. Table 5.7 below presents a full breakdown of the model fit indices for two- to seven-class models.

Table 5.7. Indicators of model fit for parent's level of education

Model	AIC	BIC	Entropy	% of sample in each class	Posterior values	LMR-LRT	BLRT
Two-class	168351.863	168431.851	0.964	-	-	<.001	<.001
1				54.67	0.992		
2				45.33	0.989		
Three-class	142056.218	142158.021	0.978	-	-	<.001	<.001
1				19.06	0.992		
2				38.73	0.995		
3				42.21	0.988		
Four-class	130708.075	130831.692	0.977	-	-	<.001	<.001
1				36.47	0.997		
2				18.1	0.987		
3				16.72	0.976		
4				28.71	0.982		
Five-class	123459.268	123604.7	0.989	-	-	<.001	<.001
1				36.83	0.998		
2				27.11	0.992		
3				12.71	0.996		
4				15.74	0.988		
5				7.61	0.972		
Six-class	121092.039	121259.286	0.978	-	-	<.001	<.001
1				12.25	0.986		
2				15.52	0.989		
3				36.71	0.997		
4				7.86	0.98		
5				23.3	0.977		
6				4.36	0.922		
Seven-class	120450.572	120639.634	0.978	-	-	n.s.	n.s
1				0.93	0.911		
2				36.22	0.997		
3				23.13	0.976		
4				8.38	0.968		
5				15.07	0.989		
6				4.67	0.942		
7				11.6	0.984		

The following parent level of education trajectories were identified in the six-class model: Stable high (n = 3912, 36.71%), stable average (n = 1644, 15.52%), stable low (n = 2492, 23.3%), no qualifications (n = 1313, 12.25%), increasing no qualification-low (n = 829, 7.86%), and increasing low-high (n = 433, 4.36%).

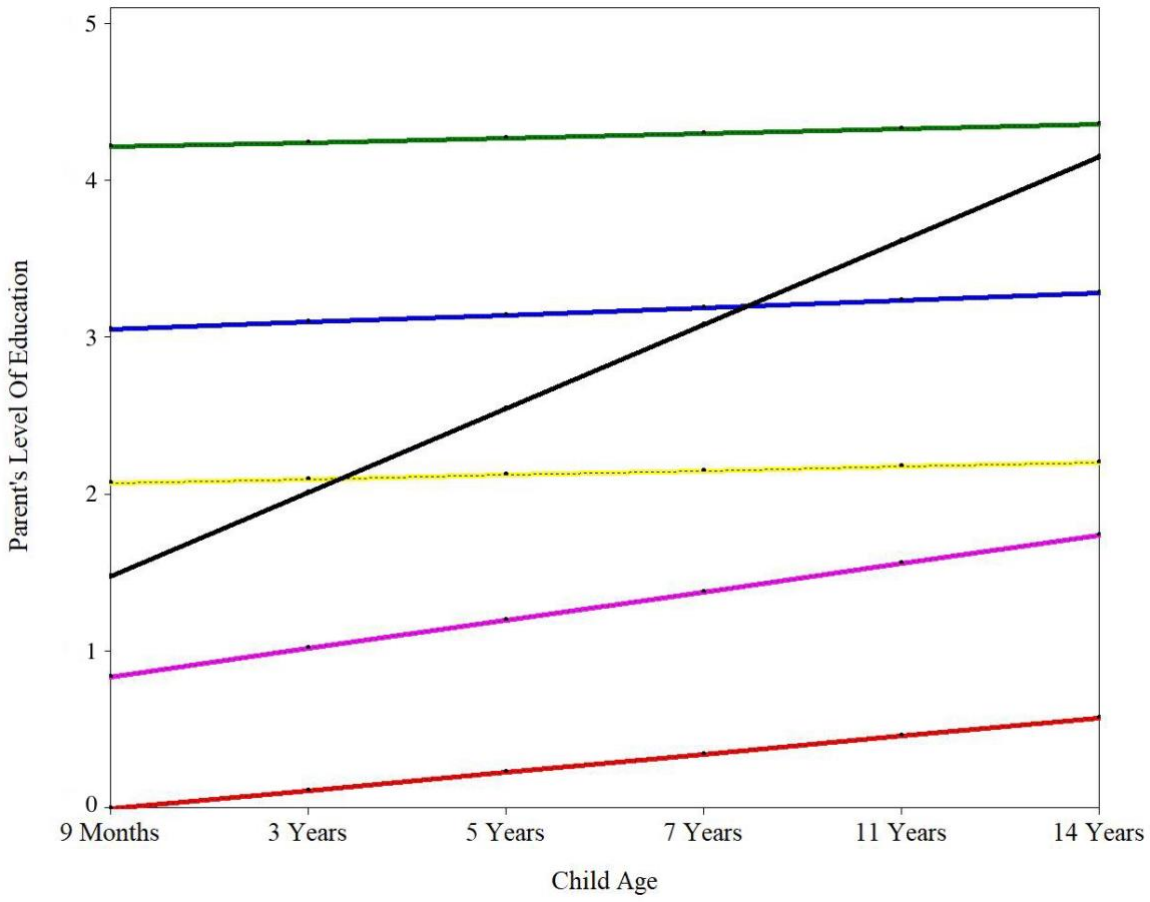

Figure 5.2. Parent level of education trajectories

Note. Green = Stable-high. Blue = Stable-average. Yellow = Stable-low. Red = no qualifications. Pink = Increasing no qualification-low. Black = Increasing low-high.

5.4.6 Associations between parent education trajectories and children's outcomes

Multiple regression was carried out to observe the associations that each education trajectory had on children's language ability, externalizing behaviour, and internalizing behaviour. The findings are presented in table 5.8 below. The stable-high education trajectory was used as the reference category. For language ability results show that belonging to the no-qualifications trajectory was associated with the lowest language ability (β = -0. 213, p<.001), followed by the stable-low, increasing no-qualifications-low, stable average, and increasing low-high trajectories. Children belonging to an increasing education trajectory had better

language ability compared to their peers in non-increasing trajectories. For example, those in the increasing no-qualifications-low trajectory had better language ability (β = -0. 145, p<.01) than those remaining in the no-qualifications trajectory (β = -0. 213, p<.001) and the difference was significant (t = 6.15, p <.001). Similarly, those in the increasing low-high trajectory (β = -0.077, p<.01) had better language ability than their peers that remained in the stable-low trajectory (β = -.19, p<.001) and the difference between the trajectories was also significant (t = 3.01, p <.001).

For both internalizing and externalizing behaviour results show the no qualifications trajectory was associated with more internalizing (β = 0.132, p<.001) and externalizing (β = 0.171, p<.001) behaviour problems followed by the stable-low, increasing no qualifications-low, increasing low-high, and stable average. Children belonging to an increasing education trajectory also had fewer behavioural problems compared to their peers in non-increasing trajectories. Belonging to the increase no qualifications-low trajectory was associated with fewer internalizing (β = 0.099, p<.001) and externalizing (β = 0.124, p<.001) behaviour problems compared to their peers that remained in the stable-low trajectory (internalizing: β = 0.132, p<.001; externalizing: β = 0.171, p<.001). Similarly, those belonging to the increasing low-high trajectory had fewer internalizing (β = 0.059, p<.001) and externalizing (β = 0.063, p<.001) behaviour problems compared to their peers that remained in the stable-low trajectory (internalizing: β = 0.11, p<.001; externalizing: β = 0.127, p<.001).

Table 5.8. Associations between parent education trajectories and children's language ability, internalizing and externalizing behaviour

Table 5.8. Associations between parent education trajectories and children's language ability, internalizing behaviour, and externalizing behaviour.

	Age 14 Language Ability		Age 14 Internalizing Behaviour		Age 14 Externalizing Behaviour	
Trajectory	B (95% CI)	S.E.	B (95% CI)	S.E.	B (95% CI)	S.E.
Stable-high (ref)	-	-	-	-	-	-
Increasing low-high	**-0.077 (-0.103, -0.051)*** **	0.013	**0.059 (0.03, 0.087)*** **	0.015	**0.063 (0.033, 0.093)*** **	0.015
Stable-average	**-0.113 (-0.138, -0.088)*** **	0.013	**0.036 (0.011, 0.061)** **	0.013	**0.037 (0.013, 0.06)** **	0.012
Increasing no qualification-low	**-0.145 (-0.177, -0.114)*** **	0.016	**0.099 (0.068, 0.129)*** **	0.016	**0.124 (0.092, 0.156)*** **	0.017
Stable-low	**-0.19 (-0.216, -0.164)*** **	0.013	**0.11 (0.082, 0.139)*** **	0.015	**0.127 (0.098, 0.155)*** **	0.014
No Qualification	**-0.213 (-0.243, -0.183)*** **	0.016	**0.132 (0.098, 0.166)*** **	0.017	**0.171 (0.136, 0.206)*** **	0.018
Birth weight	0.012 (-0.013, 0.037)	0.013	**-0.056 (-0.084, -0.028)*** **	0.014	**-0.06 (-0.09, -0.031)*** **	0.015
Gender	0.006 (-0.018, 0.03)	0.012	**0.046 (0.021, 0.071)*** **	0.013	**-0.143 (-0.167, -0.119)*** **	0.012
Parents in home	-0.023 (-0.052, 0.006)	0.015	**0.037 (0.004, 0.07)***	0.017	**0.042 (0.008, 0.077)***	0.018
Mother age at birth	**0.078 (0.05, 0.106)*** **	0.014	**-0.053 (-0.083, -0.022)*** **	0.016	**-0.134 (-0.164, -0.105)*** **	0.015
Mixed ethnicity	0.007 (-0.017, 0.031)	0.012	0.008 (-0.022, 0.038)	0.015	-0.021 (-0.05, 0.008)	0.015
Indian	-0.001 (-0.026, 0.024)	0.013	**-0.029 (-0.046, -0.012)*** **	0.009	**-0.034 (-0.049, -0.018)*** **	0.008
Pakistani & Bangladeshi	**-0.024 (-0.044, -0.004)***	0.01	**0.022 (0.002, 0.043)***	0.01	**-0.027 (-0.047, -0.006)***	0.01
Black British	-0.019 (-0.045, 0.006)	0.013	-0.014 (-0.044, 0.016)	0.015	-0.012 (-0.04, 0.015)	0.014
Chinese and other	-0.004 (-0.027, 0.018)	0.011	-0.005 (-0.031, 0.022)	0.014	-0.02 (-0.046, 0.005)	0.013

Note. $p < .05$ = *, $p < .01$ = **, $p < .001$ = ***. $N = 10,683$.

5.4.7 Trajectories of parent's level of occupation

The five-class trajectory model for parent's level of education was selected over alternate models because the AIC and BIC were lower than previous models, the entropy remained high, and the likelihood ratio test indicated that the six-class model would not be a significant improvement over a five-class model. When examining the trajectory plots the six-class model had an additional class within the same level of occupation and therefore did not add anything over the five-class model. Therefore, the five-class model was, therefore, the best fitting model for the data whilst being interpretable. Table 5.9 below presents a full breakdown of the model fit indices for two- to six-class models.

Table 5.9 Indicators of model fit for parent's level of occupation

Model	AIC	BIC	Entropy	% of sample in each class	Posterior values	LMR-LRT	BLRT
Two-class	192129.508	192208.921	0.958	-	-	<.001	<.001
1				58.77	0.988		
2				41.21	0.985		
Three-class	182091.529	182192.599	0.929	-	-	<.001	<.001
1				22.76	0.93		
2				49.71	0.981		
3				27.53	0.974		
Four-class	176414.25	176536.978	0.941	-	-	<.001	<.001
1				35.12	0.954		
2				24.38	0.976		
3				17.53	0.99		
4				22.97	0.976		
Five-class	171446.598	171590.984	0.962	-	-	<.001	<.001
1				27.92	0.975		
2				17.21	0.989		
3				18.72	0.951		
4				13.33	0.988		
5				22.82	0.978		
Six-class	162582.193	162748.237	0.96	-	-	n.s.	<.05
1				23.31	0.996		
2				26.92	0.872		
3				17.44	0.976		
4				8.74	0.962		
5				10.87	0.975		
6				12.72	0.972		

The following parent level of occupation trajectories were identified in the five-class model: Decreasing very high-high (n = 2312, 22.82%), decreasing high-intermediate (n = 2777, 27.92%), stable-intermediate (n = 1944, 18.72%), stable-average (n = 1317, 13.33%), and increasing routine-semi-routine (n = 1740, 17.21%).

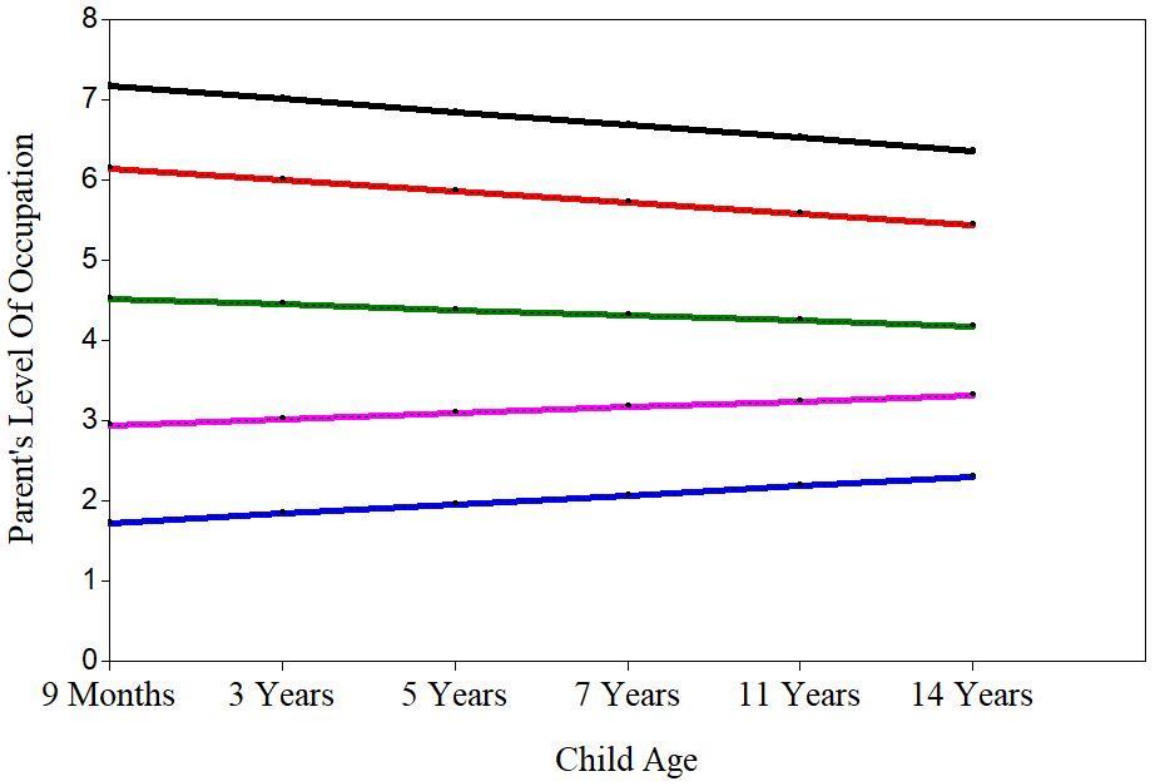

Figure 5.3. Parent level of occupation trajectories

Note. Black = decreasing very high-high. Red = decreasing high-intermediate. Green = stable-intermediate. Pink = stable-average. Blue = increasing routine-semi-routine.

5.4.8 Occupation trajectories on children's outcomes

Multiple regression was carried out to observe the associations that each occupation trajectory had on children's language ability, externalizing behaviour, and internalizing behaviour. The findings are presented in table 5.10 below. The decreasing very high-high

occupation trajectory was used as the reference category. Results show that there is no significant difference between the decreasing very high-high reference category and the decreasing high-intermediate trajectory for any of the children's outcomes. For children's language ability, the increasing routine-semi-routine trajectory had the largest negative association (β = -.203, p <.001), followed by stable-average and stable-intermediate trajectories. For both internalizing and externalizing behaviour the routine-semi-routine trajectory had the largest associations with behaviour problems (internalizing: β = .124; p <.001; externalizing: β =.128, p <.001) followed by the stable-intermediate, and stable-average trajectories.

Table 5.10. Associations between parent occupation trajectories and children's language ability, internalizing and externalizing behaviour

Table 5.10 Associations between parent occupation trajectories and children's language ability, internalizing behaviour, and externalizing behaviour

	Age 14 Language Ability		Age 14 Internalizing Behaviour		Age 14 Externalizing Behaviour	
Trajectory	B (95% CI)	S.E.	B (95% CI)	S.E.	B (95% CI)	S.E.
decreasing very high-high (ref)	-	-	-	-	-	-
High-intermediate decreasing	-0.007 (-0.038, 0.025)	0.016	0.004 (-0.039, 0.031)	0.018	0.002 (-0.038, 0.034)	0.019
Stable intermediate	**-0.036 (0.007, 0.065)***	0.015	**0.063 (-0.094, -0.031)*****	0.016	**0.056 (-0.087, -0.025)*****	0.016
Stable-average	**-0.042 (0.014, 0.071)****	0.015	**0.041 (-0.072, -0.011)****	0.016	**0.052 (-0.082, -0.022)*****	0.015
routine-semi-routine increasing	**-0.203 (0.174, 0.231)*****	0.014	**0.124 (-0.153, -0.096)*****	0.014	**0.128 (-0.157, -0.099)*****	0.015
Birth weight	0.019 (-0.006, 0.045)	0.013	**-0.062 (-0.09, -0.033)*****	0.014	**-0.068 (-0.098, -0.039)*****	0.015
Gender	0.008 (-0.016, 0.033)	0.012	**0.043 (0.018, 0.068)*****	0.013	**-0.149 (-0.173, -0.124)*****	0.012
Parents in home	**-0.076 (-0.105, -0.046)*****	0.015	**0.071 (0.039, 0.104)*****	0.017	**0.089 (0.055, 0.123)*****	0.017
Mother age at birth	**0.083 (0.054, 0.112)*****	0.015	**-0.05 (-0.081, -0.018)****	0.016	**-0.136 (-0.167, -0.105)*****	0.016
Mixed ethnicity	0.007 (-0.018, 0.032)	0.013	0.009 (-0.023, 0.04)	0.016	-0.02 (-0.05, 0.01)	0.015
Indian	0.004 (-0.021, 0.029)	0.013	**-0.032 (-0.049, -0.015)*****	0.009	**-0.037 (-0.052, -0.022)*****	0.008
Pakistani & Bangladeshi	**-0.047 (-0.067, -0.027)*****	0.01	**0.039 (0.019, 0.059)*****	0.01	-0.005 (-0.023, 0.014)	0.01
Black British	-0.017 (-0.043, 0.009)	0.013	-0.012 (-0.043, 0.019)	0.016	-0.01 (-0.037, 0.017)	0.014
Chinese and other	-0.015 (-0.038, 0.008)	0.012	0.002 (-0.024, 0.028)	0.013	-0.012 (-0.037, 0.014)	0.013

*Note. $p < .05$ = *, $p < .01$ = **, $p < .001$ = ***. N = 10,683.*

5.5 Discussion

Using data from the millennium cohort study, this study aimed to examine whether different family income, parent education, and parent occupation trajectories could be identified and whether the trajectories had differential associations with children's language ability, internalizing behaviour, and externalizing behaviour during late childhood. The study found that six family income trajectories (Very high-decreasing, stable-high, high-decreasing, average-increasing, stable-average, and stable-low), six parent education trajectories (Stable high, stable average, stable low, no qualifications, increasing no qualification to low, and increasing low-high), and five parent occupation trajectories (Stable high, decreasing high to intermediate, stable intermediate, stable average, and increasing routine-semi-routine) fit the data best. A substantial proportion of the sample belonged to increasing or decreasing SES trajectories. For family income 7.3% of families belong to a decreasing income trajectory, 15.68% belonged to an increasing income trajectory, and 77.02% remained in a stable income trajectory. For parents' education, 12.22% belonged to an increasing education trajectory and 87.78% belonged to a stable education trajectory. For parents' occupations, 27.92% belonged to a decreasing trajectory, 17.21 % belonged to an increasing trajectory, and 64.87% remained in a stable trajectory.

In terms of the previous literature that has examined family income trajectories, the present results were as expected as studies have found several increasing and decreasing income trajectories (Dearing et al., 2001; Dohoon, 2014; Jackson et al., 2017; Kwon et al., 2022). Between three and six trajectories have been found in the literature (Kozyrskyj et al., 2010; Lee, 2014; Demment et al, 2014; Jackson et al., 2017; Kendzor et al., 2017; Comeua et al., 2018; Kwon et al., 2022) but most choose a three- or four-class model (Demmet et al., 2014; Lee, 2014). A possible reason for this study finding a higher number of trajectories than some

of the other studies is because this study examines a longer period of time. Studies that gather data over a longer period of time tend to find more trajectories than those that examine a shorter period of time (e.g., Miller & Votruba-Drzal 2017; Björkenstam et al., 2017). Another possible reason for the different number of trajectories could be due to the measurement of income. Generally, studies look at trajectories of poverty (Lee, 2014) or movements into or out of a low-income band (Demmet et al., 2014). Using categories such as poverty status inherently limits the number of trajectories to a variation of "always poor", "never poor", "leaving poverty", and "entering poverty" as additional trajectories would not make theoretical sense and would make findings more difficult to interpret (e.g., Demmet et al., 2014; Lee, 2014). However, the current study measured family income as continuous based on weekly income which is likely to vary more than poverty status since families can experience a decrease in income while not entering poverty for example. The interpretation of these additional trajectories makes sense given the way income is measured in this study.

Similarly, some studies do find six income trajectories but opt to use models with fewer trajectories because it fits the purpose of their study, even when it is not necessarily the best fitting model as per the goodness of fit indices (e.g., Demmet et al., 2014). Jung and Wickrama (2008) explain that while the goodness of fit indices should be used, they should not be the only determining factor in model selection. They stress that in addition to model fit, researchers should choose the models that make the most theoretical or empirical sense for their research questions. In the supplementary material from Demmet et als (2014) study the goodness of fit indices indicated that both a five-class and six-class model outperformed their four-class model. However, they chose to use the four-class model because the additional trajectories would unnecessarily complicate the model and would not add value to the interpretation of the results because two additional trajectories would be too similar.

However, in the current study, the six-class model was chosen as each trajectory was distinctly different as seen in figure 1 and the entropy value of 0.878. The six-class model identified the stable-high income trajectory representing 7.72% of the sample which the five-class model did not identify. Therefore, if a model with fewer classes were selected in this study, then those families would have been assigned to a trajectory that would not have best represented their income trajectories over the measured period.

Regarding family income, the results are in line with previous research in that the highest income trajectories are associated with better language and behavioural outcomes while the lowest income trajectories are associated with poorer language and behavioural outcomes (e.g., Dearing et al., 2001; Schoon et al., 2011; Zachrisson & Dearing, 2015; Björkenstam; Jackson et al., 2017; Comeau et al., 2018; Hoyt et al., 2019). However, this study extends previous studies by showing this pattern continues into late childhood. Like previous studies (e.g., Jackson et al., 2017; Hoyt et al., 2019) the increasing family income trajectory was associated with better child language ability, internalizing behaviour, and externalizing behaviour when compared to the non-increasing trajectory. This was particularly true regarding children's externalizing behaviour as the association between the increasing from average-high income trajectory and children's externalizing behaviour was not significantly different from the stable-high income trajectory showing that they were equally beneficial for children's externalizing behaviour during late childhood. It is possible that the increasing income trajectories are associated with better child outcomes as the family is increasingly able to invest more into their children's development as outlined in the family investment model. The family stress model also would suggest that an increased income would reduce the amount of financial pressure on parents which reduces parental stress and parent-child conflict and also leads to improved outcomes. Additionally, children become increasingly

aware of their economic situations as they get older and if their family's low income leads to them missing out on social activities (Hjalmarsson & Mood, 2015) and being excluded by their peers (Hills et al., 2002; Bai et al., 2021) then they can feel stress and shame (Conger et al., 2010; Walker, 2014; Hjalmarsson & Mood, 2015). The family stress model indicates that this would cause additional conflict and impaired interactions between parents and children leading to increased behavioural problems. By belonging to an increasing income trajectory it is less likely that children will experience this and they are therefore less likely to have behavioural problems. On the other hand, the decreasing from high income was associated with worse child language ability, internalizing behaviour, and externalizing behaviour when compared to the stable-high trajectory. Following the same logic as above then as income decreases then parents have fewer finances to invest in their children's development which impacts their outcomes. There is also likely to be increased financial pressure on the parents as their income decreases, particularly as the cost of raising a child increases (Twenge et al., 2003), which would result in parental stress and conflict leading to poorer child outcomes.

While these trends are similar to the literature, it should be noted that this study found that the decreasing-high income trajectory had a better association with children's language ability than the increasing average-high income trajectory. This indicates that while improving income is beneficial for children's language ability, it cannot fully compensate for experiencing high income during the earliest years of life. This is aligned with previous research which indicates that the earliest years are most important, particularly in terms of children's language (e.g., Costello et al., 2011; Gibb et al., 2012; Lai et al., 2019). However, this finding differs from Jackson et al. (2017) who found the increasing income trajectory had a better association with children's language outcomes than the decreasing trajectory. A possible reason for the different findings could be the measure of income used and therefore

what the income trajectories represent. Jackson et al (2017) measured family income using the household poverty ratio to determine the probability that a family would be poor. Their trajectories, therefore, reflected the increasing and decreasing probability that a family will be poor rather than describing the extent to which family income increased or decreased. In the current study, income was measured by weekly income which allowed the income trajectories to reflect the extent to which weekly income increased or decreased.

In terms of internalizing and externalizing behaviour, the current findings were in line with previous research (e.g., Hoyt et al., 2019). Hoyt et al (2019) found that increasing and decreasing income trajectories both had the same association with children's internalizing behaviour ($\beta = .04$) while this study found the same for the decreasing income trajectory ($\beta = .04$) and a similar association for the increasing income trajectory ($\beta = .046$). For externalizing behaviour, Hoyt et al (2019) found the increasing income trajectory was associated with better externalizing behaviour than the decreasing income trajectory which was also the case in the current study. In fact, the association between the increasing income trajectory and children's externalizing behaviour was not significantly different from the stable high-income trajectory indicating that increasing income is particularly beneficial for children's externalizing behaviour.

Regarding parent's education trajectories, the stable-high education trajectory had the best association with children's late childhood language and behavioural outcomes and the no qualification trajectory had the worst association with all outcomes which was expected since previous studies show that higher levels of parent education are associated with better child outcomes (Magnuson et al., 2009; Harding, 2015; Monaghan, 2017). Increasing parent education trajectories were also associated with better language ability, internalizing

behaviour, and externalizing behaviour. However, while increasing from no qualifications to low education had a better association with children's language and behavioural outcomes when compared to their peers that did not improve, the improvement was not significant. On the other hand, increasing from low-to-high education had a significantly better association with all child outcomes when compared to their peers that did not improve their education.

While this study is in line with the majority of previous studies that have shown increased parent education improves children's language and behavioural outcomes (e.g., Magnuson et al., 2009; Harding, 2015; Monaghan, 2017; Awada & Shelleby, 2021), some studies have shown that increased parent education was not associated with improved externalizing behaviour (Magnuson, 2003; Harding, 2015). A possible reason for the different findings could be the limited timeframe examined in those studies as they are limited to early childhood (Magnuson, 2003; Harding, 2015). It has been suggested that examining education increases during short periods of time may not show improved child outcomes because it takes time for improved education to filter into changes in children's environment to benefit the child (Awada & Shelleby, 2021) and therefore a longer timeframe should be examined. A further reason for the different findings could be the way in which increased education is defined. Previous studies have defined increased education as enrolment in an education program even though the parents have not necessarily completed the course (Magnuson, 2003; Magnuson et al., 2009). This is problematic as it does not reflect parents' educational attainment and assumes all parents would complete the program.

Further studies that have defined educational increases as the successful completion of a program of study tend to group parents into an increasing category without differentiating between levels of educational increase (e.g., Magnuson et al., 2009; Harding, 2015; Awada &

Shelleby, 2021). Awada and Shelleby (2021), for example, categorised parents into the increasing education group if their current level of education was higher than their baseline level of education. Similarly, Magnuson et al (2009) used a dichotomous variable to indicate whether or not parents' education increased, despite parents reporting different levels of education increase. While both Awada and Shelleby (2021) and Magnuson et al. (2009) found that increasing education had a better association with children's outcomes, they do not provide any indication about what level of education increase significantly improves children's outcomes. The current study addressed the above limitations by examining different education trajectories based on parents' attainment over 14 years and identified different increasing trajectories. Results indicate that increasing to a low level of education is not likely to significantly improve children's outcomes and suggest that parents must achieve a certain level of education to significantly improve their children's outcomes.

Regarding parents' occupation trajectories, the results found very little variation over the childhood timeline. The results largely reinforce previous research in that the higher the occupation trajectory the better the association with children's language ability and behavioural outcomes. Although an increasing trajectory was found, it only increased from routine to semi-routine occupation and there was no stable routine trajectory to compare with. Therefore, it cannot be determined whether increasing occupation is associated with better child language and behavioural outcomes in the current sample. The decreasing high-intermediate occupation trajectory showed no difference when compared to the stable-high trajectory. However, since the stable-intermediate trajectory had significantly poorer associations with children's outcomes compared to the decreasing from high-intermediate trajectory, it suggests that high occupation during early childhood could be a protective factor for children's outcomes. Since there was no difference between the stable-high occupation

trajectory and the decreasing from high- intermediate trajectory, future research may benefit from using the more efficient four-class model which combines both trajectories.

5.5.1 Limitations of the study

The limitations of this study should be considered when interpreting the results. The family income, parent education, and parent occupation trajectories were identified using latent class growth analysis which requires researchers to select the appropriate number of latent classes at their discretion. While goodness of fit indices are used to guide researchers to the best fitting model, they do not dictate the final model selection. Researchers must consider the research question, theory, and the data alongside the goodness to fit indices when selecting the appropriate model (Jung & Wickrama, 2008). This is inherently problematic as researchers may draw different conclusions when deciding on the best model to use for their studies. Still, since the family income trajectories found in the study are similar to those found in previous studies, it provides confidence that researchers are following similar methods when selecting trajectories. However, there is no frame of reference to draw upon regarding education and occupation trajectories and this should be considered when drawing conclusions.

Second, the highest household level of parent education and occupation was measured at each time point and used to generate trajectories. This method does not provide information about which parent has the highest education and occupation at each time point or whether the parent with the highest level of education changed over time. While both maternal and paternal education and occupation have significant associations with children's developmental outcomes (Erola et al., 2016; Jeong et al., 2017), some studies indicate that maternal education is more important (Jeong et al., 2017). On the other hand, evidence

indicates that maternal education is most important for children's outcomes during early childhood and decreases over time while the association between fathers' education and children's outcomes increases over time (Erola et al., 2016). However, since both maternal and paternal education and occupation are significantly associated with children's development, measuring the highest level of household education and occupation was appropriate for this study. Attrition in the millennium cohort study was more likely to occur in low-income families (Plewis, 2007). This could potentially lead to a biased sample resulting in the SES trajectories and outcome trajectories identified in this study being less likely to represent lower income families. However, the sample design of the millennium cohort study meant that deprived families were oversampled, and attrition weights were generated and applied to account for potential bias.

5.5.2 Implications of the study

First, despite comprehensive income support for low-income families during early childhood, greater prolonged income support to improve family income over middle and late childhood is likely to be beneficial for children's language ability and behavioural outcomes. Although policy prioritises low-income families, improving income for higher earners over early to late childhood is also likely to improve children's developmental outcomes. Prolonged support is particularly important as this study found that a decrease in income can negatively impact children's outcomes. It may therefore be beneficial to consider extending the age limit for some age-related policies such as the Child Payment in Scotland otherwise the decrease in family income is likely to impair children's outcomes. Second, policy aimed at improving parents' level of education is likely to somewhat improve children's language ability and behavioural outcomes in late childhood. To achieve improvementments in children's outcomes parents should be supported to improve their education. Further research is needed

to determine the extent to which parents' education needs to be improved to significantly benefit children's outcomes as this study was only able to examine the effect of increasing to NVQ 1 level education and NVQ 4 level education. Further research may indicate that parents who achieve NVQ level 2 or NVQ level 3 qualifications significantly benefit children's outcomes. This would be easier for policy to facilitate and would cost the parents less time and money to achieve.

To conclude, this study adds to current SES trajectory literature by examining whether income, education, and occupation trajectories over the entire childhood timeline are associated with children's language ability and behavioural outcomes. It presents novel findings by examining education and occupation trajectories that have not previously been studied and examines a longer timeframe than previous literature. It highlights the potential usefulness of the findings for policy given that the SES dimensions and the child outcomes are currently of interest to policymakers.

5.6 Summary

This chapter examined whether different dimensions of family SES had unique trajectories and whether the SES trajectories were associated with children's language ability, internalizing behaviour, and externalizing behaviour and discussed the implications of the findings. In the next chapter, this study will be expanded by examining whether SES trajectories are associated with children's developmental trajectories.

Chapter 6 – Associations between family SES trajectories and children's language, internalizing, and externalizing trajectories

6.1 Aim of this chapter

This chapter aims to build upon the findings of chapter 5 by examining whether children have different developmental outcome trajectories and whether the likelihood of belonging to outcome trajectories varies by their family socioeconomic status (SES) trajectories. An introduction and a brief overview of the literature are presented followed by the methodology used to conduct this study. The findings are then presented, and their implications are discussed.

6.2 Introduction

Associations between SES and children's language ability, internalizing behaviour, and externalizing behaviour are well documented (Sirin, 2005; Letourneau et al., 2011; Cooper & Stewart, 2013; 2017), however recent research has become increasingly interested in the associations between different dynamics of SES and children's outcomes (Chen et al., 2007; Peres et al., 2007; Séguin et al., 2012; Björkenstam et al., 2016; Boe et al., 2016; Mok et al., 2018). A small body of literature has shown that different family income trajectories are differentially associated with children's language and behaviour outcomes (Dohoon, 2014; Jackson et al., 2017; Zachrisson and Dearing, 2015; Comeau et al., 2018; Hoyt et al., 2019). Chapter 5 expanded this literature by showing that trajectories of family income, parents' level of education, and parents' level of occupation from birth to late childhood are each associated with children's late childhood language ability, internalizing behaviour and externalizing behaviour.

However, like SES dimensions, children's developmental outcomes are not static constructs and can also change over childhood forming their own trajectories (Elder, 2003). This can be seen in the child developmental literature that has identified several language ability and behavioural trajectories (Miller & Votruba-Drzal, 2016; Mangin et al., 2017; Yaari et al., 2018; Comeau, 2018; Gutman et al, 2019). Evidence indicates that these different language and behavioural trajectories are associated with children's future health, educational attainment, economic outcomes, cognitive functioning, and socioemotional functioning later in life (Reef et al., 2011; McKean et al., 2017; Bevilacqua et al, 2018; Zhu et al., 2019; Oerlemans et al., 2020; Jin et al., 2020; Ramírez-Luzuriaga et al., 2020; Casanova et al., 2021). Despite evidence of different family SES trajectories, and children's different developmental trajectories, no studies have examined whether the SES trajectories are differentially associated with children's language and behaviour trajectories. Since language and behavioural trajectories have long-lasting effects extending into adolescence and adulthood, it is important to understand whether membership to different SES trajectories is associated with children's membership to language and behaviour trajectories.

The previous trajectory literature examining the relationship between SES and children's language ability and behavioural outcomes takes one of two forms. First, as chapter 5 discussed, research has examined the relationship between SES trajectories and children's later life language and behaviour outcomes measured by a static outcome measure at a single time point (e.g., Kendzor et al., 2012; Zachrisson & Dearing, 2015; Jackson et al., 2017; Björkenstam et al., 2017; Miller & Votruba-Drzal, 2017). While this provides information about which SES trajectories are associated with better or worse outcomes, it does not differentiate between the nature of the outcome trajectories. This means that it is unclear

whether different SES trajectories are associated with stable, improved, or worsening outcome trajectories. Second, research has examined the associations between SES measured as a static construct at one time point and children's membership to outcome trajectories (Ukoumunne et al., 2012; Flouri & Sarmadi, 2015; Armstrong et al.,2017; Flouri & Midouhas, 2017; Miller & Votruba-Drzal, 2017; Hentges et al., 2019). Membership to different language development trajectories, for example, has been associated with static SES measures that were measured during earlier childhood (Ukoumunne et al., 2011; McKean et al, 2015; Armstrong et al., 2017; McKean et al, 2017; Hentges et al., 2019). Static measures of SES are also associated with membership to different internalizing and externalizing behaviour trajectories (Leve et al, 2005; Silver et al., 2005; Fanti & Henrich, 2010; Flouri & Sarmadi, 2015; Gutman et al, 2019; Lansford et al., 2019). This research shows that higher levels of SES are associated with better outcome trajectories but does not indicate whether children from different family SES trajectories are more likely to be in better or worse outcome trajectories.

Policy aims to reduce the inequality gaps in children's language and behaviour outcomes (The Childcare Act, 2006; The Education (Scotland) Act, 2016) by improving family income, education, and occupation (The Welfare Reform and Work Act, 2016). Examining the associations between family SES trajectories and children's outcome trajectories would allow policy makers to see whether policies increasing family SES increase the likelihood of children belonging to better outcome trajectories. Therefore, this study will address this gap in the literature by examining whether children's likelihood of belonging to different language ability, internalizing behaviour, and externalizing behaviour trajectories differs depending on their family income, parent education, and parent occupation trajectories.

6.2.1 Theoretical framework for understanding the role of family SES trajectories in children's developmental trajectories

Bioecological systems theory explains that child development takes place due to complex bidirectional interactions between children and their proximal and distal environments (Bronfenbrenner, 1986). Interactions in proximal environments (e.g., the family and home) are more influential for children's development because they are exposed to them most frequently (Bronfenbrenner, 1979; 1999; 2006). Family SES is associated with children's development because it can determine the nature of the environments that children interact with via several pathways (Conger et al., 2010). The pathways through which this process occurs are outlined by the family stress and investment models (Conger et al., 2010; Conger & Donnellan, 2007). *Family stress model* proposes that SES is associated with children's development because economic pressure leads to parental stress which causes increased conflict between parents, poor parenting practices, and poorer parent-child interactions. Evidence indicates each of these impaired pathways lead to poorer developmental outcomes (Kiernan & Manesh, 2009; 2011; Avan et al., 2010; Micklewright et al., 2012; Azzi-Lessing, 2013; Shelleby et al., 2014; Sun et al., 2015; Neppl et al., 2016; Sosu & Schmidt 2017; Ahun et al., 2017). *Family investment model* states that SES is associated with children's development because it determines parents' ability to invest in the resources required for good child development (e.g., nutritious food, educational materials and activities, safe environment) (Conger & Donnellan, 2007). Low-SES families are less able to invest as much in their children's development while high-SES families can invest more. Research indicates the more families invest in their children the better their language ability and behavioural outcomes are (Kalil, et al., 2012; Sohr-Preston et al., 2013; Prevoo et al., 2014; Sosu &

Schmidt, 2017; Longo et al., 2017; Jeong et al., 2017; Vasilyava et al., 2018; Fomby & Musick, 2018).

Life course theory explains that people belong to several different trajectories simultaneously across different domains other (e.g., family SES trajectories and children's developmental trajectories) which can be independent or associated with each (Elder, 1974; Elder, 2003). Family SES, children's language ability, and behaviour are not static constructs and can remain stable or continuously move up or down forming trajectories from birth to death (Elder, 2003). Life course accumulation of risk and social mobility models offer hypotheses about the relationship between family SES trajectories and children's developmental trajectories. Social mobility models hypothesise that the stable, upward, and downward trajectories will be mirrored in children's developmental trajectories such that children with upward SES trajectories are more likely to belong to better developmental trajectories, while children with downward SES trajectories are more likely to belong to worse developmental trajectories (Duncan, 1988; Lynch et al., 1994). The accumulation of risk models hypothesise that the longer children remain in a low SES trajectory, the more likely children will belong to poorer developmental trajectories because continued exposure to low SES produces a cumulative adverse effect (Kuh et al., 2003). The stress and investment models explain why the life course hypotheses are likely to be correct as the SES trajectories will reflect the longitudinal exposure to family stress and investment pathways. Parents from increasing SES trajectories will likely experience decreasing stress and have improved interactions with their children making it more likely that children will belong to positive outcome trajectories. Following the investment model, it is more likely that children will belong to positive outcome trajectories if they also belong to a high or increasing SES trajectory because their parents will be more able to invest in their children's development.

6.2.2 Evidence of SES associations with children's developmental outcome trajectories

There is a growing body of literature examining children's developmental outcome trajectories. Studies examining children's language ability trajectories have identified between three and five trajectories (Landa et al., 2012; Ukoumunne et al., 2012; Brian et al., 2014; Song et al., 2015; Longard et al., 2017; McKean et al., 2017; Nguyen et al., 2018; Hentges et al., 2019; Jin et al., 2020; Riva et al., 2021). Studies normally find a variant of low-decreasing, stable low, stable mid, high-decreasing, and stable high language trajectories (Nguyen et al., 2018). Researchers have also identified between three and six internalizing behaviour trajectories, with most presenting a variant of stable low, stable high, increasing, and decreasing (Melchior et al., 2014; Korhonen et al., 2014; Hauser-Cram & Woodman; 2016; Miller and Votruba-Drzal, 2017; Gutman & McMaster, 2020; Kuang & Flouri, 2020; Tamura et al., 2020). Between three and five externalizing behaviour trajectories have identified and typically present a variant of stable low, stable high, stable mid, increasing, and decreasing trajectories in children (Thompson et al., 2011; Hauser-Cram & Woodman, 2016; Kjeldsen et al., 2016; Lee et al., 2016; Miller and Votruba-Drzal 2017; Gerstein et al., 2017; Olsen et al., 2017; Figge, 2018; Min et al., 2018; Perry et al., 2018; Gutman, 2019; Tamura et al., 2020).

Evidence shows that family SES dimensions are associated with children's developmental trajectories. Low family income is associated with children's membership to lower language trajectories than their higher income peers (McKean et al., 2017; Hentges et al., 2019). Children are also twice as likely to belong to a worsening language ability trajectory if their family is poor compared to their non-poor peers (Armstrong et al.,2017). Research has also

found that children are more likely to belong to low or decreasing language ability trajectories if their parents have low levels of education (Ukoumunne et al., 2012; Armstrong et al.,2017; Hentges et al., 2019) or spent less time in education (McKean et al., 2017). Regarding children's internalizing and externalizing behaviour trajectories, evidence shows that children from low income and deprived families are most likely to belong to the highest behavioural problem trajectories compared to their more affluent peers (Flouri & Sarmadi, 2015). Children who belong to poor families are more likely to belong to problematic behaviour trajectories than their non-poor peers (Flouri & Midouhas, 2017; Comeau, 2018) and those that experience intermittent poverty are most likely to belong to the middle internalizing and externalizing problem trajectory between highest and lowest behaviour trajectories (Comeau & Boyle, 2018). When families experience income loss or job loss, children are more likely to belong to a high problem or worsening behaviour trajectory (Flouri & Midouhas, 2017; Miller & Votruba-Drzal, 2017).

The above studies use static measures of SES from a single time point to examine their associations with children's developmental trajectories. Since SES is not static and has its own trajectories as found in chapter 5 (study 2) and previous literature (Miller & Votruba-Drzal 2017; Björkenstam et al., 2017; Hoyt et al., 2019), it raises the question of whether different SES trajectories are associated with children's different outcome trajectories. Addressing this question will provide useful information in terms of policy about whether short or long-term intervention and support increases children's chances of belonging to positive language and behavioural trajectories. If, for example, membership to the best outcome trajectories is most likely for stable high-income families, then it is unlikely that short term income support policies will help reduce the developmental inequality gap, but longer-term support increasing SES trajectories may be beneficial. The previous studies

generally examine children's outcome trajectories during limited timeframes from early childhood (Landa et al., 2012; Ukoumunne et al., 2012; Brian et al., 2014; Song et al., 2015; Longard et al., 2017; Hentges et al., 2019), early to middle childhood (Flouri & Sarmadi, 2015; McKean et al., 2017; Armstrong et al., 2017; Flouri & Midouhas, 2017), or middle childhood to late childhood (e.g., Miller & Votruba-Drzal, 2017; Comeau & Boyle, 2018). Using short timeframes to generate trajectories is a limitation as it incorporates less data and may miss key stages of childhood. For instance, trajectories formed between middle and late childhood neglect early childhood which is a sensitive period (Kuh et al., 2003; Miller & Votruba-Drzal 2017). It would therefore be unknown whether children's outcomes improved, worsened, or were stable over throughout childhood. The more data that is included in the analysis, the more accurate the trajectories will be (Cavanagh et al., 2016; Miller & Votruba-Drzal 2017; Björkenstam et al., 2017; Oshio et al., 2018).

6.2.3 The current study

This study aims to address the above gaps in existing SES trajectory literature by examining which language ability, internalizing behaviour, and externalizing behaviour trajectories children are most likely to belong to based on their family income, parent education, and parent occupation trajectories. Since chapter 5 found different income, education, and occupation trajectories had associations with children's language and behavioural outcomes, it is likely that those SES trajectories will also be associated with children's membership to language and behavioural trajectories (Elder, 2003). This will provide evidence about whether long-term support for improving family income, education, or occupation is likely to benefit children's developmental trajectories. This study will also use data from early through late childhood to form language and behaviour trajectories. This will allow policymakers to determine the impact of their SES policy decisions over a longer timeframe than is currently

available in the literature for language and behavioural outcomes. To achieve these aims the following research questions will be addressed:

1. To what extent do children belong to different developmental (language, internalizing and externalizing behaviour) trajectories?

2. To what extent does the likelihood of belonging to different developmental (language ability, internalizing and externalizing behaviour) trajectories differ by family SES trajectory (stable, increasing, or decreasing SES)?

6.3 Methodology

6.3.1 Sample

The data used in this study comes from the first six waves of the Millennium Cohort Study (MCS). The MCS is a longitudinal national cohort study in the UK that follows the lives of 18851 families with a child that was born in the UK between 2001 and 2002 when children were 9 months old (Fitzsimons, 2017). The data were collected when children were aged, 9 months, 3, 5, 7, 11, and 14 years old and the productive samples at each wave were 18,551, 15,590, 15,246, 13,857, 13,287, and 11,726 families (Ketende 2010; Mostafa, 2014; Fitzsimons, 2020). The sample was obtained from 398 electoral wards across the UK and families from disadvantaged and ethnic minority electoral wards were oversampled to ensure that adequate sample sizes for each stratum could be achieved while accounting for attrition (Plewis, 2007; Ipsos MORI, 2017). As discussed in chapter 3, the productive sample from wave 6 (N = 11,726) was used in this study to ensure that all families included had longitudinal weights assigned to them which were used to account for attrition. 947 cases were removed for having no valid information for any of the variables of interest at any data

collection wave and a further 96 cases were identified as having extreme outlier values. This process left a final analytic sample of 10,683 families. To account for panel attrition the non-response weights provided in the MCS were applied (Plewis, 2007; Mostafa, 2014) and missing data were handled using Full Information Maximum Likelihood estimation (Muthén & Muthén, 2017).

6.3.2 Measures

The dependent variables in this study were children's language ability, internalizing behaviour, and externalizing behaviour. Data on the dependent variables were obtained when children were three (MCS 2), five (MCS 3), seven (MCS 4), eleven (MCS 5), and fourteen (MCS 6) years old. The independent variables were family SES (i.e., family income, maternal education, and maternal occupation). The covariates used were age, gender, ethnicity, birth weight, single or dual parent household. Data on the independent variables and covariates apart from birth weight were available at all six data collection waves when children were 9 months old (MCS1), three (MCS 2), five (MCS 3), seven (MCS 4), eleven (MCS 5), and fourteen (MCS 6) years old. Birth weight was recorded at wave 1.

6.3.3 Language Ability

Children's language ability was measured by testing their vocabulary knowledge when they were 3, 5, 7, 11, and 14 years old (Moulton et al., 2020; McElroy et al 2021). Different measures were used to measure language ability as the children got older. At ages 3, 5, 7, and 11, British Ability Scale (BAS) subscales are used to measure language ability and at age 14 Applied Psychology Unit (APU) Vocabulary Test (Closs, 1976) was used. To allow meaningful comparison across all of the different language measures children's scores were standardised (e.g., Pereyra-Elias et al., 2022). For each British Ability Scale subscale (at 3, 5,

7, and 11 years old) age-adjusted standardised T-scores are used to account for children's different ages when the tests were administered. Standardised T-scores were used at age 14 but were not age-adjusted as the Applied Psychology Unit Vocabulary test was a self-completion test conducted online when children were the same age. The following section provides a description of each language ability measure at age 3, 5, 7, 11, and 14.

6.3.4 Age 3 (MCS2) language ability

The BAS Naming Vocabulary subscale was used to measure children's language ability when they were 3 years old. The Naming Vocabulary subscale comprised 36 pictures of objects that children were asked to identify and name when shown. The pictures were numbered 1 through 36 with 1 being the easiest and 36 being the most difficult. Children were presented with a first tranche of 16 pictures and were only asked to go further if they made fewer than 3 mistakes. If the children progressed to the second tranche, then they saw items 17 through 30. If they made fewer than 3 mistakes, they were then presented with the third tranche containing items 31-36. The precise starting point for each child was dependent on their age and ability which meant that they were not presented with items too easy or difficult for them in order to protect their self-esteem and avoid frustration. This means that children's raw scores (summing the total correct responses) were not comparable. As a result, the raw scores were adjusted for item difficulty and age. Children scored a minimum of 0 and a maximum of 30 correct answers to the naming vocabulary test with a mean of 16.62 (SD=4.811). The MCS uses this data to generate T-scores for researchers to use. Previous analyses have found the measure to be reliable (alpha = .81; Elliott, 1997).

6.3.5 Age 5 (MCS3) language ability

The BAS Naming Vocabulary subscale was used again to measure language ability children were 5 years old, so the procedure was the same as above when children were age 3. Children scored a minimum of 0 and a maximum of 25 correct answers to the naming vocabulary test with a mean of 14.14 (SD=3.826).

6.3.6 Age 7 (MCS4) language ability

The BAS Word Reading subscale was used to measure children's language ability when they were 7 years old. The BAS word reading subscale assesses children's reading vocabulary knowledge between the ages of 5 and 17 years and 11 months, so was suitable for the current study when children were 7 years old. The child is presented with a series of words on a card. There is a total of 90 words divided into 9 blocks of 10 words. Each block of words increased in difficulty as the child progressed through blocks 1 to 10. Children were asked to read each word aloud with the correct pronunciation. The number of blocks the child was asked to attempt was dependent on their performance in the previous block (e.g., if the child struggled with their current block, they would not be asked to attempt the next more difficult block. Example words from the easiest block of words (block 1) are "box", "fish", and "jump" and from the most difficult block (block 10) "catastrophe", "regurgitate", and "archaic". Children's raw scores on the word reading task were calculated by summing the total number of correct responses ranging from 0-90 with a mean score of 44.4 (SD19.278). This scale has been shown to have good reliability in previous studies (Stuart, 1999; Hatcher, Hulme & Ellis, 1994).

6.3.7 Age 11 (MCS5) language ability

The BAS Word Similarities subscale assesses children's verbal vocabulary knowledge at age 11. There are a total of 21 items with each item containing 3 words that shared a common theme. The task was that upon hearing the 3 words, the child would be asked to provide a 4th word that matched the theme and then state what the theme was. For example, the interviewer would say "apple, orange, banana" and the child could say "strawberry" as the 4th item and "fruit" as the theme. Children only score one point if they provide both the correct word and the correct theme. Therefore, children could get a maximum of 21 points. The data show that the raw scores range from 0- 20 with a mean of 8.69 (SD=3.637).

6.3.8 Age 14 (MCS6) language ability

The Applied Psychology Unit Standardised Vocabulary Test was used to assess children's verbal vocabulary knowledge at age 14. The vocabulary test is designed to measure respondents understanding and meaning of words and is suitable for those aged 14 and over. The word activity involved presenting respondents with a list of 20 target words. For each target word, 5 additional words were presented. Children were asked to identify which of the 5 additional words had the same meaning as the target word. The words used were subsets of those used in the vocabulary test from the 1970 British Cohort Study which were originally from the standardised vocabulary test designed by the Applied Psychology Unit at the University of Edinburgh in 1976. Children were given 1 point for each correct answer and total scores were a sum of all correct answers meaning 20 was the maximum score. In the current sample, the scores ranged from 0-19 with a mean of 7.09 (SD= 2.625). Previous analyses have found the measure to be reliable (alpha = .83 - .95; Levy & Goldstein, 1984).

Previous studies using the abovementioned measures of language ability have found small to moderate correlations (r = .2 - .56) indicating a small to moderate degree of association

between the measures which provides confidence that the different measures are recording the same underlying construct (Girard et al., 2017; Hernández-Alava & Popli 2017; Forrest et al 2018; Toseeb & St Clair 2020; Kromydas et al.,2022; Pereyra-Elias et al., 2022). The correlation between the APU vocabulary test and the BAS naming vocabulary test is similar to the correlations observed between the BAS subscales at r = .36 (Hill, 2005; Girard et al., 2017; Sullivan et al., (2017). Correlations were run between the measures to ensure that the data used in this thesis had similar correlations with the literature. This was found to be the case as correlations ranged between .247 and .496 which is within the expected range (see table 6.1).

Table 6.1. Correlations between language ability measures at all data collection points

	Age 3 BAS Naming Vocabulary	Age 5 BAS Naming Vocabulary	Age 7 word reading task	Age 11 word similarities task	Age 14 vocabulary test
Age 3 BAS Naming Vocabulary	-				
Age 5 BAS Naming Vocabulary	.496***	-			
Age 7 word reading task	.278***	.386***	-		
Age 11 word similarities task	.271***	.378***	.358***	-	
Age 14 vocabulary test	.247***	.317***	.410***	.354***	-
N	10683	10683	10683	10683	10683
M	49.971	49.894	49.767	49.431	49.248
SD	9.766	9.840	9.841	9.536	9.831

*Note. Standardised T-scores used to generate these statistics. *** = p <.001.*

6.3.9 Internalizing and externalizing behaviour

The Strength and Difficulties Questionnaire (SDQ; Goodman, 1997) was used to measure children's internalising and externalizing behaviours at ages 3, 5, 7, 11, and 14 years old and was completed by the parents. The SDQ contains 25 items measuring five dimensions of behavioural development in children aged between 3 and 16. The five dimensions are

emotion symptoms, conduct problems, hyperactivity, peer problems, and pro-social behaviour. Each item in the subscales is answered on a 3-point scale ("not true" = 0, "somewhat true" = 1, "certainly true" = 2). Total score on each subscale can range from 0-10. Goodman provides information and syntax for scoring the SDQ and deriving internalizing and externalizing behaviour scales on his website (Goodman: SDQ Info, 2023).

The internalizing behaviour scale is derived by summing the items from the emotional subscale ("*often complains of headaches, stomach aches or sickness*", "*many worries, often seems worried*", "*often unhappy, down-hearted or tearful*", "*nervous or clingy in new situations, easily loses confidence*", and "*many fears, easily scared*") and the peer problems subscale ("*rather solitary, tends to play alone*", "*has at least one good friend*", "*generally liked by other children*", "*picked on or bullied by other children*", and "*gets on better with adults than with other children*"). Normal internalizing scores range from 0-4, borderline problems scores range from 5-7, and abnormal scores range from 8-20 (Maurice-Stam et al., 2018). The externalizing behaviour scale is derived by summing the items from the hyperactivity subscale ("*restless, overactive, cannot stay still for long*", "*constantly fidgeting or squirming*", "*thinks things out before acting*", "*sees tasks through to the end, good attention span*", and "*easily distracted, concentration wanders*") and the conduct problems subscale ("*often has temper tantrums or hot tempers*", "*generally obedient, does what adults request*", "*often fights with other children or bullies them*", "*can be spiteful to others*", and "*often argumentative with adults"*). Normal externalizing scores range from 0-5, borderline scores range from 6-8, and abnormal scores range from 9-20 (Maurice-Stam et al 2018). The two-factor model (internalizing and externalizing behaviour) has been shown to have good model fit (CFI = .94; TLI = .94) (Sosu &Schmidt, 2017). There is good reliability for both the internalizing behaviour scale with α ranging from .73 - .82, and the externalizing behaviour

scale with α ranging from .78 - .83 (Palmieri & Smith 2007; Goodman et al., 2010; Hessel, et al., 2017). The convergent and discriminant validity of the internalizing and externalizing model has been found to be good (e.g., Goodman et al., 2010; Croft et al., 2015; Kersten et al., 2016) and the measurement invariance has shown good model fit (Sosu & Schmidt, 2017) indicating that the SDQ measures the intended constructs over time.

6.3.10 Measures of socio-economic status

Information on *family household income* was measured using net equivalised weekly income gathered at every data collection wave during the face-to-face interviews by asking respondents to state their take-home income. The average income and standard deviations are presented in table 6.2 below. Parents' *level of education* was measured at each time point by asking parents to indicate their highest level of academic or vocational education which was mapped onto the National Vocational Qualification (NVQ). The NVQ ranges from NVQ 1 (lowest level of qualification) – NVQ 5 (highest level of qualification). Parents' *occupational class* was measured at every data collection wave by asking parents to indicate their occupation which was mapped onto the 7-class National Statistics Socio-economic Classification (NS-SEC). The NS-SEC ranges from 1 (routine occupations) to 7 (higher managerial and professional occupations). Table 6.3 below shows the percentage of parents in each education and occupation category during early, middle, and late childhood.

6.3.11 Covariates

Several covariates were identified in the literature as being associated with family SES and children's outcomes so were included in the analyses. *Mother's age at birth* (Knipe 2016) was measured by asking mothers to state their age in years when they gave birth. The *number of parents living in the household* (Flouri et al., 2016) was specified by the main respondent

during the interview when asked whether they lived in a one or two-parent household. *Ethnicity* (Sullivan et al., 2021) is measured by asking the main respondent to indicate the child's ethnicity during the interviews. *Gender* (Mous et al., 2017) was measured by asking the main respondent to specify whether the child was male or female. Children's *birth weight* (Bromley, 2009) was measured by asking the main respondent for information during the interview. Table 4.3 below presents the descriptive statistics of each covariate.

6.3.12 Analytic strategy

The same family income, parent education, and parent occupation trajectories that were identified in study 2 were used in this study. Further latent class growth analysis (LCGA) models were used to examine whether different trajectories of language ability, internalizing behaviour, and externalizing behaviour could be found in the sample. This was done by using the language ability, internalizing behaviour, and externalizing behaviour data from all 6 data collection waves in the MCS (when children were 9 months, 3, 5, 7, 11, and 14 years old). A two-class model was run first so that each progressive model can be assessed to check if it offers a better fit over the previous model (Jung & Wickrama, 2008).

To determine how many trajectories there were for each SES dimension best fit the data, several goodness of fit indices were used (Jung & Wickrama, 2008; Maydeu-Olivares & Garcı́a-Forero, 2010). Akaike's information criterion (AIC; Akaike, 1974) and Bayesian information criterion (BIC; Schwarz, 1978) both assesses model fit based on the likelihood estimates within given parameters (Burnham & Anderson 2002). The AIC and BIC estimates reward a model for being simple and fitting the data well (Burnham & Anderson 2002; Nylund et al., 2007). The better a model fits the data the more it is rewarded but as the model becomes more complex with additional parameters the more it is penalised in the estimates

(Burnham & Anderson 2002). Lower AIC and BIC scores indicate better model fit. Entropy was assessed to determine the extent to which latent classes are 'separate' from each other (Weiss & Dardick, 2016). Entropy values range from 0-1 and the closer entropy is to 1 the more the model distinguishes between different classes. Entropy values >.8 indicate that individuals are assigned to different groups with a good level of accuracy (Celeux & Soromenho, 1996). Posterior probability values range from 0-1 and represent the accuracy of latent group classification with values closer to 1 indicating greater accuracy (Geiser, 2013). Likelihood ratio and bootstrapped likelihood ratio tests were assessed to determine whether the current model is a better fit than a model with one less class (Lo, Mendell, & Rubin, 2001; McLachlan & Peel, 2000). In both cases, if the *p*-value is significant (<.05) then it means that the current model is a significantly better fit than the previous model with one less class.

After the best fitting models for children's language ability, internalizing behaviour, and externalizing behaviour were determined using the above criteria, latent class probabilities were generated for each family and exported and merged with the income, education, and occupation probabilities from study 2. A series of multinomial logistic regressions were run to generate the predicted probabilities which were used to determine the likelihood of children belonging to language and behavioural trajectories based on their membership to SES trajectories. The predicted probabilities were plotted on graphs to improve the interpretability of the results.

6.4 Results

6.4.1 Descriptive statistics

Table 6.2 below presents the descriptive statistics of the analytic sample. Suggested cut-off points for internalizing behaviour are 0-4 for normal scores, 5-7 for borderline problems, and 8-20 for abnormal scores (Maurice-Stam et al., 2018). As seen in table 6.2 below, the majority of children fall within the normal range across childhood. Suggested cut-off points for externalizing behaviour are 0-5 for normal scores, 8-6 for borderline problems, and 9-20 for abnormal scores (Maurice-Stam et al 2018). Table 6.2 shows that children on average reduced from borderline externalizing behaviour problems to a normal range as they got older. This represents a decrease from borderline problematic scores to normal scores. Average family income continued to increase over time and the average level of education increased from A levels/ Highers to teaching qualification/degree. Little change was seen with parents' level of occupation which remained in the same category on average (small employers/own account workers). Table 6.3 below shows the percentage of parents in each education and occupation category during early, middle, and late childhood.

Table 6.2. Descriptive statistics of all variables in the analyses (n = 10683)

	M	SD	%	Range
Language ability				
3 years	50.418	9.812	-	20 - 80
5 years	50.544	9.525	-	20 - 80
7 years	50.523	9.840	-	20 - 80
11 years	50.412	9.662	-	20 - 80
14 years	50.022	10	-	20 - 80
Internalizing behaviour			-	
3 years	2.824	2.450	-	0 – 16
5 years	2.445	2.444	-	0 – 18
7 years	2.64	2.686	-	0 – 18
11 years	3.082	3.010	-	0 – 19
14 years	3.711	3.346	-	0 – 19
Externalizing behaviour				
3 years	6.549	4.021	-	0 – 20
5 years	4.614	3.333	-	0 – 20
7 years	4.551	3.484	-	0 – 19
11 years	4.294	3.436	-	0 – 19
14 years	4.323	3.506	-	0 - 19
Family income				
9 months	317.52	204.61	-	14.45 - 1282.61
3 years	343.89	223.37	-	14.39 - 1362.46
5 years	364.98	222.88	-	17.09 - 1282.94
7 years	398.86	232.38	-	14.93 - 1282.54

11 years	418.07	178.66	-	65.85 - 1162.80
14 years	417.44	178.07	-	80.02 - 1153.52
Parent's level of education				
9 months	2.884	1.403	-	0 - 5
3 years	2.929	1.406	-	0 - 5
5 years	2.909	1.4	-	0 - 5
7 years	3.041	1.387	-	0 - 5
11 years	3.181	1.388	-	0 - 5
14 years	3.263	1.4	-	0 - 5
Parent's level of occupation				
9 months	4.639	1.975	-	1-7
3 years	4.614	1.945	-	1-7
5 years	4,577	1.941	-	1-7
7 years	4.517	1.94	-	1-7
11 years	4.423	1.916	-	1-7
14 years	4.378	1.913	-	1-7
Mother's age at birth	29.11	5.751	-	14-51
Birth weight (lbs)	7.41	.586	-	.86 - 14.44
Parents in household				
Two parents			87.5	
One parent			12.5	
Gender				
Male			51.9	
Female			48.1	
Ethnicity				

White	86.41
Mixed	0.09
Indian	2.5
Pakistani & Bangladeshi	6.5
Black British	2.8
Chinese/ other	1.7

Table 6.3. Parent's level of education and occupation at each time point (N=10,683)

Child age	Parent's level of education	%	Parent's level of occupation	%
3 Years				
	NVQ1	**5.9**	Routine	**3.6**
	NVQ2	**25.2**	Semi routine	**18.7**
	NVQ3	**17.5**	Lower supervisory	**13.7**
	NVQ4	**42**	Small employers	**11.6**
	NVQ5	**9.4**	Intermediate occupations	**9.2**
			Lower managerial and professional	**22.9**
			higher managerial and professional	**20.4**
7 Years				
	NVQ1	**4.8**	Routine	**4.1**
	NVQ2	**23**	Semi routine	**20.3**
	NVQ3	**17.3**	Lower supervisory	**14**
	NVQ4	**41.7**	Small employers	**12.2**
	NVQ5	**13.2**	Intermediate occupations	**8.8**
			Lower managerial and professional	**22.7**
			higher managerial and professional	**18**
14 Years				
	NVQ1	**4.8**	Routine	**4.6**

NVQ2	**19.6**	Semi routine	**19.9**
NVQ3	**15.7**	Lower supervisory	**15.2**
NVQ4	**40.3**	Small employers	**15**
NVQ5	**19.7**	Intermediate occupations	**7.6**
		Lower managerial and professional	**21.6**
		higher managerial and professional	**16.2**

6.4.2 Trajectories of children's developmental outcomes

LCGA was run to determine the number of language ability, internalizing behaviour, and externalizing behaviour trajectories in the analytic sample (n = 10683) from 3 years to 14 years of age. A five-class model was selected as best fitting for all outcomes. The trajectories for language ability, internalizing behaviour, and externalizing behaviour are presented in figures 6.1, 6.2, and 6.3 below. The reason these models were selected over alternative models will now be discussed.

6.4.3 Trajectories of language ability

The five-class language ability model was selected over alternate models for the following reasons. The AIC and BIC were lower for the five-class than the four-class model and the entropy improved. The likelihood ratio test and the bootstrapped likelihood ratio test both indicated that the five-class model was a significant improvement over the four-class model (P<.001). A six-class model was run to test if it fits better than the five-class model, but the likelihood ratio test and bootstrapped likelihood ratio test were both non-significant

indicating that it was not a better model fit. Table 6.4 below presents a full breakdown of the model fit indices for two- to six-class models. The following language trajectories were identified in the five-class model: Always-high (n = 1130; 10.6%), always average (n = 6427; 60.16%), average-decreasing (n = 2197; 20.57%), low-high increasing (n = 640; 6%), always low (n = 287;2.67%).

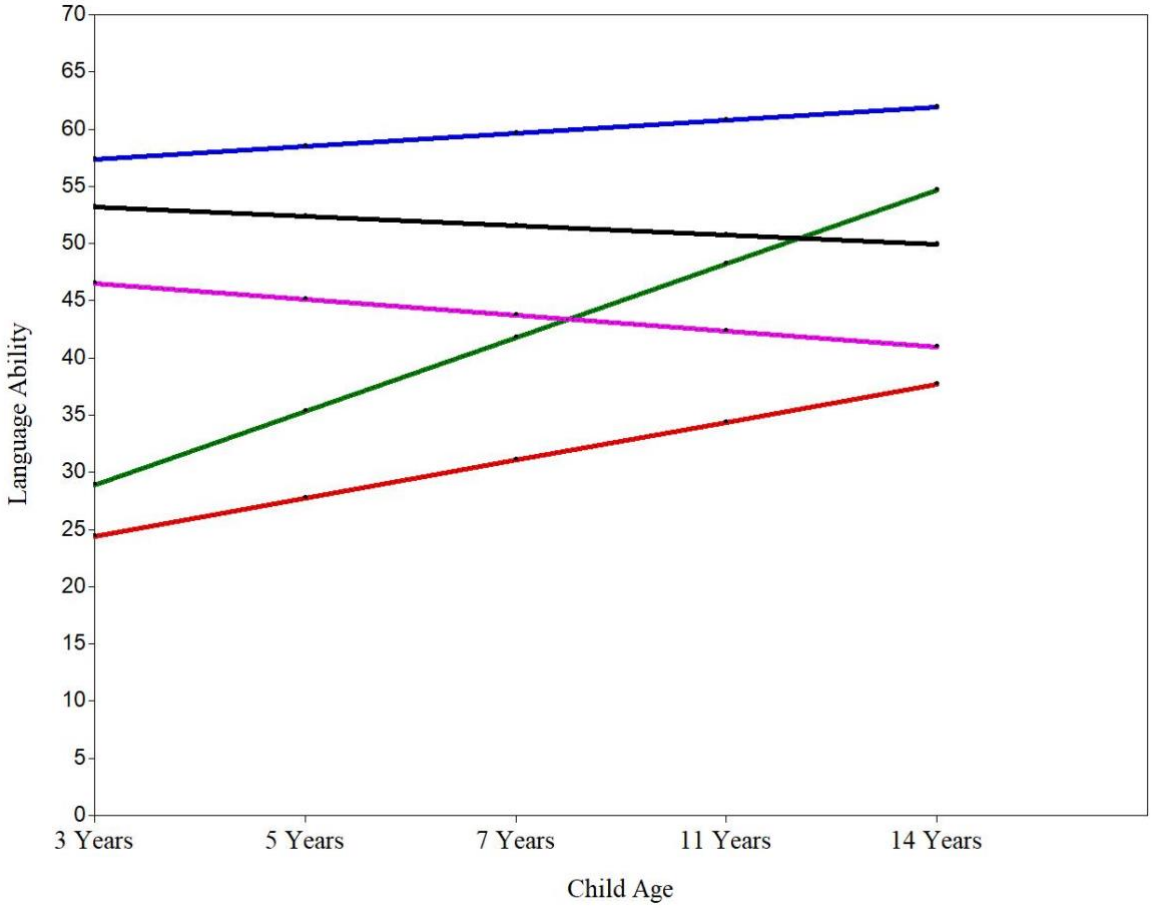

Figure 6.1. Five-class model of language ability trajectories

Note. Blue = Always-high. Black = Always-average. Pink = Average-decreasing. Green = low-high increasing. Red = Always-low.

Table 6.4. Indicators of model fit for children's language ability

Model	AIC	BIC	Entropy	% Sample in class	Posterior values	LMR-LRT	BLRT
Two-class	359731.929	359804.693	0.916	-	-	<.001	<.001
1				12.52	0.928		
2				87.48	0.984		
Three-class	356662.075	356756.668	0.709	-	-	<.001	<.001
1				42.6	0.836		
2				8.9	0.96		
3				48.5	0.856		
Four-class	355763.603	355879.629	0.734	-	-	<.01	<.01
1				8.4	0.966		
2				10.35	0.799		
3				20.92	0.788		
4				60.33	0.853		
Five-class	354986.687	355124.939	0.766	-	-	<.05	<.01
1				2.67	0.86		
2				10.6	0.807		
3				6	0.893		
4				20.57	0.793		
5				60.16	0.857		
Six-class	354820.359	354980.44		-	-	n.s.	n.s.
1				32.05	0.721		
2				6.1	0.896		

3	5.06	0.718
4	7	0.798
5	2.41	0.866
6	47.38	0.788

6.4.4 Trajectories of internalizing behaviour

The five-class internalizing behaviour model was selected over alternate models because the AIC and BIC were lower for the five-class than the four-class model and the entropy remained high. The likelihood ratio test and the bootstrapped likelihood ratio test both indicated that the five-class model was a significant improvement over the four-class model (P<.001). A six-class model was run, and the likelihood ratio test and bootstrapped likelihood ratio test indicated that it was a better model fit than the five-class model. The trajectory plots were then examined to determine which model was most appropriate and found the six-class model had two 'always-low' trajectories. Including the extra trajectory would not benefit interpretation and add would add unnecessary complexity to the model. The five-class model was selected as it identified the same trajectories as the six-class model without duplicating the 'always-low' trajectory. Table 6.5 below presents a full breakdown of the model fit indices for two- to six-class models. The following internalizing behaviour trajectories were identified in the five-class model: Always-high (n = 225; 2.11%), borderline-low decreasing (n = 1444; 13.52%), low-high increasing (n =; 581; 5.45%), low-borderline increasing (n =; 1867; 17.48%), always low (n = 6560; 61.43%).

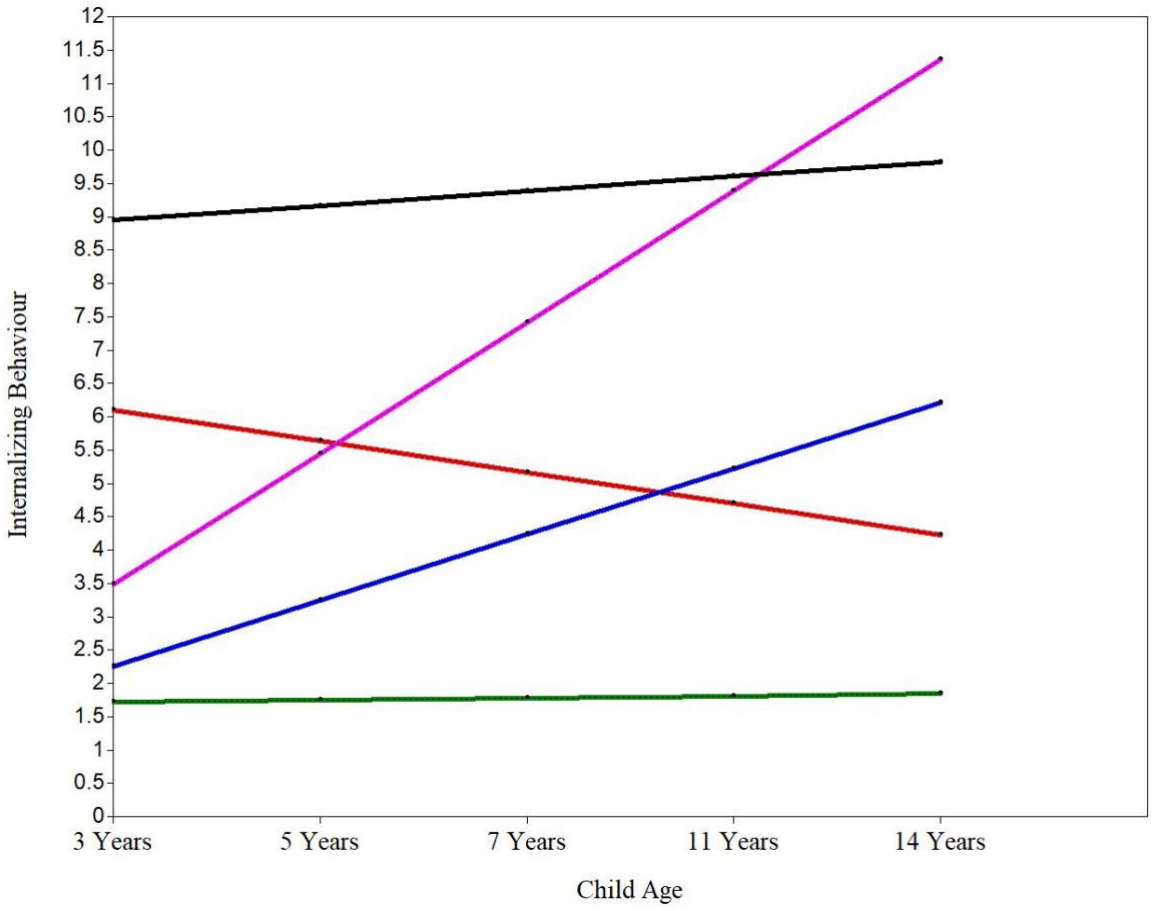

Figure 6.2. Five-class model of internalizing behaviour trajectories

Note. Black = Always-high. Pink = Low-high increasing. Red = Borderline-low decreasing.

Blue = Low-borderline increasing. Green = Always-low.

Table 6.5 Indicators of model fit for children's internalizing behaviour

Model	AIC	BIC	Entropy	% Sample in class	Posterior values	LMR-LRT	BLRT
Two-class	231218.744	231291.505	0.846	-	-	<.001	<.001
1				76.66	0.967		
2				23.34	0.915		
Three-class	228697.699	228792.287	0.815	-	-	<.001	<.001
1				6.64	0.903		
2				28.55	0.855		
3				64.81	0.94		
Four-class	227153.193	227269.61	0.818	-	-	<.001	<.001
1				5.61	0.896		
2				16.12	0.794		
3				64.82	0.943		
4				13.45	0.802		
Five-class	226340.445	226478.689	0.815	-	-	<.001	<.001
1				13.52	0.814		
2				17.49	0.759		
3				61.43	0.93		
4				5.45	0.853		
5				2.11	0.87		
Six-class	225839.162	225999.235	0.79	-	-	<.05	<.01
1				7.07	0.792		
2				14.34	0.698		

3	56.92	0.916
4	15.5	0.76
5	1.46	0.885
6	4.71	0.849

6.4.5 Trajectories of externalizing behaviour

The five-class externalizing behaviour model was selected over alternate models as the AIC and BIC were lower for the four-class model and the entropy improved. The likelihood ratio test and the bootstrapped likelihood ratio test both indicated that the five-class model was a significant improvement over the four-class model (P<.001). A six-class model was run to test if it fits better than the five-class model, but the likelihood ratio test and bootstrapped likelihood ratio test were both non-significant indicating that it was not a better model fit. Table 6.6 below presents a full breakdown of the model fit indices for two- to six-class models. The following externalizing behaviour trajectories were identified in the five-class model: Always-high (n = 441; 4.13%), high-borderline decreasing (n = 1250; 11.71%), borderline-high increasing (n = 847; 7.93%), borderline-low decreasing (n = 3808; 35.67%), and always low (n = 4331; 40.56%).

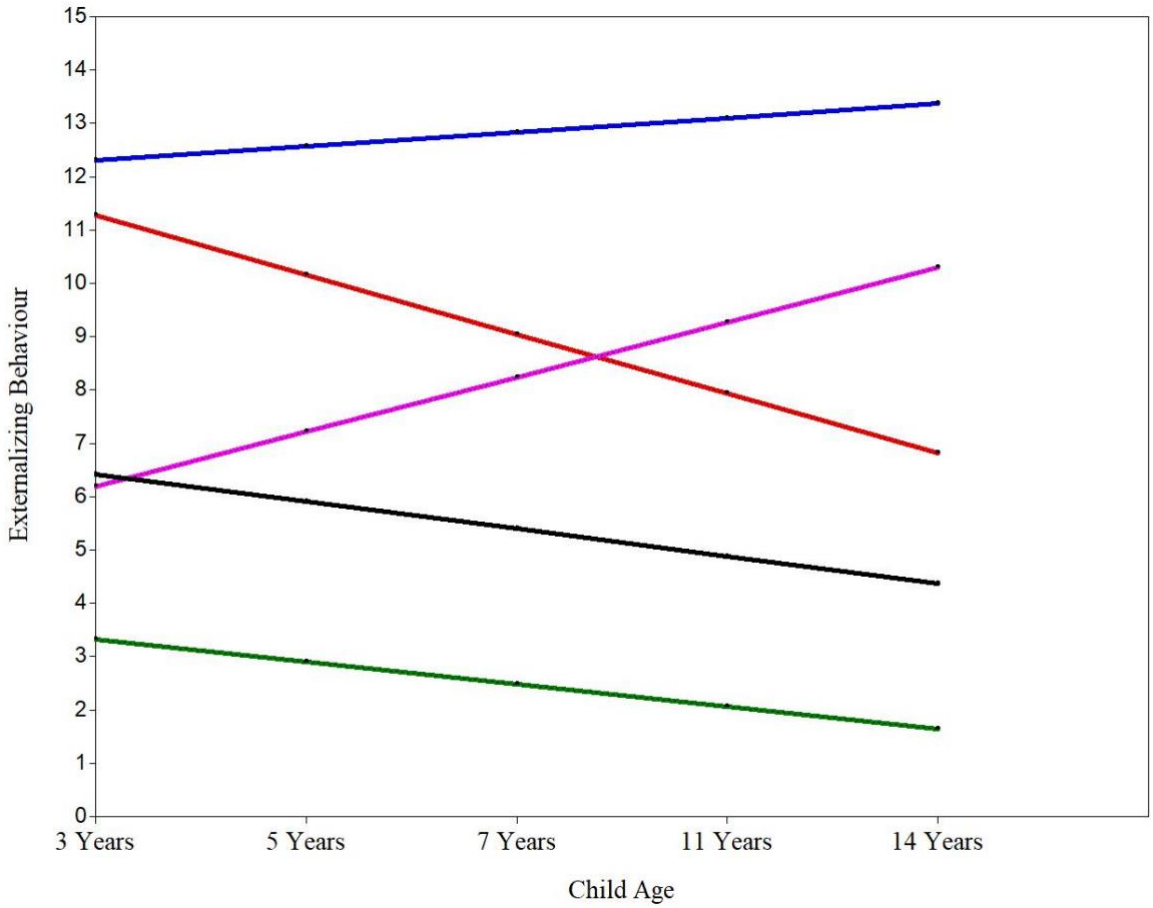

Figure 6.3. Five-class model of externalizing behaviour trajectories

Note. Blue = Always-high. Red = High-borderline decreasing. Pink = Borderline-high increasing. Black = Borderline-low decreasing. Green = Always-low.

Table 6.6 Indicators of model fit for children's externalizing behaviour

Model	AIC	BIC	Entropy	% Sample in class	Posterior values	LMR-LRT	BLRT
Two-class	251876.493	251949.253	0.854	-	-	<.001	<.001
1				70.13	0.966		
2				29.87	0.934		
Three-class	247360.903	247455.492	0.814	-	-	<.001	<.001
1				52.81	0.936		
2				35.7	0.879		
3				11.49	0.915		
Four-class	245718.736	245835.153	0.786	-	-	<.001	<.001
1				35.79	0.833		
2				4.22	0.926		
3				41.72	0.903		
4				18.28	0.875		
Five-class	244567.472	244705.717	0.793	-	-	<.001	<.001
1				11.71	0.812		
2				4.13	0.93		
3				40.56	0.905		
4				7.93	0.811		
5				35.67	0.829		
Six-class	244169.359	244329.432	0.745	-	-	n.s.	n.s
1				6.92	0.799		
2				32.76	0.768		

3	34.46	0.876
4	14.36	0.721
5	3.37	0.929
6	8.13	0.798

6.4.6 Probabilities of children's membership to outcome trajectories

Multinomial logistic regression was performed to generate the predicted probabilities of children belonging to different trajectories of language ability, internalizing behaviour, and externalizing behaviour based on their family income, parent education, and parent occupation trajectories. The figures in the following sections present the likelihood of children belonging to each outcome trajectory. The findings discuss which income, education, and occupation trajectories were most likely to lead to the best and worst child outcome trajectories, whether those who improve their SES were more likely to belong to positive outcome trajectories than those who do not improve their SES, and whether those decrease their SES were more likely to belong to worse outcome trajectories than those who did not decrease their SES.

6.4.7 Probability of belonging to outcome trajectories based on family income

Chapter 5 (study 2) found the following income trajectories which will be used in this study: Very high-decreasing (n = 290; 2.77%), stable-high (n = 828; 7.72%), high-decreasing (n = 450; 4.53%), average-increasing (n = 1666; 15.68%), low-increasing (n = 3043; 28.25%), and stable-low (n = 4406; 41.05%). The probability of children belonging to language ability trajectories based on family income trajectories is presented in figure 6.4 below. Children

from the very high-decreasing income group and the stable-high income group showed similar probabilities of belonging to each language trajectory. Children from stable-low-income families are most likely to belong to the always-low language trajectory, average-decreasing language trajectory, and increasing low-high language trajectory. They are also least likely to belong to the always-high language trajectory. Children with stable high income were 9.3 times more likely to belong to the always-high language trajectory than those with stable-low income.

Decreasing income was shown to have a negative impact on language trajectories as compared to those with stable-high-income, children from the high-decreasing income group were 1.5 times less likely to belong to the always-high language trajectory and 3.1 times more likely to belong to the average-decreasing language trajectory. Increasing income was shown to have a positive association with language trajectories as those in the low-increasing income trajectory are 3.4 times more likely to be in the always high language trajectory than those who remain in the stable-low income trajectory. Similarly, they are 5.5 times less likely to belong to the always-low language trajectory.

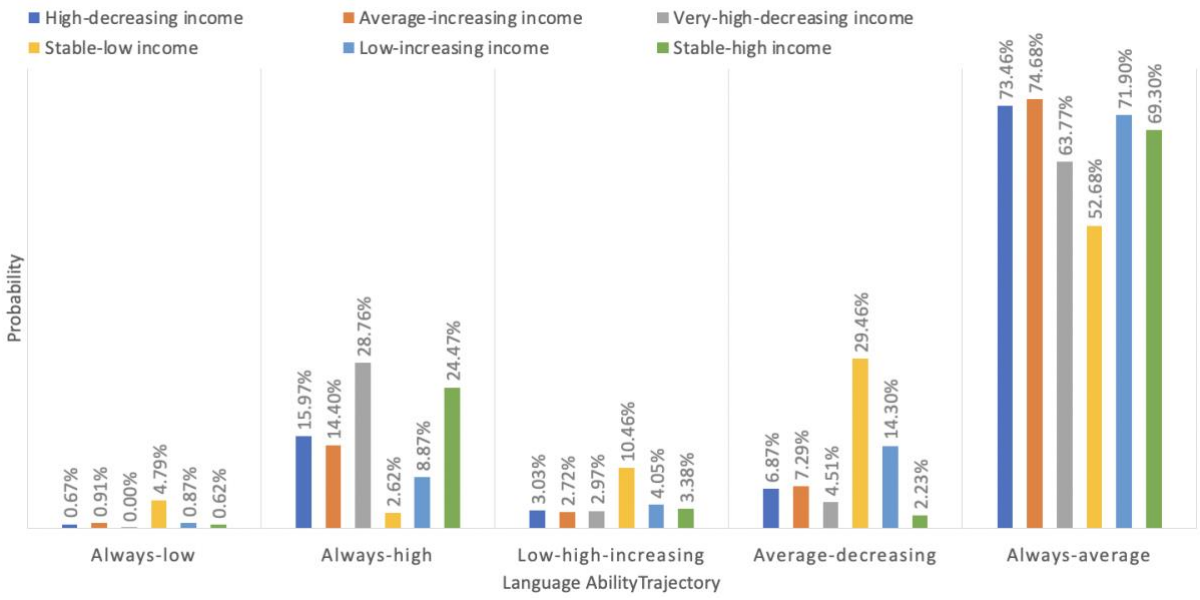

Figure 6.4. Children's likelihood of belonging to language trajectories based on family income trajectories

The probability of children belonging to internalizing behaviour trajectories based on family income trajectories is presented in figure 6.5 below. Belonging to the always-low internalizing trajectory is the most desirable trajectory as it represents the least problems. Children from the decreasing very high-decreasing income group and the stable-high income group showed similar probabilities of belonging to each internalizing trajectory. Children with stable-low income are most likely to belong to the always-high internalizing problems trajectory, increasing internalizing problem trajectories, and the decreasing borderline-low internalizing trajectory. They are also the least likely to belong to the always-low internalizing trajectory. Children with stable-high income were 1.7 times more likely to belong to the always-low internalizing problems trajectory than those with stable-low income.

Decreasing income was shown to have a negative impact on internalizing trajectories as compared to those with stable-high income, children in the high-decreasing income group were 1.1 times less likely to belong to the always-low internalizing trajectory. Increasing income was shown to have a positive association with internalizing behaviour trajectories as those in the low-increasing income trajectory are 1.4 times more likely to be in the always-low internalizing problems trajectory than those who remain in the stable-low income trajectory. Similarly, they are 2 times less likely to belong to the always-high internalizing trajectory.

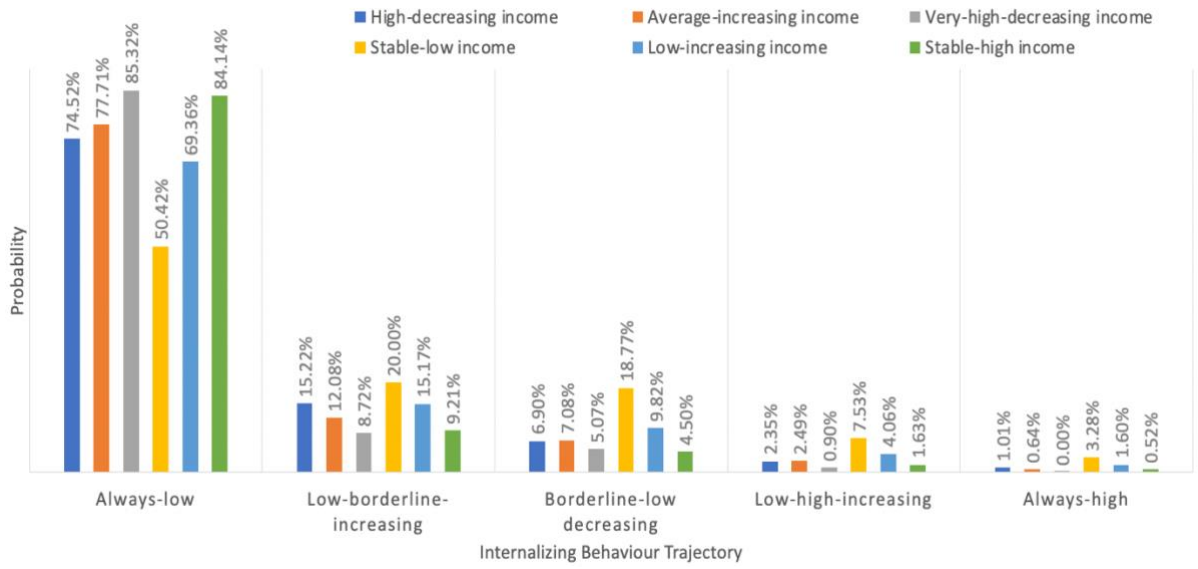

Figure 6.5. Children's likelihood of belonging to internalizing behaviour trajectories based on family income trajectories

A similar pattern was found for externalizing behaviour. The probability of children belonging to internalizing behaviour trajectories based on family income trajectories is presented in figure 6.6 below. Children from the decreasing very high-decreasing income group and the stable-high income group showed similar probabilities of belonging to each externalizing trajectory. Children with stable-low-income are most likely to belong to the

always-high externalizing trajectory, increasingly problematic externalizing trajectories, and the decreasing from problematic to low externalizing trajectory. They are also the least likely to belong to the always-low externalizing trajectory. Children with stable-high income were 2.2 times more likely to belong to the always-low externalizing trajectory than those with stable-low income.

Decreasing income was shown to have a negative impact on externalizing trajectories as compared to the stable-high-income group, those in the high-decreasing income group were 1.2 times less likely to belong to the always-low externalizing trajectory. Increasing income was shown to have a positive association with externalizing behaviour trajectories as those in the low-increasing income trajectory are 1.6 times more likely to be in the always-low externalizing problems trajectory than those who remain in the stable-low income trajectory. Similarly, they are 28 times less likely to belong to the always-high internalizing trajectory.

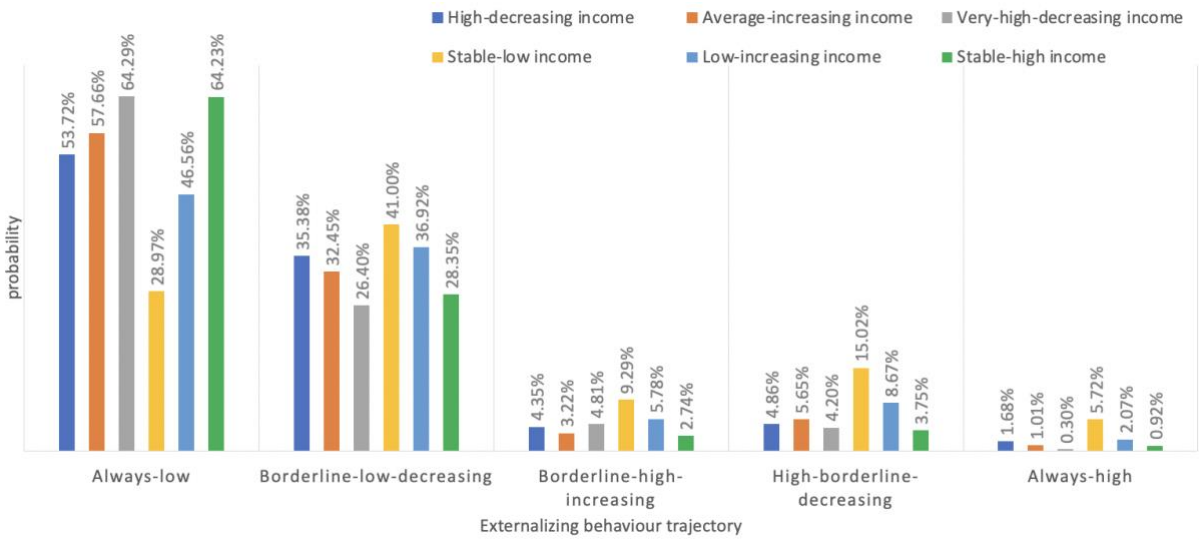

Figure 6.6. Children's likelihood of belonging to externalizing behaviour trajectories based on family income trajectories

6.4.8 Probability of belonging outcome trajectories based on parent education

Chapter 5 (study 2) found the following income trajectories which will be used in this study: Stable high (n = 3912, 36.71%), stable average (n = 1644, 15.52%), stable low (n = 2492, 23.3%), no qualifications (n = 1313, 12.25%), increasing no qualification-low (n = 829, 7.86%), and increasing low-high (n = 433, 4.36%). The probability of children belonging to language ability trajectories based on parents' education trajectories is presented in figure 6.7 below. The stable-high education group were most likely to be in the always-high language trajectory and least likely to be in the always-low language trajectory. The no qualifications group were most likely to belong to the always-low language trajectory, low-high-increasing language trajectory, and average-decreasing language trajectory. They were also 11.5 times more likely than the stable-high education group to belong to the always-low language trajectory and 22.3 times less likely to be in the always-high language trajectory.

Increasing education was shown to have positive associations with children's language ability as compared to no qualifications, those in the increasing form no qualification-low education trajectory were 2.75 times less likely to be in the always-low language trajectory and 5.2 times more likely to be in the always-high language trajectory. Those in the no qualifications group were 1.1 times more likely to be in the average-decreasing language trajectory compared to those in the increasing from no qualification-low education group. Similarly, compared to stable-low education, those who increased from low-high education were 1.5 times less likely to be in the always-low language trajectory and 1.25 times more likely to be in the always-high language trajectory. The stable-low education group were 1.25 times more likely to belong to the average-decreasing language trajectory compared to those in the increasing low-high education group.

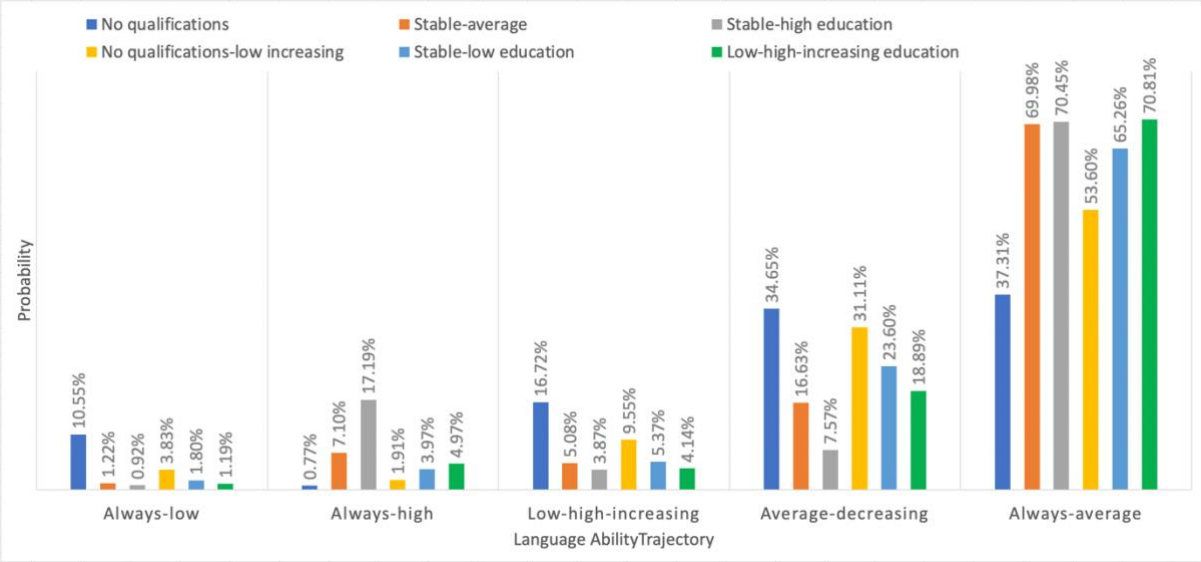

Figure 6.7. Children's likelihood of belonging to language trajectories based on parent's education trajectories

The probability of children belonging to internalizing behaviour trajectories based on parents' education trajectories is presented in figure 6.8 below. The stable-high education group were most likely to be in the always-low internalizing trajectory and least likely to be in the always-high internalizing trajectory. The no qualifications group were most likely to belong to the always-high internalizing problems trajectory, increasing internalizing trajectories, and borderline-low-decreasing internalizing trajectory. Compared to stable-high education, those with no qualifications were 1.7 times less likely to be in the always-low internalizing trajectory, and 5.82 times more likely to be in the always-high internalizing trajectory. They were also 1.5 times more likely to belong to the increasing low-borderline internalizing trajectory, and 2.75 times more likely to belong to the increasing low-high internalizing trajectory.

Increasing education was shown to have a positive association with children's internalizing behaviour as compared to the no qualifications group, those who increased from no qualification-low education were 1.2 times more likely to be in the always-low internalizing trajectory, and 1.6 times less likely to be in the always-high internalizing trajectory. The increasing no qualifications-low education group were 1.3 times more likely to be in the decreasing borderline-low internalizing trajectory than those with no qualifications. They were both equally likely to belong to the increasing low-borderline internalizing trajectory and increasing low-high internalizing trajectory. Compared to stable-low education, those increasing low-high education were 1.6 times less likely to belong to the decreasing borderline-low internalizing trajectory and 1.2 times less likely to belong to the increasing low-borderline internalizing trajectory. They were almost equally likely to belong to all other internalizing trajectories.

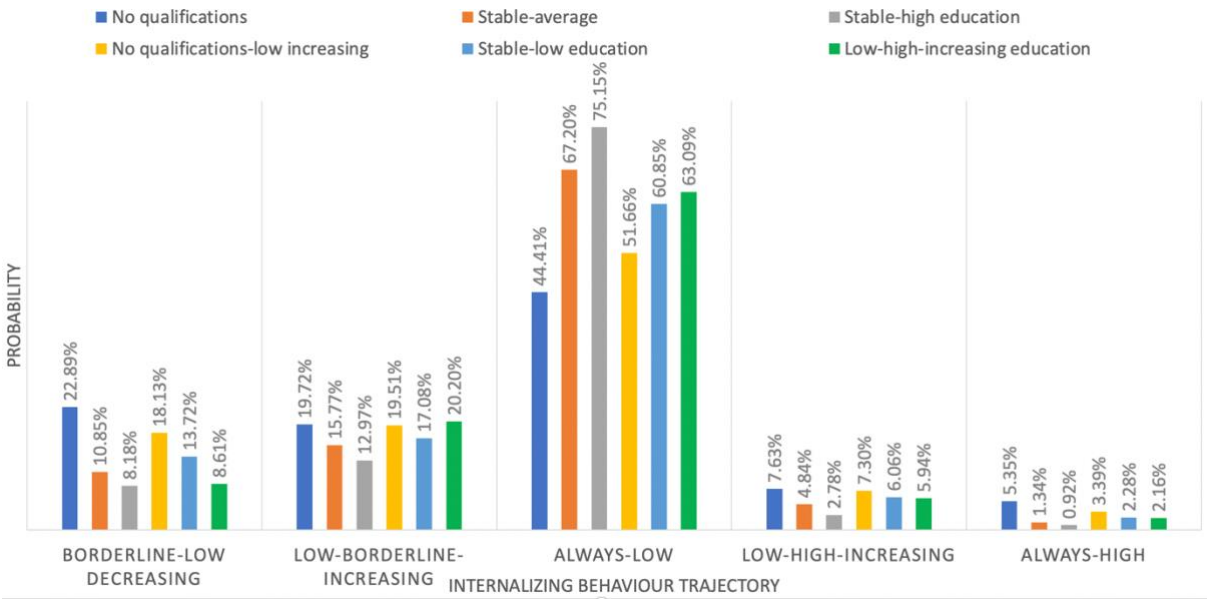

Figure 6.8. Children's likelihood of belonging to internalizing behaviour trajectories based on parent's education trajectories

The probability of children belonging to externalizing behaviour trajectories based on parents' education trajectories is presented in figure 6.9 below. Those in the stable-high education trajectory were most likely to be in the always-low externalizing trajectory and least likely to be in the always-high externalizing trajectory. Both the no qualification trajectory and the increasing from no qualification-low education trajectory were almost equally likely to belong to all externalizing behaviour trajectories. Compared to stable-high education, those with no qualification group were 2.2 times less likely to be in the always-low externalizing trajectory, and 5.8 times more likely to be in the always-high externalizing trajectory. They are also 1.5 times more likely to belong to the increasing low-borderline externalizing trajectory, 2.75 times more likely to belong to the increasing low-high

externalizing trajectory, and 2.8 times more likely to belong to the decreasing borderline-low externalizing trajectory.

Compared to stable-low education, those increasing from low-high education were 1.2 times more likely to be in the always-low externalizing trajectory and the increasing borderline-high externalizing trajectory. They were also 1.2 times less likely to belong to the always-high externalizing trajectory, and 1.15 times less likely to belong to the increasing borderline-high externalizing trajectory and the decreasing borderline-low externalizing trajectory.

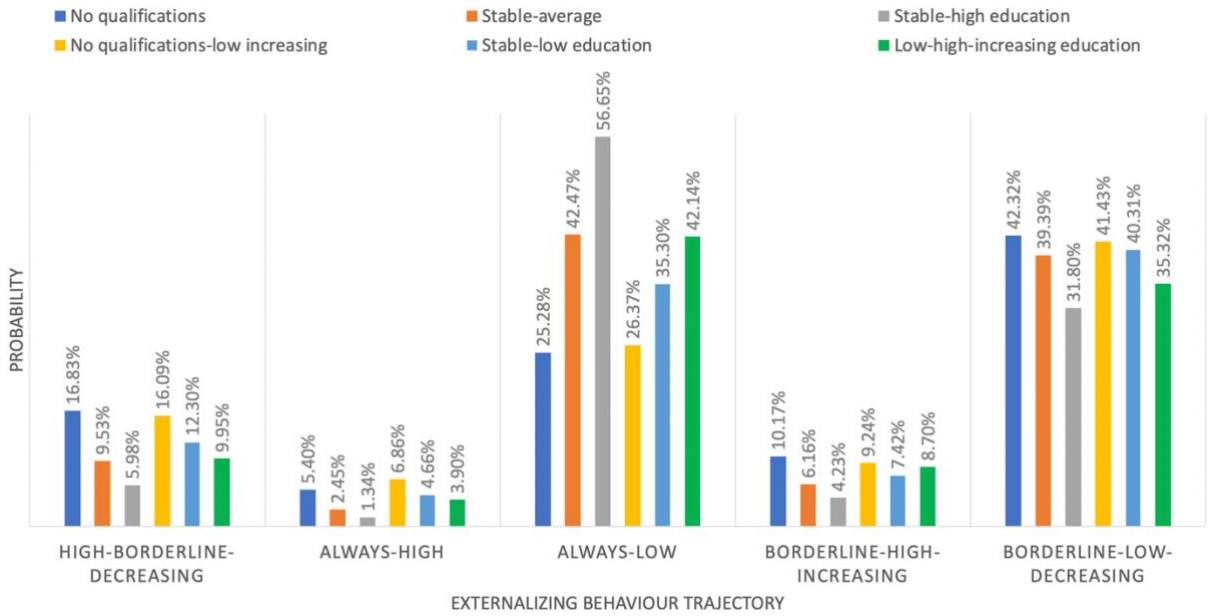

Figure 1.9. Children's likelihood of belonging to externalizing behaviour trajectories based on parent's education trajectories

6.4.9 Probability of belonging outcome trajectories based on parent occupation

Chapter 5 (study 2) found the following income trajectories which will be used in this study: Decreasing very high-high (n = 2312, 22.82%), decreasing high-intermediate (n = 2777, 27.92%), stable-intermediate (n = 1944, 18.72%), stable-average (n = 1317, 13.33%), and increasing routine-semi-routine (n = 1740, 17.21%). The probabilities of children belonging to language ability trajectories based on parents' occupation trajectories are presented in figure 6.10 below. The decreasing from very high-high occupation group were most likely to belong to the always-high language trajectory and least likely to be in the always-low language trajectory. The increasing routine-semi-routine occupation group were most likely to belong to the always-low language trajectory, increasing low-high language trajectory, and average-decreasing language trajectory.

Those in the decreasing from very high-high occupation group occupation were 5.4 times more likely to be in the aways-high language ability trajectory and 5.5 times less likely to be in the always low language trajectory compared to those in the increasing routine-semi-routine occupation group. Decreasing occupation was shown to have a negative association with children's language ability as those in the decreasing high-intermediate trajectory were 1.78 times less likely to be in the always high language trajectory and 1.4 times more likely to be in the always low language trajectory compared to the decreasing very high-high occupation group.

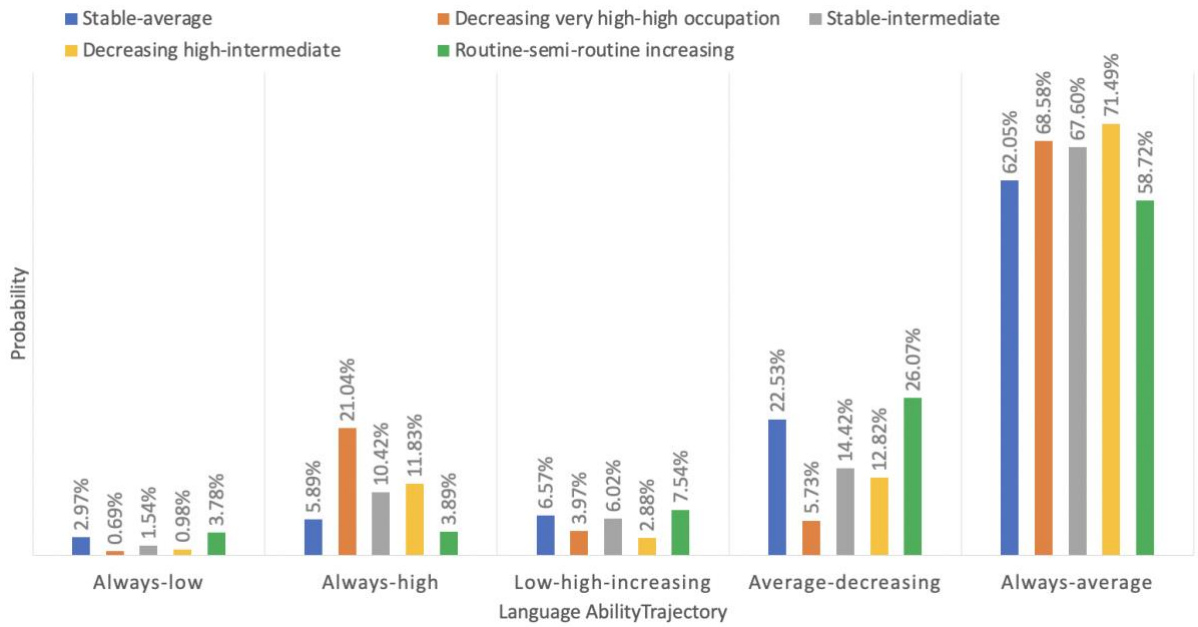

Figure 6.10. Children's likelihood of belonging to language trajectories based on parent's occupation trajectories

The probability of children belonging to internalizing behaviour trajectories based on parents' occupation trajectories is presented in figure 6.11 below. The decreasing from very high-high occupation group was most likely to belong to the always-low internalizing trajectory and least likely to belong to the always-high internalizing trajectory. The increasing from routine-semi-routine occupation group was most likely to belong to the always-high internalizing trajectory and least likely to be in the always-low internalizing trajectory.

Those in the decreasing from very high-high occupation group occupation were 1.38 times more likely to be in the aways-low internalizing trajectory and 4.7 times less likely to be in the always-high internalizing trajectory compared to those in the increasing routine-semi-routine occupation group. Decreasing occupation was shown to have a negative association with children's internalizing behaviour as those in the decreasing high-intermediate trajectory

were 1.1 times less likely to be in the always-low internalizing trajectory and 2.6 times more likely to be in the always-high internalizing trajectory compared to the decreasing very high-high occupation group.

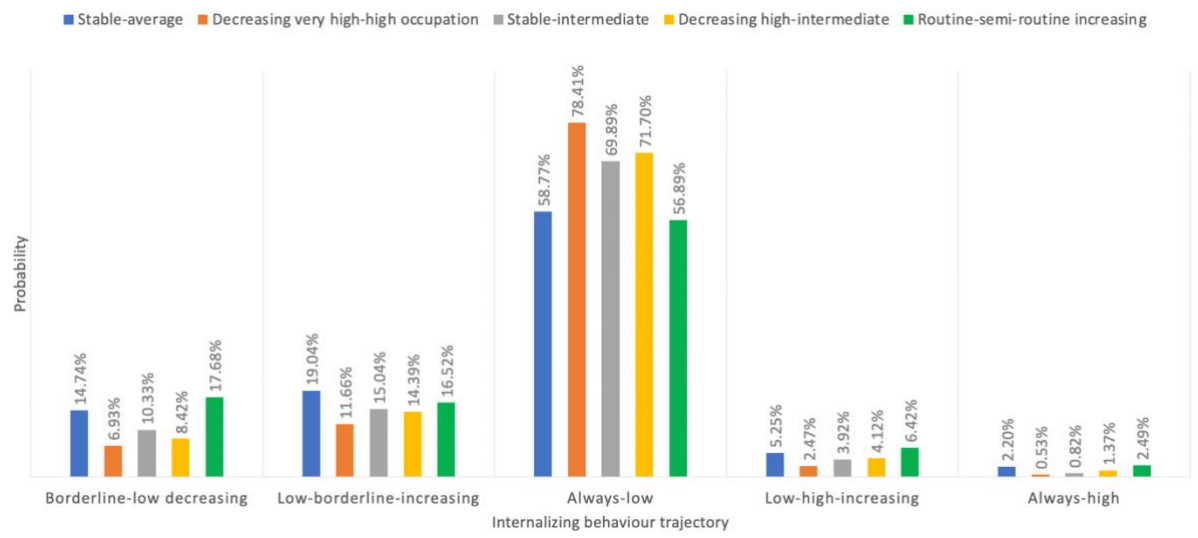

Figure 6.11. Children's likelihood of belonging to internalizing behaviour trajectories based on parent's occupation trajectories

The probability of children belonging to externalizing behaviour trajectories based on parents' occupation trajectories is presented in figure 6.12 below.

The decreasing from very high-high occupation group was most likely to belong to the always-low externalizing trajectory and least likely to belong to the always-high externalizing trajectory. The increasing from routine-semi-routine occupation group was most likely to belong to the always-high externalizing trajectory and least likely to be in the always-low externalizing trajectory.

Those in the decreasing from very high-high occupation group occupation were 1.83 times more likely to be in the aways-low externalizing trajectory and 3.87 times less likely to be in the always-high externalizing trajectory compared to those in the increasing routine-semi-routine occupation group. Decreasing occupation was shown to have a negative association with children's externalizing behaviour as those in the decreasing high-intermediate trajectory were 1.22 times less likely to be in the always-low externalizing trajectory and twice as likely to be in the always-high externalizing trajectory compared to the decreasing very high-high occupation group.

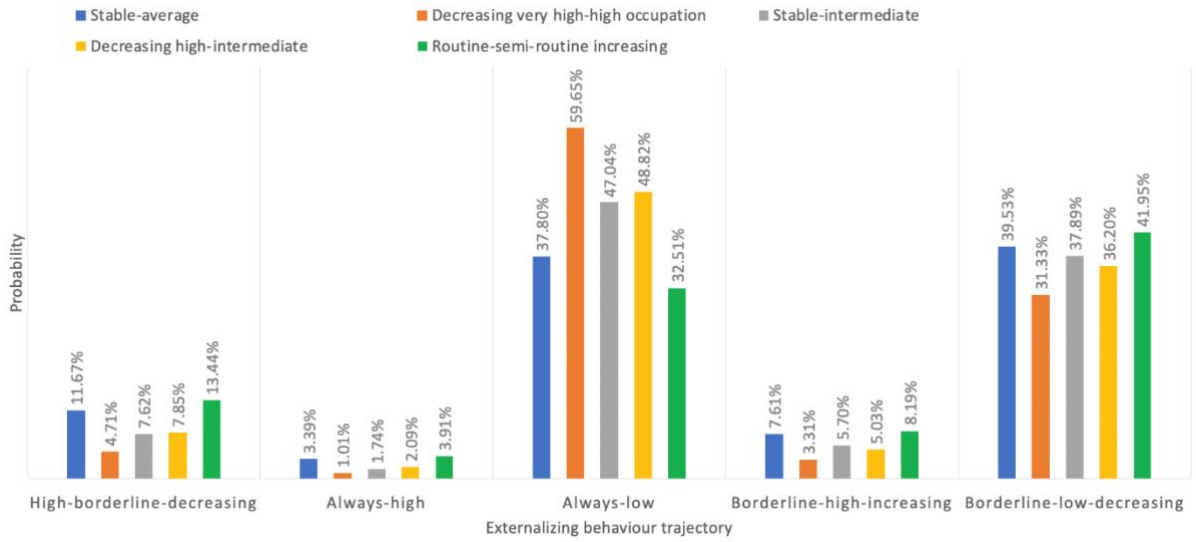

Figure 6.12. Children's likelihood of belonging to externalizing behaviour trajectories based on parent's occupation trajectories

6.5 Discussion

This study examined whether children followed different language ability, internalizing behaviour, and externalizing behaviour trajectories from age 3 to 14 years old and whether membership to these outcome trajectories was more or less likely depending on their family's income trajectory, parent's education trajectory, and parent's occupation trajectory. As in previous studies (e.g., Ukoumunne et al., 2012; Weeks et al., 2014; Miller and Votruba-Drzal, 2017), five trajectories of language ability (Always-high, always average, average-decreasing, low-high increasing, and always low), internalizing behaviour (Always-high, borderline-low decreasing, low-high increasing, low-borderline increasing, always low), and externalizing behaviour (always-high, high-borderline decreasing, borderline-high increasing, borderline-low decreasing, and always low) were found. In addition to finding the same number of trajectories as previous studies, the trajectories were also characterised similarly for both internalizing and externalizing trajectories (Weeks et al., 2014; Miller & Votruba-Drzal, 2017).

The characteristics of the language trajectories found in this study are also somewhat similar to previous studies but with some differences. Research by Ukoumunne et al., (2012) found three similar trajectories as the current study: low-increasing, average decreasing, stable average. However, they also found average-increasing and high-decreasing language trajectories which this study did not find. Instead, this study found an always-high trajectory and an average-decreasing trajectory. Two methodological reasons could explain the different trajectories between studies. First, Ukoumunne et al., (2012) focussed on early childhood measuring language ability at 8 months, 2 years, 3 years, and 4 years. The current study measured language ability from early childhood through to late childhood meaning that more language ability data were used to produce trajectories. This additional data over a longer

time period is more likely to capture change over time (Cavanagh et al., 2016; Oshio et al., 2018) and could explain why different trajectories were found between the studies. Second, Ukoumunne et al., (2012) used parent-reported language ability (e.g., asking parents about children's vocabulary and whether they know certain words) at 8 months, 2 years and 3 years and then administered a language test to children at 4 years old. The current study administered language tests at all time points rather than using parent-reported language ability. The difference between objective and subjective measures might explain why this study found different trajectories.

In addition to examining the extent to which children belonged to different outcome trajectories, this study found that the likelihood of children belonging to each outcome trajectory was different depending on their family SES trajectories. Regarding family income, children were most likely to belong to the best language and behaviour trajectories if they belonged to the highest income trajectories, while children were most likely to belong to the worst language and behaviour trajectories if they belonged to the lowest income trajectory. Compared to families with stable-average income, children from families that increased their income were more likely to be in the always-low internalizing and externalizing trajectories, and the always-high language ability trajectory. Children that remain stable-average income were almost twice as likely to experience a decrease in their language ability over time. On the other hand, compared to families with stable-high income, children from families that experience a decrease in their income were less likely to be in the always-low internalizing and externalizing trajectories and less likely to be in the always-high language ability trajectory. They are also more likely to experience a decrease in their language ability and an increase in their internalizing and externalizing behaviour problems.

While these findings are consistent with previous studies in that higher income trajectories have better associations with children's outcomes than lower income trajectories (e.g., Miller & Votruba-Drzal 2017; Björkenstam et al., 2017), this study provides additional unique information. The findings show that improving family income is likely to have a positive impact on children's language and behavioural trajectories throughout the entirety of childhood rather than only having a better association with late childhood outcomes as presented in previous literature (Zachrisson & Dearing, 2015; Jackson et al., 2017; Miller & Votruba-Drzal 2017; Björkenstam et al., 2017; Oshio et al., 2018). This provides context about how income trajectories are likely to impact children's developmental experiences over the life course and the direction of their developmental trajectories as opposed to the result at a later date. This is useful because income trajectories may have better, worse, or similar associations with children's later outcomes, but this does not explain the direction that their outcomes are likely heading in. For example, Jackson et als. (2017) study found that increasing and decreasing income trajectories both similar associations with children's language ability while Comeua and Boyle (2018) found that their moving into and out of poverty trajectories had similar associations with children's internalizing and externalizing outcomes. However, although the associations that the increasing and decreasing trajectories had with children's outcomes were similar, it does not mean they are equally beneficial as one could be on a decreasing outcome trajectory and the other in an increasing outcome trajectory. Results of the current study, therefore, add insight into the likely direction of children's outcomes.

Regarding parents' education, results found that increasing parents' education trajectories had the most benefit for children's language ability. Children of parents that increased their education from no qualifications to low-education or from low-high education were more

likely to be in the always-high language ability trajectory and less likely to decrease their language ability compared to those that did not increase their level of education. While children were also more likely to belong to the always-low internalizing and externalizing trajectories if their parents increased their level of education, they were also more likely to belong to an increasing behaviour problem trajectory. Specifically, compared to stable-low education, children of parents that increased from low-high education were more likely to belong to the increasing from low-borderline internalizing trajectory and the increasing borderline-high externalizing trajectory. In addition, children were most likely to belong to the always-high externalizing trajectory if their parents increased from no qualifications to low-education.

Previous research has shown that higher levels of education are associated with better language and behavioural outcomes (e.g., Magnuson et al., 2009; Harding, 2015; Monaghan, 2017), and that parent education is more beneficial for children's cognitive outcomes than behavioural outcome (Coddington et al., 2014; Gonzáleza et al., 2018). Chapter 5 (study 2) also indicated that compared to parents that did not improve their education, parents from increasing education trajectories had better associations with children's language and behavioural outcomes during late childhood. However, this study adds further insight showing that while increasing parents' education increases children's odds of belonging to positive outcome trajectories, it can also increase the likelihood of children belonging to worsening behaviour trajectories. One possible explanation for this finding may be that parents' level of stress has increased due to their studies. Research shows that education can be particularly stressful for parents as they have to balance childcare with education and they have more financial worries due to being in education (Lin, 2016). The family stress model

indicates that increased parental stress can impair child-parent interactions and ultimately impact their developmental outcomes (Conger et al., 2010).

Regarding parents' occupation, the results showed that children were most likely to be in the always-high language trajectory and always-low internalizing and externalizing trajectories if their parent's belonged to the decreasing very high-high occupation trajectory which was the highest level occupation trajectory found in this study. They were also most likely to be in the always-low language trajectory and always-high internalizing and externalizing behaviour trajectories if their parents were in the increasing routine-semi-routine occupation (the lowest occupation trajectory found in this study). Since no 'stable-routine' occupation trajectory was found in the analysis it is not possible to determine whether increasing from routine to semi-routine occupations is more beneficial than staying in a routine occupation.

The findings also showed that children were less likely to be in positive language and behavioural trajectories if their parents were in the decreasing high-intermediate occupation trajectory compared to the decreasing very high-high occupation trajectory.
It is possible that children are more likely to be in poorer language and behavioural trajectories if their parents' occupations declined as it would cause stress in the household (Bradley, 2016). Research looking at work-related family stress shows that demanding job requirements such as moving jobs, the difficulty of work, and working long hours are associated with increased parental stress, mental health problems, poor parenting practices, and increased family conflict within the household (Brooks-Gunn, Han, & Waldfogel, 2010; Hadzic et al, 2013; Dockery et al., 2016; Cho, 2018; Moreira et al., 2019). As stated by the family stress model, parental stress, poor parenting, and family conflict are all likely to negatively impact children's developmental outcomes (Conger et al., 2010). Indeed, Moreira

et al (2019) found that work-family conflict was associated with parental anxiety, depression, and parenting stress which all had negative associations with parents' emotional awareness of their child, compassion for their child, and attention paid to their child, and each of these pathways was associated with children's externalizing (Johnson, Li, Kendall, Strazdins, & Jacoby, 2013) and internalizing (Dockery et al., 2016) behaviour problems.

6.5.1 Limitations of the study

The limitations of this study should be considered when interpreting the results. The family SES trajectories, language trajectories, and behavioural trajectories examined in this study were selected based on the result of latent class growth analysis. While this approach provides model fit indices to help researcher determine the appropriate number of latent classes in a sample, they are only guidelines and ultimately the final decision on the number of latent classes is at the researcher's discretion depending on the research questions, theory, or measures used (Jung & Wickrama, 2008). This means that the trajectories identified between studies may be different making it difficult to compare findings across studies (Demment et al., 2014). However, the language and behaviour trajectories found in this study are similar to those identified in previous literature indicating that the trajectories seem to be consistent across different samples, particularly for internalizing and externalizing behaviour (Ukoumunne et al., 2012; Weeks et al., 2014; Miller and Votruba-Drzal, 2017). Sample attrition over time is another limitation most longitudinal studies have to face. Attrition in the millennium cohort study was more likely to occur in low-income families (Plewis, 2007). This could potentially lead to a biased sample resulting in the SES trajectories and outcome trajectories identified in this study being less likely to represent lower income families. However, the sample design of the millennium cohort study meant that deprived families

were oversampled, and attrition weights were generated and applied to account for potential bias.

6.5.2 Implications of the study

Despite the limitations of this study, the findings have useful implications for improving the likelihood that children will belong to positive developmental trajectories. Examining associations between SES trajectories and children's developmental trajectories from early through late childhood provides information about the likely long-term impact that improving SES will have on children's development. Policies focused on increasing family income are likely to be beneficial for children's language ability, internalizing behaviour and externalizing behaviour as they are more likely to belong to more favourable outcome trajectories than those who do not increase their income. Increasing family income also reduces the likelihood of children belonging to a worsening outcome trajectory. However, policies increasing family income are likely to be most beneficial if they can be sustained across the entire childhood timeline rather than over a shorter period of time. This is because when family income decreases, children are more likely to belong to a decreasing language ability trajectory and an increasing internalizing and externalizing problem trajectory. This may be relevant for policies such as the Scottish Child Payment which is only available until the child turns 6 years old, after which the family may experience a decrease in income which could negatively impact children's developmental trajectories. Taken together it would suggest that in addition to increasing family income over childhood policymakers should also focus on implementing measures to prevent family income loss during later childhood.

Policy increasing parents' level of education is also likely to improve children's outcome trajectories. Helping parents with no qualifications gain a qualification increases the

likelihood that children will have high language ability by 148%, low internalizing problems by 16.32%, and low externalizing problems by 4.31%. Further increasing education from low-high increases the likelihood that children will have high language ability by 25.19%, low internalizing problems by 3.6 %, and low externalizing problems by 19.37%. However, improving parents' education from low-high also increased the risk of children belonging to worsening outcome trajectories, so it may be prudent to examine why this happens before policy is implemented. Policy helping parents with no qualifications increase their level of education to NVQ 1 level may be the most practical approach based on the current study as this increased the likelihood of children belonging to positive language and behaviour trajectories without increasing their odds of belonging to worsening trajectories. Gaining an NVQ 1 qualification can typically be achieved in one academic year meaning the period of potential stress and financial pressure are shorter and the benefits for children's outcome trajectories can be seen sooner.

This study highlighted that children's membership to different language and behaviour trajectories differ depending on their family income, parent education, and parent occupation trajectories. While the findings regarding family income are rather clear, more research is required to better understand how parent education and occupation trajectories operate before making policy decisions. To conclude, this study built upon previous research on the associations between SES trajectories and children's language and behaviour outcomes by examining whether children's outcome trajectories are affected by their family income, parents' education, and parents' occupation trajectories. It presents novel findings that children's developmental trajectories are impacted by their family SES trajectories. It highlights that policy improving family income and helping parents with no qualifications gain a qualification is likely to improve children's developmental trajectories.

6.6 Summary

This chapter examined whether different family SES trajectories made children more or less likely to belong to language, internalizing, and externalizing trajectories and discussed the implications of the findings. The next chapter will be a general discussion of the thesis as a whole.

Chapter 7 – General Discussion

7.1 Aim of this chapter

This chapter will begin by giving a recap of the aims of this thesis before discussing how the aims were achieved. An overview of the findings from the three studies will be presented and a discussion about what they mean in terms of previous research. Limitations will be highlighted, and the policy implications of the findings will be discussed. Finally, a summary of the thesis as a whole will be provided.

7.2 Aim of this thesis

The overall aim of this thesis was to examine whether different dynamics of family socioeconomic status (SES) are associated with children's language ability, internalizing behaviour, and externalizing behaviour. The dynamics of SES refers to the change, movement, or stability of SES over time and is a useful area of research as it can provide an understanding of people's SES over the life course while static research can only provide information about SES during specific points in time. SES dynamics research is beneficial as it can help untangle some of the complexities involved in SES research such as how the timing, persistence, and transitions, of SES, are associated with specific outcomes which help policymakers understand when policy intervention might be useful and the likely long-term impact the interventions will have (Miller et al., 2021). This study examined two types of SES dynamics, the stage of childhood (timing) and trajectories of SES.

This study focused on the timing of SES because evidence indicates that children are sensitive to the negative effects of low SES during different stages of childhood (Blakemore, 2014), but most studies only examine short time frames such as early-middle childhood (e.g.,

Schoon et al., 2011; 2013; Burchinal et al., 2018) or mid-late childhood (Lai et al., 2019) which makes it difficult to assess at which stage SES is most important. This study addressed this gap in the literature by examining the associations between SES and children's language ability, internalizing behaviour, and externalizing behaviour during early, middle, and late childhood. The findings from this study could help policymakers understand the effect that current policies have which are primarily targeted at early childhood (e.g., Best Start) and indicate whether policies could benefit children at different stages of childhood.

This study also focused on the trajectories of SES because SES is not a static construct and people can transition between different social circumstances over their life course to form SES trajectories (Elder, 2003). Since trajectories encompass people's experiences and life events, they can better represent people's SES compared to static SES since the more data points there are the more accurate the trajectories become (Cavanagh et al., 2016; Oshio et al., 2018).

However, current literature tends to generate SES trajectories over short timeframes such as during early childhood (e.g., Dearing et al., 2001; Zachrisson & Dearing, 2015; Jackson et al., 2017) or from mid-childhood to early adolescence (e.g., Miller & Votruba-Drzal 2017; Comeau & Boyle, 2018). This means families are classified into SES trajectories based on short periods of time. Given that trajectories are created over the life course and influenced by life events and life changes (Elder, 2003), it is likely that more SES variation will be captured over a longer duration which could identify additional trajectories. This would be beneficial as it would give insight into the different trajectories that exist over the entire childhood timeline rather than specific stages of childhood only. This would also give long-term insight into the likely efficacy of policy long-term. Similarly, children's developmental

outcomes are not static constructs and have their own trajectories over their life course (Elder, 2003). Since SES trajectories are associated with language ability, internalizing behaviour, and externalizing behaviour (Miller & Votruba-Drzal 2017; Björkenstam et al., 2017; Hoyt et al., 2019) it is likely that they would also be associated with trajectories of language ability, internalizing behaviour, and externalizing behaviour. Examining this provides policymakers with information about what is likely to happen to children's language and behavioural outcomes over their life course if they belong to different SES trajectories. For example, if belonging to a decreasing income trajectory increases the likelihood of belonging to a decreasing language ability trajectory then policymakers may consider policies to prevent income loss.

This thesis defined SES as a multidimensional construct comprising of family income, parent's level of education, and parent's level of occupation which is the most widely used definition of SES (Bradley & Corwyn, 2002; APA, 2007) and is consistent with theory (Weber, 1968; Bourdieu, 1986; Coleman, 1988). The thesis aim was achieved through three studies that examined whether different aspects of SES dynamics were associated with children's language ability and behaviour. First, in study 1, the extent to which family income, parent's education, and parent's occupation had unique associations with children's language ability and behaviour was examined. As children can be sensitive to family SES at different stages of childhood (Sylva 1997**;** Campbell et al., 2000; Costello et al., 2005; Kuhl et al., 2005), the associations between SES dimensions and children's outcomes were examined at different stages of childhood to determine whether the timing of each SES dimension was important for children's outcomes. Second, study 2 examined whether trajectories of SES, rather than static measurements of SES were associated with children's language and behavioural outcomes. Since study 1 showed that each of the SES dimensions

had a different association with children's outcomes across different stages of childhood it was likely that SES trajectories would also have associations with children's outcomes. This was supported by life course models which propose that different trajectories of each SES dimension could have differential associations with children's development (Duncan, 1988; Lynch et al., 1994; Elder, 2003). The findings from study 2 expanded those from study 1. Third, study 3 examined whether trajectories of SES increased or decreased the likelihood of children belonging to different language or behavioural trajectories. Since study 2 showed that SES trajectories had differential associations with children's late childhood language ability and behavioural outcomes, it was likely that the SES trajectories were also associated with different child developmental trajectories. Since life course models propose that both SES and children's developmental outcomes have different trajectories that are likely associated with each other, this was that natural progression from study 2.

The next section will summarise the research findings from each of the three studies and discuss the implications of the findings. Limitations and future research will be discussed.

7.4 Key findings and their Implications

7.4.1 SES dimensions

The findings from the thesis as a whole show that family income, parents' education, and parents' occupation were each associated with children's developmental outcomes. This supports the theoretical positions outlined in chapter 2 which define SES as a multidimensional construct with each construct representing the different economic and social resources a family can access (Weber, 1968; Bourdieu, 1986; Colemann, 1988; Jæger, 2007; Bukodi & Goldthorpe, 2013; Harding et al., 2015; Festin et al., 2017). In terms of previous research, few studies have examined the independent associations that family

income, parent education, and parent occupation have on children's language ability and behaviour. The majority of studies examine a single SES dimension or generate a composite SES measure (Coddington et al., 2014; Jackson et al., 2017; Gonzalez et al., 2020; Britton et al., 2021). Two notable studies that did examine family income, parent education, and parent occupation were Sullivan and Brown (2013) who focused on language ability, and Miller et al (2021) who focussed on internalizing and externalizing behaviour. They both examined the unique association that income, education, and occupation have with children's outcomes. The findings of this thesis support Sullivan and Brown (2013) who found that parents' education was the most important SES dimension for children's early adolescent language ability, followed by income, then occupation. This study expanded their findings by showing the same pattern was also found for early, middle, and late childhood which will be discussed in the next section.

Regarding internalizing and externalizing behaviour, the results of this thesis broadly support Miller et al (2021) as it found that each SES dimension was uniquely associated with children's outcomes. However, there were important differences in the findings for externalizing behaviour that has implications in terms of theory. For example, while Miller et al (2021) found that parents' occupation was the most important SES dimension for children's externalizing behaviour, this study found that occupation was significantly less important than family income and parents' education. It is likely due to methodological differences between studies as Miller et al., (2021) dichotomised occupation into working and non-working categories rather than examining the level of occupation which was done in this study. This may have theoretical implications about how research examining the associations between SES and child development should be framed. For example, this study, and several other studies, have drawn upon Bronfenbrenner's bioecological systems theory to explain

why SES dimensions are associated with child development (e.g., Schoon et al., 2010; 2013; Gutman et al., 2019; Sosu & Schmidt, 2022). The theory states that child development takes place due to frequent bidirectional interactions between children and their environments (Bronfenbrenner, 1986; Bronfenbrenner & Morris, 2006). The microsystem, being the most proximal environment including the family and home, is proposed to have the strongest influence on children's developmental outcomes due to its proximity to children and their ability to interact with it directly (Bronfenbrenner, 1979; Bronfenbrenner & Ceci, 1993; Bronfenbrenner & Morris, 1998). Therefore, it is often considered the most significant system for child development (Biggeri & Cuesta, 2021) and why researchers often use the microsystem to explain the associations between SES and children's development (Eamon, 2001; Biggeri & Cuesta, 2021; Lee & Zhang 2022). However, the results of this research suggest that while income and education belong in the microsystem, occupation might be better suited in the macrosystem. For example, parents' occupation in this study represented a family's social class so it might therefore be appropriate to place occupation in the macrosystem which is the most distal environment in Bronfenbrenner's theory and represents societal contexts which children do not interact with directly. On the other hand, children's daily interactions are more directly impacted by family income and parents' education. For example, family income can determine the material resources at home, impact parental stress, and increase family conflict (Conger & Donnellan, 2007; Conger et al., 2010) while parents' education is associated with the quantity and quality of speech that parent's use with children (Rowe, 2012; Cartmill et al., 2013). Therefore, income and education belong in the microsystem.

7.4.2 Stage of childhood

This thesis found that SES was associated with children's language and behaviour at all stages of childhood which broadly supports the different studies that have examined shorter time frames across childhood (e.g., Schoon et al., 2011; 2013; Mazza et al., 2017; Burchinal et al., 2018; Lai et al., 2019). However, the findings could support the argument that children are most sensitive to the adverse effects of SES during early childhood as all SES dimensions were associated with all outcomes during early childhood but not during later childhood. Income was associated with all outcomes at all time points, education was associated with language ability and externalizing behaviour at all childhood stages but only during early and middle childhood for internalizing behaviour, and occupation was associated with language ability and externalizing behaviour at all childhood stages but only during early childhood for internalizing behaviour. This would be in line with the sensitive period model (Sylva 1997**;** Kuhl et al., 2005) which proposes children are particularly sensitive to external factors (e.g., SES) during early childhood due to heightened brain plasticity in which neural networks can be modified based on external factors (Hensch, 2018; Gabard-Durnam & McLaughlin 2020). However, while SES during early childhood appeared to be most important for children's developmental outcomes generally due to all SES dimensions being associated with all outcomes, the findings are more complex as different SES dimensions were more or less important at different stages of childhood.

Consistent with most studies, the current findings showed that family income was significantly associated with children's language ability and behavioural outcomes at all childhood stages (Mazza et al., 2017; Burchinal et al., 2018). Family income was also found to become increasingly important as children got older as the strength of the associations between income and children's outcomes was always larger during late childhood. This

finding is also consistent with the accumulation of risk model which explains that children's exposure to low SES at each stage of childhood an association with children's outcomes but also accumulates to produce a cumulative adverse effect on children's outcomes (Power et al., 1991; Kuh et al., 2003). This could lead to cumulative impaired child-parent interactions and prolonged periods with less investment in their development according to the family stress and investment models (Conger et al., 2010; Conger & Donnellan, 2007). This build-up of exposure to stressful and impaired interactions is associated with worse developmental outcomes (Conger et al., 2010; Conger & Donnellan, 2007).

This study also found that while family income was associated with all outcomes at all childhood stages it had the largest associations with children's internalizing and externalizing behaviour during late childhood which is consistent with some previous studies (Costello et al., 2011; Gibb et al., 2012; Lai et al., 2019). It is likely that this is because late childhood is a period of significant social change where children are navigating relationships with peers (Blakemore2014; Fuhrmann et al., 2015; Efstathopoulos et al., 2018) where children become more aware of their economic situation because income becomes an important factor in their ability to participate in social events with their peers (Hjalmarsson & Mood, 2015). A lack of income, therefore, could limit children's ability to take part in activities with their peers and, from a family stress perspective, cause additional conflict and impaired interactions between parents and children leading to increased behavioural problems as outlined in the family stress model (Conger et al., 2010). Additionally, from an investment model perspective, low-income parents are less able to invest finances into their children's activities as children age and they become more expensive to raise as they get older (Twenge et al., 2003; Conger & Donnellan, 2007).

Parents' education was significantly associated with children's language ability and externalizing behaviour at all childhood stages but only associated with internalizing behaviour during early and middle childhood and not during late childhood.
Parents' education had the largest associations with children's language ability at all stages of childhood and for internalizing and externalizing behaviour during early and middle childhood. These findings are consistent with the literature as previous studies which, although they only examined children over short timeframes, have found parents' education to have larger associations than income with children's language ability (Davis-Kean, 2005; Sullivan & Brown., 2013; Coddington et al., 2014; Harding et al., 2015; Gonzalez et al., 2020; Miller et al., 2021).

These findings have implications for theory, for example, the family stress and investment models indicate that SES is associated with children's developmental outcomes via several different pathways (Conger & Donnellan, 2007; Conger et al., 2010). It is possible that this study found parents to have the largest association with children's language ability because parents' education operates through different theoretical pathways that are more relevant for children's language development than income pathways. For instance, while income can operate via purchasing educational materials and funding extra tuition, parents' education operates via cognitive and linguistic stimulation (Coddington et al., 2014) which is noted to be essential for children's language development (Vygotsky, 1978). Similarly, the family stress model states that parenting styles are important pathways between SES and children's development (Conger et al., 2010) and parental responsiveness is a parenting style which is crucial for children's language development (Farrant & Zubrick, 2012; Madigan, 2019). Studies have found that children have better language ability if their parents show higher responsiveness during their interactions (Madigan, 2019) and parents with higher levels of

education are known to show higher levels of responsiveness to their children during interactions (Dearing et al., 2004; 2006). These unique educational pathways are likely more strongly associated with children's language development as children's language development takes place through frequent exposure to language and practice using language during interactions with their parents (Vygotsky, 1978; Bronfenbrenner, 1986). Since higher-educated parents are more likely to have more frequent, better quality, and more encouraging interactions with their children (Rowe, 2012; Cartmill et al., 2013) it could explain why parents' education has larger associations with children's language ability than income.

In terms of internalizing and externalizing behaviour, previous studies have also found parents' education to have larger associations than income with externalizing behaviour during early childhood (Boe et al., 2014; Jackson et al.,2017) while others have also found that parents' education is associated with and internalizing behaviour during early childhood but do not compare other SES dimensions. Again, from a theoretical perspective, the reason parent's education had a stronger association with children's internalizing and externalizing behaviour during early and middle childhood, but income had a stronger association during late childhood could be due to the theoretical mechanisms through which they operate. As with language ability, parental responsiveness to children's needs is a pathway through which education is associated with children's behaviour development as responsive parents are more likely to react positively to children's needs to support their development (Ray et al., 2013; Padilla-Walker et al., 2016). Additionally, parental expectations are a unique pathway between parents' education and children's outcomes (Davis-Kean et al., 2021) and higher educated parents have higher expectations for their children's outcomes, and they are more likely to invest the time and resources to promote their desired outcomes for children (Davis-Kean et al., 2021). Applying these pathways to Bronfenbrenner's bioecological model

(Bronfenbrenner, 1979; Bronfenbrenner & Morris, 1986) might explain why parents' education is more important for children's behavioural outcomes during early childhood but not late childhood. For example, during early childhood children's microsystems are generally limited to family interactions (Bronfenbrenner, 1979) and therefore children are likely to develop internalizing and externalizing behaviours based on their parents' expectations and responsiveness as they do not have any other models to learn from. However, as children age and interact with other adults and their peers, the influence of parental inputs is likely to be diluted somewhat (Hoferichter et al., 2021). At the same time, children are becoming more aware of their financial circumstances and might be more susceptible to family income pathways. This could explain why education is more important for behavioural outcomes during the younger years and income during later childhood.

There is also the possibility that parents' education and family income are associated with children's development through shared pathways. For example, as established, parenting styles (such as parental responsiveness) are pathways through which SES is associated with children's outcomes as stated in the family stress model (Conger et al., 2010). One of the most studied parenting styles is harsh parenting which is consistently shown to be a pathway between family income and children's outcomes (Rijlaarsdam et al., 2013; Neppl et al., 2016; Sutton et al., 2017; Sosu & Schmidt, 2017). However, parental expectations are also associated with harsh parenting as parents with higher levels of education have higher expectations for their children and sometimes use harsh parenting styles to achieve the desired outcome (Ren & Edwards, 2015; Jocson & McLoyd, 2015; White et al., 2016; Pinquart, 2016; Sanvictores & Mendez, 2022). It is therefore possible that different SES dimensions influence children's development through shared pathways. This information could have implications for theory because at present most theories focus on explaining the

pathways between financial pressures and children's outcomes (e.g., the family stress model) but if other SES dimensions are also shown to operate via the same pathways, then there could be scope to build upon family stress models to include additional SES dimensions that operate via the same pathways.

Examining the impact of SES at different stages of childhood also has implications for policy. Since family income was important at all childhood stages, policies that support family income at any time point are likely to improve children's outcomes quicker than supporting the other SES dimensions (e.g., it might take longer to improve education than income). While several policies are designed to support family income during early childhood, there are fewer targeting later childhood which could be an area for improvement. Policies supporting parents' education are likely to be most beneficial if it is targeted as early as possible as parents' education continues to be important at all childhood stages for language ability and early and middle childhood for behavioural outcomes. If intervention is left until late childhood, then parents' education might not be as important for children's behavioural outcomes. Policy targeting parents' occupation is also likely to be most beneficial during early childhood to benefit all outcomes. However, while parents' occupation is important for children's language development at all stages of childhood, its importance for behavioural outcomes tends to diminish over time. Additionally, parents' occupation was not found to be as important as parents' level of education or family income so policy might be more efficient if it focussed on education and income.

7.4.3 Trajectories

This thesis found that there were several different trajectories of family income, parent education, and parent occupation. The family income trajectories that were found were consistent with the range of income trajectories in previous studies which have found between three and six trajectories (e.g., Demment et al, 2014; Jackson et al., 2017; Kendzor et al., 2017; Comeua et al., 2018; Kwon et al., 2022). The novel aspect of this thesis is that it also examined trajectories of different SES dimensions (income, education and occupation) rather than only income trajectories as in previous studies (Demment et al, 2014; Zachrisson & Dearing, 2015; Björkenstam et al., 2017; Jackson et al., 2017; Kendzor et al., 2017; Hoyt et al., 2019). This showed that different trajectories of family income, parent education, and parent occupation could be identified and followed their own unique patterns over the life course. Previous literature examining education and occupation tends to use static measures or use a dichotomous variable to indicate change over time (Magnuson et al., 2009; Harding, 2015; Awada & Shelleby, 2021). This study was able to identify different trajectories of occupation and education to examine whether the different trajectories were associated with children's outcomes.

The findings are in line with previous research showing that the highest income trajectory was associated with the best outcomes, the increasing income trajectory was associated with improved developmental outcomes, and the decreasing income trajectory was associated with worsening outcomes (Zachrisson & Dearing, 2015; Jackson et al., 2017; Hoyt et al., 2019). Similarly, results showed that increasing parents' education was also associated with improved outcomes indicating that children's language and behavioural outcomes can benefit from improvement in either family income or parent education. Parents' occupation trajectories, while moving slightly, remained relatively constant across the childhood

timeline. Although there were decreasing trajectories it could be argued that the decreasing very high-high trajectory and the decreasing high-intermediate trajectory did not differ substantially. It is also unclear whether the increase from routine to semi-routine occupation trajectory improved outcomes as there was no stable routine group to compare findings with. Broadly speaking the findings suggest that parents' occupation remains stable over time which is in line with the literature which shows that social class remains relatively constant across the life course (Goldthorpe, 2016). This has useful implications for researchers interested in the associations between SES and children's outcomes as it shows that not only do the different SES dimensions have associations with children's later outcomes but that different trajectories exist in the population, and each has different associations with children's outcomes. This would benefit researchers who are interested in studying the mechanisms between SES and children's outcomes as these findings suggest that there may be overlapping or unique trajectories through which parents' education and occupation impact children's language and behavioural outcomes.

Study 3 expanded on study 2 and provided novel findings by examining the association between SES trajectories and children's language and behavioural trajectories rather than associations with late childhood outcomes as a static measure. The results found that the language and behaviour trajectories were similar to those found in the previous literature (e.g., Ukoumunne et al., 2012; Weeks et al., 2014; Miller and Votruba-Drzal, 2017). It was found that children in the highest income education and occupation trajectories were most likely to belong to the best language and behaviour trajectories and that increasing income and education trajectories were more likely to belong to improving language and behavioural trajectories compared to their peers that did not improve their income or education. These findings showed that children's developmental experience across childhood was impacted by

their family's SES trajectories and indicated the likely pattern of outcomes trajectories that children would experience. This is in line with the life course theory which assumes that individuals have multiple trajectories across several domains of life and that they can interact with each other. In this case, it shows that children's language and behavioural trajectories are associated with family SES trajectories.

A further novel aspect of this study in addition to examining trajectories of other SES dimensions, this study also examined trajectories over a longer time frame. Previous research tended to focus on early childhood trajectories (Dearing et al., 2001; Kendzor et al., 2010; Zachrisson & Dearing, 2015; Bøe et al., 2016; Jackson et al., 2017) rather than the entire childhood timeline. By using data over a longer time point, this study was able to identify an additional income trajectory and an additional language trajectory compared to previous studies (e.g., Ukoumunne et al., 2012; Miller & Votruba-Drzal 2017; Björkenstam et al., 2017). This ultimately leads to a better understanding of how longitudinal SES is associated with children's development. It also shows the benefit of following a life course approach when examining the associations between SES and children's developmental outcomes as it states that more life events and transitions will be captured over longer timeframes leading to a better understanding of the impact of people's life experiences.

These findings have further implications for the life course theory as the assumptions in both the accumulation of advantage/disadvantage hypothesis and the social mobility hypothesis were supported in both studies 2 and 3. The accumulation of risk model (Power et al., 1991; Kuh et al., 2003) proposes that children's exposure to low SES at several time points each has an association with children's outcomes, but also accumulates to produce a cumulative adverse effect on children's outcomes (Power et al., 1991; Kuh et al., 2003). Study 2 found

this to be the case as the lowest income, education, and occupation trajectories were associated with the lowest child language ability scores and the highest behavioural problem scores. On the other hand, the highest income, education, and occupation trajectories were associated with the highest child language ability scores and low behavioural problem scores indicating the cumulative advantage of higher SES trajectories. Study 3 showed that the lowest SES trajectories were associated with the lowest language and behavioural trajectories which shows that accumulation of risk impacts children's outcomes across the life course. These findings suggest that other SES dimensions, other than income which is normally examined (e.g., Jackson et al., 2017; Björkenstam et al., 2017; Kendzor et al., 2012), can have a cumulative effect on children's outcomes and show that the accumulation of risk model is a useful way to frame research to further examine the associations between SES dimensions and children's outcomes.

The social mobility hypothesis proposes that individuals can continuously move between different social circumstances over their life course and that these upward and downward trajectories can have an association with children's developmental outcomes (Duncan, 1988; Lynch et al., 1994). This study found this to be the case as increasing income education and occupation trajectories were found as well as a decreasing income trajectory. In line with the social mobility hypothesis, the increasing income and education trajectories were associated with better language ability and lower behavioural problems compared to those who did not increase their income and education. They were also more likely to belong to improving language ability and behaviour trajectories compared to those that did not improve their income and education. Overall, life course theory was shown to be useful when applied to the associations between SES and children's language and behaviour outcomes as it was for

identifying new SES and developmental trajectories and examining their associations between different trajectories.

7.5 Overall implications

This thesis found that a significant proportion of children belonged to problematic language and behavioural trajectories over their life course which aligns with the existing literature (e.g., McKean et al., 2017; Hentges et al., 2019; Flouri & Midouhas, 2017; Miller & Votruba-Drzal, 2017; Comeau, 2018). To improve children's language and behaviour outcomes it is essential that policy address socioeconomic inequalities as the United Nations cites poverty and inequality as the largest barrier to improving children's outcomes (United Nations, 2023). Similarly, in a UK-specific context, Cooper and Stewart concluded that any attempt to improve children's outcomes is unlikely to be successful unless it addresses the socioeconomic inequalities associated with children's development (Cooper & Stewart, 2013; 2017). This is especially true as child poverty rates are rising in the UK and inequality is one of the worst in the Organization for Economic Cooperation and Development countries (OECD) (OECD, 2022). The results of this thesis have implications for policymakers to consider if they are concerned with improving children's developmental outcomes by reducing economic inequalities.

7.5.1 Multidimensional support

First, with all SES dimensions (family income, parents' education, and parents' occupation) being associated with all children's language ability and externalizing behaviour at all times, and with internalizing behaviour during early childhood, policy that takes a multidimensional approach to improve family SES is likely going to be most beneficial for children's overall development which would be in line with UK policy that aims to reduce child poverty by

improving family income through work and education as outlined in the Welfare Act (2016). However, most policy support currently focuses on improving family income directly or indirectly (Northern Ireland Executive, 2016; Welsh Government, 2015; Scottish Government, 2018). While this is beneficial for children's outcomes as the results show that family income is important at all stages of childhood, to maximise children's outcomes this thesis suggests that it would be beneficial to place additional emphasis on supporting parents' education and occupation as they were also important at all stages of childhood (although education was not associated with internalizing behaviour during late childhood and occupation was not associated with internalizing behaviour during middle and late childhood, they were still important for language ability and externalizing behaviour at those times).

Since parents' education has the strongest association with children's language ability and externalizing behaviour during early and middle childhood it is likely that intervention here would be beneficial. Although some previous studies found no benefit of increases to parent education (Magnuson, 2003; Harding, 2015) they have only examined education across short time frames (e.g., early childhood). This study examined parents' education trajectories over a longer timeframe and used more data to show that increasing parents' education will likely benefit children in the long term. Evidence of education interventions tends to support the findings of this study as parental education programs have been found to improve parenting practices and reduce children's behaviour problems (Yap et al., 2016; Buchanan et al., 2018). In terms of parents' occupation, this thesis found that higher levels of occupation were associated with better language ability and behavioural outcomes in children which is in line with previous research (Cano, 2022). However, there was very little variation in parents' occupation over the childhood timeline meaning that it could not be determined whether

increasing parent's level of occupation over time would lead to significantly improved language and behaviour outcomes for children.

While a multi-dimensional approach to improving family SES dimensions is likely to benefit children, policymakers will have to carefully consider the feasibility of implementing such a large-scale policy to improve the education and occupation of parents. For example, logistically it might be challenging to implement policies to increase education and occupation as it would require collaboration with several parties (e.g., to identify eligible people, provide the services, and monitor progress), however, it could be possible by using the existing policy infrastructure. A recent example of how this could be implemented can be seen in Scotland where the Fair Start Scotland (FSS) and No One Left Behind (NOLB) policies share the same infrastructure to enable both policies to run in parallel. The Fair Start Scotland program was launched first and developed a network of local authorities, local employability service providers, and third-party service providers to identify eligible people and support them into employment (Chief Economist Directorate, 2019). When No One Left Behind was launched, it was able to utilise the same existing network of partners from FSS to minimise costs and speed up the launch (Scottish Government, 2020). In addition to providing employability support to low-income families, No One Left Behind also provides training and education to eligible people through their service provider partners (Scottish Government, 2020). If future policymakers wished to implement a policy to improve the level of education and occupation of parents, then they would likely be able to use the existing partnerships and extend the eligibility criteria to specifically target parents rather than only low-income families.

The other issue policymakers will likely come across is the cost of such a wide-reaching policy as all policies require a cost-benefit analysis to support the business case for funding.

A recent example of a cost-benefit evaluation of an employability policy in the UK comes from Fair Start Scotland (FSS) (Scottish Government, 2022). The policy has cost £82 million to run but has an estimated benefit to society of £298 million (or for every £1 spent has a £3.60 benefit to society) since the eligible people are earning more, paying taxes, receiving less welfare, and using less services (Scottish Government, 2022). In terms of the eligible peoples' take-home income, for every £1 spent running FSS, the person was £1.40 better off once they gained employment showing that FSS is a beneficial policy. However, the target people for FSS were unemployed to begin with so it is likely that clients were better off because they were initially unemployed and entering employment through FSS. It is unlikely that a new policy targeting parents who are already employed would yield a cost-benefit ratio as high as that seen in FSS because the benefit of supporting people who are already in employment into a higher-paying job will have less of an impact compared to getting unemployed people into work in the first place. Policymakers interested in proposing such a policy might wish to be selective in the eligibility criteria to best target parents that might benefit most. For example, study 2 indicated that children's language ability and behavioural outcomes were similar in both the stable-average and stable-intermediate occupation trajectories which would suggest that improving from average to intermediate occupation might not lead to a large improvement in terms of children's outcomes. However, there was a larger difference in children's outcomes between the routine-semi-routine and stable-average occupation trajectories which would suggest it might be more beneficial to target those with lower-level occupations.

Similar considerations would also have to be made in terms of implementing policy to increase parents' level of education. The results indicated that increasing parents' level of

education from low to high led to significantly better language and behavioural outcomes compared to those that remained in the stable-low education trajectory. However, this represents an increase from standard grades or GCSEs to bachelor's degree level (or equivalent) which would be an unrealistic goal for policymakers to have. For instance, as of 2021 only 26% of 25–64-year-olds held a bachelor's degree in the United Kingdom meaning that the number of parents that would be eligible for education under this policy would be unmanageable and likely unaffordable. As an example of costs, in 2021 Student Awards Agency Scotland (SAAS) spent almost £230 million on tuition fees for approximately 146,000 students in Scotland with overall costs of almost £1 billion when all other support such as bursaries and loans were accounted for (Student Awards Agency Scotland, 2021). The funding required to finance all parents would be unrealistic especially since the tuition costs in the rest of the UK is £9,250 per person per year (OEDC, 2021) compared to Scotland's £1,820. There are also practicalities to consider when supporting parents in education. For example, they will have childcare costs, higher costs of living than a student with no children, and less time to commit to education when raising children. Additionally, achieving a bachelor's degree typically involves at least 3 years in higher education which could also increase the financial burden on families making such courses less likely to attract parents. It is therefore likely that policymakers would have to be selective with the eligibility criteria for parents to ensure that it is affordable. While not as good as increasing parent education from low to high, the results of this thesis also found that increasing parents' level of education from no qualifications to low education also improved children's language ability and behavioural outcomes so policymakers might consider introducing basic education for parents with no qualifications.

Alternatively, further research could examine the pathways between parents' education and children's developmental outcomes to identify why parents' education is important for children. If research can identify what parents with high levels of education do to improve their children's outcomes, then perhaps policy can address those factors rather than directly increasing parents' education through formal education. For example, parents' education is often associated with children's outcomes via linguistic stimulation during parent-child interactions (Coddinton et al., 2014) so policy might be more effective if they taught parents with lower education how to have positive and encouraging interactions with their children to promote positive development. This could provide some of the benefits of having higher levels of education without the large time and financial commitment. Overall, children are likely to benefit from policies that take a multidimensional approach to improving their parents' SES, but policymakers would have to be selective with eligibility criteria to ensure the families that would benefit most get access to support.

7.5.2 Support over the childhood timeline

Second, the results of this thesis also indicate that the dimensions of family SES continued to be significantly associated with children's language ability, internalizing behaviour, and externalizing behaviour from early childhood through to late childhood and that lower SES trajectories were associated with more problematic child outcome trajectories. This is in line with the accumulation of risk theory that proposes the duration of exposure to adverse SES circumstances will lead to worsening developmental outcomes over time (Kuh et al., 2003), and has also consistently been the case in the literature focussing on the persistence of poverty which almost invariably shows that persistent poverty over a longer duration is worse for children's outcomes compared to episodic poverty (Kiernan & Mensah, 2009; 2011;

Schoon et al., 2010; 2012; Holmes & Kiernan, 2013; Dickerson & Popli, 2012; 2014; 2016). These findings have implications for policy as they suggest that support for family income, parents' education, and parents' occupation would continue to be beneficial if it was prolonged throughout childhood. Currently, most policies tend to target family income during early childhood (e.g., free school meals, free childcare, Scottish Child payment, and the Healthy Start scheme) which is beneficial as early childhood is considered a sensitive period where children develop the neuropathways responsible for facilitating cognitive and behavioural processes so policies minimising the adverse effects during this stage of childhood are important (Brummelte et al., 2017). However, the results of this thesis suggest that children are also sensitive to the different SES dimensions during middle and late childhood. In addition, the results also show that when family income decreases, there are negative consequences for children's outcomes and their outcome trajectories over the life course.

These findings present difficulties in terms of how policymakers can use this information as it is likely unfeasible for policies to support family income, parents' education, and parents' occupation continuously over the entire childhood timeline, especially when resources available to policymakers have been reduced (Cooper & Stewart, 2017; Joseph Rowntree Foundation, 2021). Therefore, policymakers would likely have to be selective in how they offer support for family income, parent's education, and parent's occupation over time. For example, this thesis found that parents' education had the largest association with children's language ability, internalizing behaviour, and externalizing behaviour during early and middle childhood and that children were more likely to belong to improving language and behaviour trajectories if their parents belonged to an increasing education trajectory. These

findings suggest that any intervention aimed at increasing parents' level of education would benefit from being administered as early as possible as increasing education earlier would result in children being exposed to more positive interactions with higher-educated parents for longer than if parents' education was increased during late childhood. This would likely have a cumulative positive impact on children's outcomes in line with the accumulation of risk model (Kuh et al., 2003) and previous research on cumulative poverty (Dickerson & Popli, 2012; 2014; 2016). This would also make sense as it is during the earlier years that children's interactions are primarily with their parents and as they get older, they are exposed to other people (e.g., peers and teachers) (Bronfenbrenner, 1986). Therefore, although the results also indicate that parents' level of education is important during late childhood, it would not be the most efficient use of resources to offer educational support to parents at this time.

Another key finding from this thesis is that children are more likely to belong to problematic language and behavioural trajectories if their families belong to a decreasing income trajectory. This is particularly problematic as many of the income support policies are limited to early childhood and end when children reach a certain age (e.g., Free school meals, free childcare, Scottish child payment, and the Healthy Start scheme). When families are no longer eligible for these payments then their income will decrease which the current results indicate could have negative consequences for children's language and behavioural outcomes. This is in line with previous research that also shows decreases in income are associated with poorer child developmental outcomes (Jackson et al., 2017; Miller & Votruba-Drzal 2017; Björkenstam et al., 2017; Hoyt et al., 2019). A recent example of policy decisions that resulted in reduced family income can be seen when the UK government rescinded the £20

per week Universal Credit and Working Tax Credit for low-income families, the consequences of which put 500,000 families and 200,000 children into poverty (JRF, 2021). So, while it may not be feasible to continually provide increases to income across the childhood timeline, policymakers should attempt to avoid income reductions as stable income is less problematic than decreasing income for children's outcomes. Reducing costs for low-income families in other areas might be more feasible than policies that directly give money to people (e.g., the Scottish child payment) and can have long-lasting positive effects on children's outcomes. For example, when families' income is increased due to tax credits rather than receiving money, there are improvements in children's reading ability and behavioural outcomes (Dahl & Lochner, 2012; Hamad & Rehkopf, 2016) with improvement lasting into late childhood and adulthood (Duncan et al., 2010).

Additionally, interventions such as childcare support are also an effective way to reduce the economic strain on families (e.g., reducing the financial cost of childcare and allowing parents to be more flexible with working patterns) while improving children's outcome trajectories. At present, children in England aged 3-4 can get 1,140 hours of childcare per year however it can only be used during term time meaning they get 30 hours of free childcare per week during term time (Department for Education, 2018). In Scotland, children also get 1,140 hours but the age range is increased to between 2 and 4 years old and families can distribute their 1,140 hours across the entire year which grants those families extra flexibility to distribute their childcare in a way that makes the most economical sense for them (e.g., if they work odd hours then they can still get childcare) (Department for Education, 2018; Scottish Government, 2018b). In Wales, children aged 3-4 can get 30 hours of free childcare per week for 48 weeks totalling 1,440 hours per year (Welsh Government, 2022). After the age range has been exceeded, the cost of childcare falls on the parents,

however, if childcare was extended to include later age ranges during non-term times, then this would likely have a positive effect on family financial circumstances and benefit children's developmental trajectories through both less family economic stress and increased positive interaction with the care provider's environment. As per the bioecological model (Bronfenbrenner & Morris, 1986), positive interactions between children and their childcare environments are likely to improve children's developmental outcomes and evidence tends to support this as good quality out-of-home childcare environments are associated with improved children's cognitive and behavioural development from age 6 years onwards (Melhuish, 2015; Gluschkoff et al., 2018). Overall, providing alternative support such as childcare might mitigate the negative impact that low SES trajectories have on children's language and behavioural trajectories.

7.5.3 Addressing stress as a mechanism between SES and child development

Policymakers interested in improving children's developmental outcomes might also consider addressing parent and child levels of stress as stress is considered one of the primary mechanisms through which SES can impair children's developmental outcomes (Masarik & Conger, 2017). This is because stress, when experienced for long enough durations, leads to prolonged activation of the stress response which can create changes in the neurobiological systems and consequently impair children's brain, learning, and behaviour development (Smith & Pollak, 2020; Shonkoff et al., 2021). Although the results of this thesis indicate that family income, parent education, and parent occupation are each associated with children's development over the life course, the Family Stress Model (FSM) would suggest that each of the SES dimensions contributes to parental stress which in turn impacts children's via parental conflict and disrupted parenting (Conger et al., 2010). This is

in line with Masarik and Conger (2017) who contend that the FSM also applies to broader environmental factors beyond purely financial pressures.

Indeed, research shows that family income, parent education, and parent occupation are associated with parental stress which impacts children's outcomes via family conflict, parenting practices, and child stress (Shaw & Shelleby, 2014; Shelleby et al., 2014; Parkes et al., 2015; Dockery et al., 2016; Vahedi et al., 2018; Moreira et al., 2019). For example, evidence indicates that low income is consistently associated with parental stress and family conflict (Shelleby et al., 2014; Simons et al., 2016; Sosu & Schmidt, 2017). Parents with lower levels of education also exhibit higher levels of stress compared to parents with higher levels of education (Parkes et al., 2015; Aizer et al., 2016). Parents with lower levels of occupation have also been shown to have increased job-related work stress that spills over into the child's home environment leading to increased family conflict, poor parenting practices, abuse, and neglect which impacts children's developmental outcomes (Li, Kendall, Strazdins, & Jacoby, 2013; Dockery et al., 2016; Cho, 2018; Moreira et al., 2019; Baldwin et al., 2020; Lawson et al., 2020).

It is also important to note that parental stress can be caused by non-economic pressures. For example, parents who are raising children with disabilities have significantly higher levels of parental stress than parents who are raising typically developing children (Cheng & Lai, 2023). This can be due to several factors such as having to manage treatment and rehabilitation plans, manage the additional costs associated with raising disabled children, and cope with the stress associated with the uncertainty about their child's future (Crnic et al., 2017; Hoff et al., 2019). The increased parental stress has been found to reduce the quality and frequency of parent-child interactions and reduce parent's ability to provide the necessary support for their children (Mbatha & Mokwena, 2023). Similarly, parental stress has been

shown to be higher in families with neurodiverse children (Da Paz & Wallander, 2017; Staunton et al., 2020; Chad-Friedmanet al., 2022). Children with learning difficulties (LD), autism spectrum disorder (ASD), and attention-deficit/hyperactivity disorder (ADHD) typically suffer from isolation, functional impairments, increased socioemotional behaviour problems, and academic difficulties which result in parents reporting higher levels of parental stress (Chad-Friedmanet al., 2022). Although all parents raising children with disabilities have higher stress levels than parents raising typically developing children, the literature indicates that there is also an SES gradient in parental stress levels (Cheng & Lai, 2023).

While parental stress has been associated with children's developmental outcomes, there is also evidence that child-level stress can impair their development (Franke, 2014; Hambrick et al., 2019). Children can also experience increased stress due to economic factors (e.g., food insecurity), family conflict, and impaired parental interactions (e.g., neglect, abuse, poor parenting, parental conflict) (Franke, 2014; Merwin et al., 2017; Liu & Merritt, 2018; Hambrick et al., 2019). There are also child-level stressors that do not necessarily stem from the family. For example, neurodiverse and disabled children can experience increased stress due to isolation and peer rejection (Plexousakis et al., 2019; Chad-Friedmanet al., 2022) and children who experience bullying at school also experience higher levels of stress (Smokowski & Evans, 2019; Andreou et al., 2021). Child stress from these experiences has been associated with increased internalizing and externalizing behaviour and poorer academic outcomes (Goodman et al., 2012; Hair et al., 2015; Burneo-Garcés et al., 2019; Schuurmans et al., 2022).

Another factor that leads to increased parent and child stress is sleep quality (Alotaini et al., 2020) which is particularly relevant to this thesis as sleep problems are more prevalent in

parents and children from low SES families which contributes to developmental inequalities (Boe et al., 2012). Sleep and stress have been shown to have a bidirectional relationship in that people who are stressed are more likely to have sleep disorders, and people with sleep disorders are more likely to experience stress (Merrill & Slavik, 2023). Similar to the above, parents with disabled children are more likely to have poor sleep quality which can exacerbate their levels of stress (Gallagher et al., 2010). Recent research has shown that the quality of sleep leads to higher levels of parent and child stress which impairs children's developmental outcomes (Alotaini et al., 2020).

According to the bioecological model (Bronfenbrenner, 1986), irrespective of the origin of stress, it is likely to cause impaired interactions between children and their microsystems (e.g., the family home) and impair their development. Therefore, policymakers interested in improving children's developmental outcomes should consider targeting parent and child levels of stress. This is in line with a recent literature review that concluded that interventions targeting family coping and stress regulation are likely to be beneficial methods of intervention specifically for low SES families (Mayo et al., 2022). Evidence has shown that mindfulness-based interventions focussing on stress reduction techniques were able to lower parental stress levels which resulted in improved interactions with children and improved child behaviour (Singh et al., 2020). Another stress reduction intervention focused on improving education, problem-solving, and communication between parents and their children (Prithivirajh & Edwards, 2011). The results found that parents felt empowered and confident in their abilities as a parent while children reported that their parents seemed more relaxed, approachable, loving, and inclusive (parents do more activities and engage with their children). Another intervention for specifically reducing financial-related stress also showed positive results by teaching parents coping skills for stress and communication skills for

improving relationships with their family (Wadsworth et al., 2011). The results of the previous interventions therefore give confidence that targeting parent and child stress in low SES families could have a positive impact on children's language and behavioural outcomes and offers an alternative approach to addressing SES dimensions directly.

Overall, this section discussed several ways in which policymakers might find the results of this thesis useful. The results suggested that a multidimensional approach to supporting family SES dimensions for a prolonged duration would be beneficial for children's language and behavioural development, however, it was acknowledged that in practice it would likely be unfeasible to implement such broad policies to address the SES dimensions directly. Alternative suggestions were discussed including being more selective with eligibility criteria for policy support and the timing of when support should be made available. Additional recommendations were made to target intervention toward reducing stress as the family stress model indicates that stress is an important mechanism in the SES-child development relationship (Conger et al., 2010; Masarik & Conger, 2017) and such interventions are likely more feasible than large-scale income, education, and occupation policies.

7.6 Limitations

There are several limitations in this thesis that should be acknowledged. The first limitation is missing data. Missing data are inherent in secondary longitudinal data that disproportionately affects lower SES families which could potentially lead to bias. There are two forms of missing data in this thesis: panel attrition and item-level missingness. Despite the problems that can be introduced by missing data several methods are used to mitigate potential bias in the sample. Longitudinal nonresponse weights are provided to account for attrition and sample design (Plewis, 2007; Mostafa, 2014) while item-level missingness was handled by

full information maximum likelihood which produces unbiased estimates (Enders & Bandalos, 2001; Larsen, 2011). The second limitation is that this study did not account for potential genetic-environmental confounding. Since genetic factors are associated with both SES and children's developmental outcomes (Pingault et al., 2015; Krapohl & Plomin, 2016), it is likely that biasing the extent to which family SES dimensions are associated with children's language and behavioural outcomes.

The third limitation is the measures used. The measures used in longitudinal data are restricted to those that fit the original researcher's purposes. The use of different language ability measures at each time point must be acknowledged as a potential limitation. The British Ability Scale subscales were used to measure language ability during early and middle childhood, but not during late childhood. Instead, the Applied Psychology Unit Standardised Vocabulary Test was used during late childhood. Given that the British Ability Scales were appropriate for use during late childhood, it may have been beneficial to use the same tests over time as it would provide more confidence that the desired constructs are being measured over time. Despite this, previous studies show that correlations between the British ability scales and the Applied Psychology Unit Standardised Vocabulary Test were adequate for use together (Hill, 2005; Girard et al., 2017; Sullivan et al., 2017). This study also found that language ability measures were correlated in line with previous research.

The fourth limitation is the method used to identify trajectories. Trajectories of family income, parent education, parent occupation, children's language ability, internalizing behaviour, and externalizing behaviour were all identified using latent class growth analysis which requires researchers to select the appropriate number of latent classes at their discretion. While goodness of fit indices are used to guide researchers to the best fitting

model, they do not dictate the final model selection. Researchers must consider the research question, theory, and data alongside the goodness to fit indices when selecting the appropriate model (Jung & Wickrama, 2008). This is inherently problematic as researchers may draw different conclusions when deciding on the best model to use for their studies. Still, since the family income trajectories found in the study are similar to those found in previous studies, it provides confidence that researchers are following similar methods when selecting trajectories. However, there is no frame of reference to draw upon regarding education and occupation trajectories and this should be considered when drawing conclusions.

The fifth limitation is how parents' education and occupation were measured over time. This thesis was interested in the highest household level of parent education and occupation which was measured at each time point and used to generate trajectories. This method does not provide information about which parent has the highest education and occupation at each time point or whether the parent with the highest level of education changed over time. While both maternal and paternal education and occupation have significant associations with children's developmental outcomes (Erola et al., 2016; Jeong et al., 2017), some studies indicate that maternal education is more important (Jeong et al., 2017). On the other hand, evidence indicates that maternal education is most important for children's outcomes during early childhood and decreases over time while the association between fathers' education and children's outcomes increases over time (Erola et al., 2016). However, since both maternal and paternal education and occupation are significantly associated with children's development, measuring the highest level of household education and occupation was appropriate for this study.

7.7 Future research

7.7.1 Examining pathways between SES and children's developmental outcomes

While research following the family stress model has consistently shown that economic stress is associated with children's developmental outcomes via disrupted parenting and interparental relationship problems (Conger et al., 2010), there are likely several other pathways through which parents' economic stress is associated with children's developmental outcomes. To identify new pathways, it would be beneficial to conduct qualitative research with families to better understand how they believe economic stress might affect the home environments that children interact with and their children's development. Thematic analysis in particular is likely to be beneficial because allows interview responses from participants to be collected and broad themes to be identified. Each broad theme may contain several more focused subthemes which can be examined in more detail (Braun & Clarke, 2006). For example, a recent study by Mathur et al. (2023) has shown the utility of qualitative research in identifying pathways between parental stress caused by the COVID-19 pandemic and children's outcomes. By interviewing parents about their experiences during the COVID-19 lockdown, the researchers were able to identify new stressors that parents believed had an impact on their children. A thematic analysis of parents' responses identified that "virtual schooling" was a common stressor for parents and was one of the main overarching themes in the study. The "virtual schooling" theme contained several subthemes such as parents having to learn how to properly facilitate virtual schooling, parents acting as teachers, learning new technologies, and overcoming technology issues. Parents believed each of these themes had an impact on their children. This study is an example of how qualitative research can be useful in identifying new pathways between parental stress and children's outcomes.

To help visualise how thematic analysis might expand the research in this thesis, the family stress model (FSM) is presented below. The FSM proposes that parental stress, because of economic pressure, is associated with children's developmental outcomes via two pathways: Interparental relationship problems and disrupted parenting (see boxes 4a and 4b in figure 2 below).

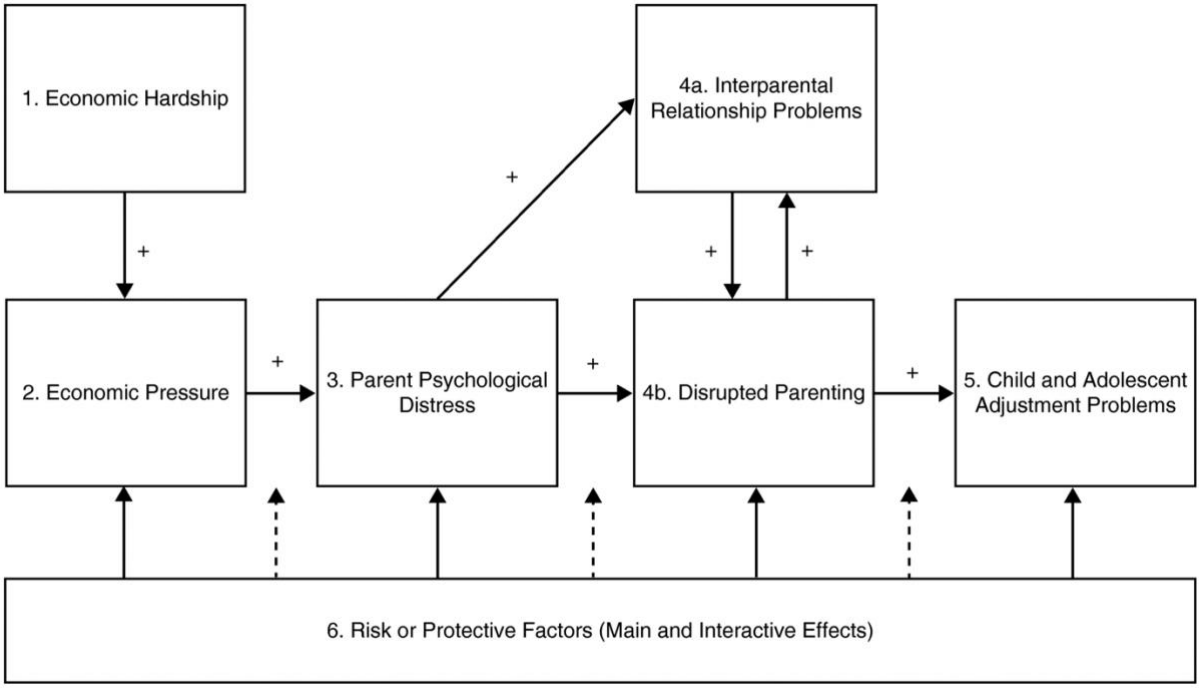

Figure 2. Family Stress Model (figure in Masarik & Conger, 2017)

Both of these pathways can be considered main themes with several subthemes falling under them. For example, interparental relationship problems (box 4a) is a broad theme that contains several subthemes that have been examined in the literature such as parental relationship satisfaction, relationship quality, work-related conflict, child-related conflict, family structure security, researcher-observed hostility and negativity (Cummings et al., 2015; Masarik & Conger, 2017; van Eldik et al., 2020). Similarly, disrupted parenting (box 4b) is also a broad theme which contains several subthemes that have been examined in the literature, for example, harsh parenting, unresponsive parenting, child maltreatment or abuse,

and child neglect (Rijlaarsdam et al., 2013; Masarik & Conger, 2017; Liu & Merritt, 2018; Zhang et al., 2022). By conducting a thematic analysis researchers might identify additional ways in which interparental relationship problems (box 4a) and disrupted parenting (box 4b) can be operationalised or they may find new broad themes to expand the family stress model (e.g., adding a box 4c into the model to further explain the association between parental stress due to family economic pressure and children's developmental outcomes through new pathways).

On a similar note, since this study shows that family income, parents' education, and parents' occupation each have unique associations with children's developmental outcomes, future research should consider the different pathways through which each SES dimension operates. At present, income pathways have been examined primarily through a family stress and investment framework (Shelleby et al., 2014; Sun et al., 2015; Sosu & Schmidt, 2017) but the current results show that those frameworks may be too narrowly focused on income. The family stress model, for example, states that economic pressure is associated with children's developmental outcomes via several pathways. This thesis shows that the different SES dimensions could be considered economic pressures so research should examine the extent to which the different SES dimensions operate via unique or similar pathways. Similar to the above discussion, qualitative research may also be useful to identify unique education and occupation pathways.

7.7.2 Considering sex differences

Future research should also consider examining different subgroups as this thesis did not analyse the different associations that SES dimensions might have with different groups of people. There is a strong case for future research to examine whether the differences in the

associations between SES and children's outcomes at different stages of childhood and the associations between SES trajectories and boys' and girls' outcome trajectories differ depending on the sex of the children. Examining sex differences at different time points might be useful as evidence shows that language ability, internalizing behaviour, and externalizing behaviour can differ between boys and girls at different stages of childhood. For instance, it is well-documented that girls have better language ability than boys from early childhood with larger vocabularies and fewer language developmental problems (Eriksson et al., 2012; Lange et al., 2016; Adani & Cepanec, 2019). There is also evidence that girls have more prevalent internalizing behavioural problems than boys from early childhood through adolescence while boys have higher externalizing behaviour problems (Keiley et al., 2010 Matos et al., 2017; Gutman & McMaster, 2020; Lau et al., 2021). Given that there are differences in boys' and girls' outcomes across childhood stages, it is likely that SES dimensions will have different associations with boys' and girls' language ability, internalizing behaviour, and externalizing behaviour at different stages of childhood.

Similarly, since boys and girls have different outcomes at different stages of childhood, it is likely that they would also have different developmental trajectories over the life course. For example, if girls have higher language ability than boys during early childhood, then it is likely that they will have better overall trajectories from early to late childhood. Therefore, there will likely be different associations between family SES and the different boys' and girls' outcome trajectories. A recent study by Houweling et al. (2022) supports this idea by examining the associations between family SES is associated with boys' and girls' language ability trajectories during early childhood (1-4 years old), and internalizing behaviour and externalizing behaviour trajectories from early-mid childhood (1.5 – 9 years old). They found that boys and girls both had different trajectories of language ability, internalizing behaviour,

and externalizing behaviour. They also found that girls from low SES families had higher problematic language ability and internalizing behaviour trajectories than boys, while boys from low SES families had higher problematic externalizing behaviour trajectories. These findings suggest that there are gender differences in the extent to which SES affects boys' and girls' different developmental outcome trajectories, but it does not examine whether the trajectories of different SES dimensions also have different associations with boys' and girls' outcome trajectories. It would be important to examine this as there is evidence that different dimensions of SES have different associations with boys' and girls' outcomes. For example, recent research found that both family income and parents' level of education had direct associations with male reading ability while only parents' level of education was associated with female reading ability (Guo et al., 2018). Future research should therefore build on this thesis and previous research by examining the extent to which the trajectories of different SES dimensions are associated with boys' and girls' language ability, internalizing behaviour, and externalizing behaviour trajectories across the different stages of childhood.

7.7.3 Considering neurodiversity

Future research should also examine the associations between the different dimensions of SES and children's language ability, internalizing behaviour and externalizing behaviour in neurodiverse children (e.g., children with autism spectrum disorders (ASD), attention deficit hyperactivity disorders (ADHD), and learning difficulties (LD)). Neurodiverse children tend to have more impaired language abilities, internalizing behaviour, and externalizing behaviour compared to their neurotypical (typically developing) peers (May et al., 2015; Howlin & Magiati, 2017; McGuinness et al., 2017; Simonoff et al., 2020; McRae et al., 2020: Vassiliu et al., 2023). For example, recent research found that children with ADHD scored 12% less in expressive and receptive vocabulary than typically developing children while

children with learning difficulties scored 27.8% less in receptive vocabulary and 40.5% less in expressive vocabulary compared to typically developing children (Vassiliu et al., 2023). Children with ASD have also been found to score significantly higher for internalizing and externalizing behaviour problems than typically developing children (Li et al., 2020). These differences in neurodiverse children lead them to have different developmental trajectories compared to typically developing children. For example, Landa et al. (2012) examined the language and behaviour trajectories of children with early ASD (diagnosis before 14 months), late ASD (diagnosis after 14 months), and neurotypical children over the first three years of life. They found that neurotypical children had better language and behaviour trajectories compared to children in both the early and late ASD groups. They also examined the extent to which children from each of the three groups exhibited diminishing language skills over time by assessing language ability at multiple time points. They found that 29% of children in the early ASD group had diminishing language skills compared to 19% in the late ASD group, and only 2% in the neurotypical group. These findings indicate that it is likely that different language ability and behaviour trajectories would be found in neurodiverse children.

There is also evidence that family SES has different associations with neurodiverse children's outcomes compared to typically developing children. For instance, research has shown that although low SES is associated with poorer language ability for all children, the negative effect is worse for children with ASD (Olson et al., 2021). Similar research has found the same pattern in children's behavioural outcomes with low SES being associated with more problematic behaviour in children with ASD compared to their typically developing peers (Olsen et al., 2022). With evidence indicating that neurodiverse children have different outcomes and outcome trajectories compared to typically developing children and that SES has different associations with neurodiverse children, it would be beneficial if future research

examined these associations in more detail to better understand the extent to which the different trajectories of SES are associated with neurodiverse children's developmental outcomes in order to better inform policy.

7.7.4 Considering different contexts

Future research should also consider the wider social context in which families live as areas with different levels of deprivation might influence the SES trajectories that are found and ultimately the associations between family SES and children's developmental outcomes. This thesis focused on national cohort data which found income, education, and occupation trajectories based on data from across the entire UK. However, if future research were to focus on particular areas such as high or low SES neighbourhoods it is likely that different trajectories would be found since research has consistently found that people from affluent areas have higher levels of income, education, and occupation than people from deprived neighbourhoods (Zuccotti, 2019; Nieuwenhuis et al., 2021; Troost et al., 2023; Kelly & Evans, 2023). It is therefore likely that the trajectories found in affluent and deprived neighbourhoods would differ. It is worth noting that even if similar SES trajectories were found in both affluent and deprived neighbourhoods in the sense that the trajectories over time moved in the same direction, their meaning could be different as a "high" SES trajectory in a deprived SES neighbourhood may not necessarily be considered "high" in a more affluent area.

For example, in Scotland, the most recent data on local-level household income estimates indicate that the average weekly income in the most deprived area was £208 per week while the most affluent areas had an average weekly income of £1,643 (Scottish Government, 2018). If income trajectories were examined independently in each of these areas, it is likely

that both areas would have a “high income” trajectory since trajectories are estimates of the data provided. However, the “high income” trajectory from the deprived area would not represent the same monetary value as the “high income” trajectory from the affluent area. Therefore, although families from both areas may categorised into a high-income trajectory, the associations that each of the “high-income” trajectories would have with children’s developmental outcomes are likely to differ. It would therefore be beneficial if future research examined SES trajectories in contexts with different levels of affluence and deprivation to better inform policymakers on how to benefit people at a local level.

7.7.5 International research

Future research should also conduct similar studies in an international context. The current thesis used a nationally representative UK sample which may not reflect the associations between SES dimensions and children’s outcomes in other countries with different social contexts and policies. While there is evidence that similar income trajectories are found across different countries (Dickerson & Popli, 2016; Jackson et al., 2017; Miller & Votruba-Drzal 2017; Björkenstam et al., 2017; Mok et al., 2018; Lai et al., 2019; Hoyt et al., 2019; Pryor et al., 2022), the same evidence base does not exist for education and occupation trajectories. It is possible that different trajectories of education and occupation would be found in other countries if they place different levels of importance on them. For example, the UK has prioritised policies to help people get into work or return to education (Department for Business Innovation & Skills, 2012; Northern Ireland Executive, 2021; Welsh Government, 2022; Chief Economist Directorate, 2022) but the same priorities may not be present in all countries, particularly in lower-income countries (Crawfurd et al., 2021) which could impact the education and occupation trajectories found in those countries. Even where similar levels of importance are placed on education and occupation, they may not be

as important for children's development in other countries. For example, the UK and US both tend to view education as important however Jackson et al. (2017) found that mothers' level of education was only important for children's language ability and externalizing behaviour in a UK sample, and not important in a US sample where family income was the only important SES dimension for children's development. Overall, it should not be assumed that the results found in this thesis will apply to other countries and future research should address this.

7.8 Conclusion

This thesis shows that each dimension of socioeconomic status has a unique association with children's developmental outcomes at each stage of childhood and that the importance of each SES dimension varies depending on the outcomes being examined. It also shows that the SES dimensions and child outcomes are not static constructs and can vary over the life course. The different trajectories of SES each have a unique association with children's language ability, internalizing behaviour, and externalizing behaviour. These associations underscore the utility of legislation requiring authorities to measure income, education, and occupation (Welfare Reform and Work Act, 2016) is likely to be beneficial for children's outcomes. Considering future policy, this thesis suggests that it would be beneficial for policymakers to expand current legislation to take a multidimensional approach to support family SES over the course of a child's life in order to improve their developmental outcomes.

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Appendix

Ethical approval for this study

From: Eugenie Samier
Sent: 10 December 2018 14:23
To: Edward Sosu; Simon Hunter; Scott Orr
Subject: Ethics Approval

Type 1 Ethics Application Approval

Dear All

Testing the mechanisms between income dynamics and children's developmental outcomes

CI Dr. Edward Sosu Chief Investigator

Other Investigators:

Simon Hunter
Scott Orr

I can now confirm full ethical and sponsorship approval for the above study.

Regards
Eugenie A. Samier
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