DOES FAMILY COMPLEXITY MATTER FOR CHILDREN'S WELL-BEING AND DEVELOPMENT?

An examination of children's experience of family complexity and their socio-emotional well-being and cognitive development using the Millennium Cohort Study

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Abstract

How the characteristics of their families affect children's well-being and development has long being of interest to researchers. Consideration of the demographic characteristics of the family has in the past predominately focused on the partnership of the parents, this thesis looks beyond this to create a broader measure of structural family complexity. Family complexity consists of both the parental partnership history of the parents in the family and the degree of relatedness amongst siblings in the family. This thesis looks at parental partnership history and the child's sibling group structure individually before combining both these aspects to examine the role of family complexity for children's well-being and development outcomes. In doing so, this thesis aims to offer an insight into what aspects of children's family structure matters for children's well-being and development and therefore how best to promote their outcomes.

The thesis uses data from the Millennium Cohort Study, using problematic externalising and internalising behaviour and age adjusted poor reading ability as outcomes at the age of seven. Three alternative ways of measuring parental partnership, trajectory, transitions, and status are examined individually and then compared in order to outline the implications of these different specifications. The association between children's complex sibling groups and their outcomes is investigated, with an association between complex sibling groups, i.e. those with half siblings, and poorer outcomes for children. Finally, family complexity is examined using logistic regression, both with and without interaction effects, and propensity score matching.

The results of this analysis suggest that the composition of the child's sibling group is more informative of their likelihood to have poor outcomes than their parent's partnership. Poorer outcomes are associated with younger half siblings and stepparents but not with stepparents only for externalising behaviour. Children who have older half siblings, regardless of their biological parent's partnership status, are at increased risk of poorer reading outcomes for age.

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Author's declaration

All work presented here is my own and has not been previously presented for an award at the University of York or elsewhere.

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Chapter 1. Introduction

1.1 Introduction

This thesis aims to examine the associations between longitudinal experience of family complexity and children's socio-emotional well-being and cognitive development in middle childhood. Family complexity occurs when a child lives in a family which is characterised by parental partnership instability and has half or step siblings in their siblings group. The distinguishing feature of family complexity is that it reflects both the partnership of the child's parents and the parentage of their siblings. Family complexity has emerged in recent years as an important concept in defining the demography of children's families in the US. The first identified study to look at family complexity in relation to children's well-being was Case, Lin and McLanahan (2001), and interest in family complexity has increased with a recent issue of The Annals of the American Academy of Political and Social Science in 2014 devoted to the subject (Volume 654, Issue 4). US research suggests that family complexity is associated with poorer outcomes for children and is has more explanatory power than parental partnership in relation to children's socio-emotional well-being (Halpern-Meekin and Tach, 2008; Harcourt, 2015; Hofferth, 2006; Strow and Strow, 2008) and children's educational outcomes (Case et al, 2001; Ginther and Pollack, 2004; Gennetian, 2005; Stundstrom, 2013). In the main these studies have looked at teenagers with limited research looking at children under 12 (Gennetian, 2005; Strow and Strow, 2008). Family complexity shows promise as a way of understanding which demographic characteristics of families are indicators of children who are struggling with poor socio-emotional well-being and cognitive development. The promise of family complexity as an indicator of poor well-being and development has led me to investigate if there is an association between family complexity and children's well-being in the UK. To my knowledge no study has attempted to look at family complexity defined in this way in the UK, so this study is the first to extend the concept of family complexity to British children.

The need for this thesis is briefly outlined in the rest of this introduction, both in terms of how family complexity relates to children's lives and the existing literature. The approach taken by the thesis to addressing the need for the investigation is the then outlined. Research questions are then specified before the structure of the argument to be advanced is outlined.

Family relationships have been found to be the biggest single factor determining how happy children report themselves as feeling (Bradshaw and Keung, 2011; Layard and Dunn, 2009). Complex families are characterised by complex relationships, in both a structural and emotional sense. In a structural way in a complex family it is not clear to either observers or members of the family who constitutes a member of the family, this is boundary ambiguity (Carroll et al, 2007). The ambiguity of who is a member of the family means that role and responsibilities between members of the family are negotiated (Brown and Manning, 2009) which increases the complexity of the environment in which the child is developing (Bronfrenbrenner, 1979). The emotional relationships within complex families are likely to be strained as complexity would have been unlikely to occur otherwise. Where interparental relationships are strained there can be spill over into the parenting relationship with their child (Stroud, 2015). Parents may see parenting as being intrinsically linked to a romantic relationship and when the inter-parental relationship is no longer romantic, and in particular when a coparent has a new partner, the non-resident parent may be unwilling to commit to parenting their shared child (Tach et al, 2010). Stepparents do not appear to be perfect substitutes for biological fathers (Carlson and Berger, 2012). Maternal parenting also appears to be affected by the process of repartnering (Beck et al, 2010). This suggests that there are two distinct ways in which family complexity can impact on the family relationships which are so important for children's happiness, namely by introducing boundary ambiguity into these family relationships and by spill over from the co-parenting relationship and the parental romantic relationship into the parent child relationship.

As well as the immediate impact of family complexity on the family relationships which are so important for the child's immediate self-reported happiness there are possible long term effects throughout the life course of growing up in a complex family.

In the long term experiencing parental separation has been found to be associated with an increased likelihood of divorce as an adult (Kiernan and Cherlin, 1999); early home leaving and having children outside of union (Cherlin et al, 1995), these effects do not seem to be less severe as parental partnership breakdown becomes increasingly common (Sigle-Rushton et al, 2005). In the United States where family complexity is a more developed research area there is an emerging view as the family complexity field develops that disproportionate experience of family complexity amongst poor and minority children is a key explanation in the poorer outcomes experienced by poor and minority children (Meyer

and Carlson, 2014). The direction of the relationship is debated in the literature and family complexity could be a cause or a consequence of poorer family outcomes (Sawhill, 2014).

The immediate effects of family complexity on children's happiness and the long term effects on children's life chances represent both children's present well-being and future well-becoming (Ben-Arieh and Frones, 2011). The distinction between the present well-being of a child and the future well-becoming of the child is of increasing importance in the broader field of child well-being (Bradshaw and Richardson, 2009). The evidence that family complexity has consequences for both present well-being and future well-becoming leads to the conclusion that family complexity has significant consequences for children who experience it at various points in their life course, and is important in considering the Life Chances of a child which aligns the investigation into family complexity with current trends in children and family policy (Cameron, 2016).

Having outlined long and short term consequences for children in experiencing family complexity that have been indicated by existing research the prevalence of family complexity in contemporary Britain is necessary. Investigating the links between family complexity and children's well-being and development is methodologically contingent on how many children are exposed to family complexity, as different methods are appropriate for a large scale phenomenon than a relatively rare one.

As family complexity as used by this thesis includes both changes in parental partnership and the presence of a complex sibling group. A complex sibling group is one which includes half or step siblings. Relatedness of siblings is not something which is collected in ordinary registration data, and census household grids make no distinction between full and half siblings (ONS, 2011). This means that no representative data of sibling group composition over time have been identified to inform how widespread sibling group complexity is amongst British children. This lack of data has led to a lack of identified research into sibling group relatedness in British children. In Europe where data, particularly in Scandinavian countries is more informative about sibling relationships family complexity is an increasing trend (Thomson, 2014).

For estimating how widespread family complexity is amongst British children it is necessary to rely on estimates of stepfamilies, not all of which will be complex families as is understood by this thesis and ignores those lone parent families who are complex.

Office for National Statistics estimates based on 2011 census data indicate that 9% of children under the age of 16 lived in a stepfamily (ONS, 2014). Children living in stepfamilies include biological children of the resident parents, but at least one of the parents in the household is a stepparent to another child in the household because as outlined above the census does not distinguish full and half siblings. The Office for National Statistics estimates suggest that the proportion of families who are stepfamilies fell between the 2001 and 2011 census (ONS, 2014). Whilst this is probably in part explained by the general increase in age at motherhood and that children in 2011 were generally younger than those in 2001 as a result of this shift to later motherhood and hence were at a different point in the family cycle (ONS, 2013), there remains the possibility that family complexity has peaked because all mothers are getting older.

As these estimates a cross sectional rather than longitudinal this does not fully capture children's experience growing up as some children with have periods of living in a complex family, as for instance older half siblings grow up and move out, or they or their half siblings move between living with different biological parents. Additionally not all stepfamilies are complex as family complexity is used in this thesis. These limitations suggest that the 9% figure of the number of children who have experienced family complexity is only advisory, none the less family complexity would appear to be a fairly widespread phenomenon and is best understood as such.

The short and long term consequences of family complexity and the relative frequency with which it is found make family complexity an interesting aspect of the relationship between family and children's well-being and development to study. There is relatively limited research on family complexity. The literature review for family complexity did not locate any research which looks at British children. There were only three papers located which looked at outcomes for children (rather than adolescents) growing up in complex families (Gennetian, 2005; Strow and Strow 2008; Hofferth, 2006) all of which use US data. There are a small body of studies which use Swedish data (Sundstrom, 2013; Turunen, 2014; Bjorkland, 2007) which may be contextually more similar to the UK than the US (Kiernan et al, 2011). There is a need in the literature for more studies which look at the association between family complexity and children's well-being and development amongst pre-adolescents. The relative lack of literature which looks at family complexity amid British children is striking. This thesis can contribute to examining the relationship between family complexity and children's outcomes in general and provide representative estimates of the frequency with which young British children experience family complexity.

This thesis aims to estimate the proportion of British seven year olds who have some form of family complexity in their residential family. Having established which children live in a complex family the thesis then seeks to understand the association between family complexity and children's well-being and development. To explain how this is intended to happen the theory, data and analysis presented in this thesis is introduced.

The theory of family stress (Hill, 1958; Paterson and McCubbin, 1983) is used to understand why family complexity might lead to difficulties in the family system. These difficulties in turn translate into poorer child development through their influence on the child's environment, as understood using ecological theory (Bronfrenbrenner, 1979). By understanding the family as a system with its own vulnerabilities and difficulties the structural ambiguity can be understood as a weakness of the family system, so a family that is structurally ambiguous with families uncertain of their responsibilities towards each other which means that the family does not have an uncontested perception of itself which is necessary for the family to adequately adapt to stress (McCubbin and Paterson, 1983). Family stress theories allow resources to vary between families, and the different adaptations of families to family complexity is the result of the different resources of the families (McCubbin and Paterson, 1983). When families adjust to the stress of developing family complexity in maladaptive ways this can create conflicts or problems with the different spheres of child development which leads to poorer outcomes for children (Bronfrenbrenner, 1979).

As family complexity in the UK is a relatively underdeveloped research field the papers identified in the literature review are broadly pragmatic descriptions of association and do not attempt to understand the mechanisms by which family complexity is linked to children's well-being and development. Family stress theory is used to explain why parental partnership instability is linked to children's well-being and development (e.g. Osbourne and McLanahan, 2015; Cooper et al, 2011; Beck et al, 2010). As family complexity is being investigated as an agent of change and uncertainty in the child's environment, rather than the presence of half siblings per se, family stress theory provides an appropriate framework for understanding how family complexity relates to children's well-being and development.

In order to examine family complexity in young children in the UK the Millennium Cohort Study has been chosen as the data source. The Millennium Cohort Study has very detailed information about the households that children live in and how they are related to the focal child and to each other (Hansen, 2012). The level of detail that the relationships

between co-resident family members are recorded allows classification of family types to be carried out in great detail and with a high degree of accuracy. The Millennium Cohort Study is unique in providing a nationally representative survey of British children with such detail about the composition of their families (Plewis, 2007). Using this dataset is the best way to generate nationally representative estimates of the prevalence of complex family forms for British children in early childhood. The Millennium Cohort Survey also includes data relating to the social and emotional well-being and cognitive development of children (Johnson, 2012). Using the Millennium Cohort Study to examine family complexity amongst British children and how it relates to their social and emotional well-being will address some of the gaps in knowledge identified.

As well as estimating the prevalence of family complexity using the MCS household grids the association between family complexity and children's well-being and development will be examined. In order to do this the constituent parts of family complexity, namely parental partnership instability and sibling group complexity will be examined separately before a single measure of family complexity is analysed.

The field of parental partnership instability is well established with enough studies to enable a large systematic review to be undertaken as long ago as 1991 (Amato and Keith, 1991). There is a debate in the parental partnership instability literature about what are the most important aspects of parental partnership for children's well-being and development. Parental partnership has been variously conceived of as a trajectory with both status and the change in status important for children (e.g. Kiernan and Mensah, 2010), as a transition with only changes in status important (e.g. Schoon et al, 2011) and finally as status with only cross sectional parental partnership status important (e.g. Amato, 2001). The different conceptions are derived in different ways and researchers select them on the basis of their understanding of what the most important aspects of parental partnership are. These measures vary in terms of the amount of data necessary to derive them. To examine the consequences for substantive results this thesis will undertake the same analysis with each of these measures of parental partnership. This will inform which conceptions of parental partnership are most important for children's well-being and should be captured by the measure of family complexity. More broadly the comparison of the three measures will inform how best to analyse parental partnership when limited data is available.

There are a number of studies of various aspects of sibling group such as birth order (Lawson and Mace, 2010) sibling group size (De La Rochebrochard and Joshi, 2013),

however the relationship between siblings is relatively little researched. Examining the relatedness of siblings and children's socio-emotional well-being and cognitive development will add to the literature about how the various aspects of children's sibling groups are important.

Parental partnership and complex sibling groups will then be combined to create a single measure of family complexity with regard to the findings of the analysis of the variables separately. This will lead to a measure of family complexity which is sensitive to the findings of previous research. The single measure of family complexity will allow a description of the association between family complexity and children's social and emotional well-being and cognitive development to be offered and how this fits into the broader context. This is to my knowledge the first time that the association between family complexity and children's well-being and development has been evaluated in a population of British young children.

To enable this thesis to address the key gaps identified three research questions have been formulated as outlined in section 1.2. Chapter 1 then concludes with an overview of the Chapters of the thesis.

This thesis uses a number of commonly used words and phrases in a specific way. A glossary is provided in Appendix 1 to share the definition of these words and phrases to help advance the argument of the thesis.

1.2 Research Questions

This thesis has three research questions:

1. How is children's well-being and development affected by their parent's partnerships? Does this differ depending on how you measure the partnership history?
2. How is children's well-being and development affected by the structural relationship between them and their siblings?
3. How is children's well-being and development affected by family complexity?

This thesis will address each of these questions using the same data set and a broadly similar analytical approach.

1.3 Chapter summary of thesis

This thesis is divided into the following chapters outlined below.

Chapter 1. Introduction

This chapter explains what the thesis is about, why the thesis is needed and how the thesis meets this need. The contribution to the field of the thesis is contextualised. Research questions are outlined in this section.

Chapter 2. Theory

Family complexity is a relatively emergent field within the UK and there is no consensus about what the best theoretical way of understanding the processes which link family complexity to children's well-being and development. Family investment theory and family stress theory are discussed and contrasted and the broad theoretical links between family complexity outlined. Ecological theory is introduced to explain how family complexity is linked to child development. The role of incomplete institutionalisation and selection in the process linking family complexity and children's well-being and development is outlined.

Chapter 3. Policy

Policy can relate to family complexity in a number of different ways. Policy can seek to reduce the incidence of family complexity or ameliorate the consequences of family complexity for children. This distinction is explored in this chapter, as well as the degree to which family complexity is present and influential in the policy agenda. Family complexity is contextualised in terms of both the life chances agenda and in terms of the historical and contemporary context of family complexity.

Chapter 4. Literature review

This chapter begins by explaining why children's social and emotional well-being and cognitive development have been chosen as outcomes with reference to the debate about well-being and well-becoming. Existing literature about family complexity is reviewed and the weaknesses of the coverage in terms of age of child and nation in which the research took place highlighted. The literature related to the two constituent parts of family complexity is also reviewed. The parental partnership literature is selectively reviewed as it is an extensive field. Research that relates to British children is prioritised. There is relatively little research on sibling group relatedness, but literature which investigates

intersecting aspects of sibling group, particularly sibling group size and birth order. Finally, the different methodologies used in the family complexity literature are reviewed in order to inform the choice of analytical method for the thesis.

Chapter 5. Dataset, sample and statistical techniques

The choice of the Millennium Cohort Study is explained in this chapter. The eligible sample is outlined. The analytical techniques considered for evaluating the association between family complexity and children's well-being and development are discussed. The reasons for choosing the techniques of logistic regression and propensity score matching are described. The use of the techniques is described alongside the limitations of the technique.

Chapter 6. Variables

This Chapter describes the derivation of the parental partnership variables and the sibling variables and the family complexity variable. The interdependencies between the three variables and how weaknesses in the derivation of one variable impact on subsequent variables. This chapter explains how the household grid was used to give estimates of multipartnered fertility in the Millennium Cohort Study families. The descriptive characteristics of family complexity in Millennium Cohort Study families are presented in this chapter.

The outcome variables are described in this chapter, and the same three outcome measures are used in all the analysis in this thesis. Frequency tables and missing values are presented for these variables.

The variables used to control for common confounders are outlined together with a justification of why they have been identified as likely to confound the association between family complexity and children's socio-emotional well-being and cognitive development. Variables which were considered as control variables are discussed with the reasons why they were not included in the eventual model. Frequency tables for all included variables are presented.

Chapter 7. Association between parental partnership trajectory and children's outcomes

This chapter contains the analysis using logistic regression of the association between parental partnership trajectory and the odds of children displaying problematic

externalising behaviour; problematic internalising behaviour; and poor reading ability respectively.

Chapter 8. Association between parental partnership transitions and children's outcomes

This chapter contains the analysis using logistic regression of the association between parental partnership transitions and the odds of children displaying problematic externalising behaviour; problematic internalising behaviour; and poor reading ability respectively.

Chapter 9. Association between parental partnership status and children's outcomes

This chapter contains the analysis using logistic regression of the association between parental partnership status and the odds of children displaying problematic externalising behaviour; problematic internalising behaviour; and poor reading ability respectively.

Chapter 10. Comparison of the findings of parental partnership trajectory, transitions and status

This chapter compares the findings from the parental partnership trajectory, transitions and status models for each of problematic externalising behaviour, problematic internalising behaviour and poor reading ability in order to examine if there are any differences to the results dependent on how parental partnership is constructed. This is intended to identify the benefits of using a more complex measure and what exactly is lost by using a simpler measure if perhaps data is limited.

Chapter 11. Association between sibling group type and children's outcomes

This chapter contains the analysis using logistic regression of the association between sibling group relatedness and the odds of children displaying problematic externalising behaviour; problematic internalising behaviour; and poor reading ability respectively.

Chapter 12. Association between parental partnership and complex sibling groups jointly and children's outcomes

This chapter contains the joint analysis of the association between parental partnership and sibling group and children's outcomes using both jointly controlled and interacting models.

Chapter 13. Association between single measure of family complexity and children's outcomes

This chapter contains the analysis using logistic regression of the association between parental partnership trajectory and the odds of children displaying problematic externalising behaviour; problematic internalising behaviour; and poor reading ability respectively.

Chapter 14. Propensity score analysis comparing step families with subsequent children with those without

Propensity scores are generated for children who live with a stepparent for their propensity to also have a younger half sibling. This is intended to control for latent differences between families in which there are children born to multiple partnerships and families which follow a similar trajectory with regard to parental partnership but in which no children are born to the higher order partnerships. The younger half siblings and no younger half siblings groups are matched on the basis of this propensity to have a younger half sibling to attempt to disentangle some of the effects of having a younger half sibling. Once the two groups have been matched the regression analysis for each of problematic externalising behaviour, problematic internalising behaviour and poor reading ability are performed to understand what the effects of the birth of a younger half siblings are.

Chapter 15. Key findings

This chapter provides a brief summary of the findings of each of Chapters 7-14. This brings into one place the findings of the thesis in order for the discussion to relate in a simple way to the analytical findings of the thesis.

For the externalising behaviour outcomes in Chapters 7-14 there are relatively consistent findings across Chapters. Chapter 7 finds that children who have experienced the repartnering of their biological parent are at increased risk of problematic externalising behaviour, however this varies by the initial partnership status of their parent, with a protective effect of initially married parents apparent. Chapter 8 finds that children who have experienced the repartnering of their biological parent are at greatest risk of displaying problematic externalising behaviour. Chapter 9 finds that children who are living with a stepparent at the age seven wave are at increased risk of problematic internalising behaviour. Chapter 10 compares the findings of Chapters 7-9. Chapter 11 finds that problematic externalising behaviour is an increased risk amongst children who have younger half siblings, and particularly complex sibling groups. Chapter 12 suggests that understanding the association between family complexity and problematic externalising

behaviour is not best done using interaction models. Chapter 13 finds that problematic externalising behaviour is associated with sibling complexity, even where this occurs without parental partnership change, whereas acquiring a stepparent is not associated with a greater likelihood of problematic externalising behaviour where there is no sibling complexity. Chapter 14 uses propensity score matching to address the issue of unobserved bias between stepfamilies who have subsequent children and those who do not and finds that the difference in the focal child's likelihood to display problematic externalising behaviour can be explained by the fertility within the higher order partnership.

For the internalising behaviour outcome all models in Chapters 7-14 which contain both parental partnership and the economic characteristics of the family do not show any association between family structure and the child's likelihood to display problematic internalising behaviour.

For the reading outcome in the analysis there is a less consistent pattern of association in Chapters 7 -14 than that obtained for the externalising and internalising outcomes. In Chapter 7 the trajectory model finds that initial partnership is more relevant than the changes in parental partnership experienced by a child for the association between parental partnership and children's likelihood to be a poor reader. In Chapter 8 the transitions model finds that there is an association between both experiencing the repartnering of the parent or the breakdown of parental partnership and the child's likelihood of being a poor reader. Chapter 9 finds an association between being a poor reader and both having a currently cohabiting or a currently repartnered parent. Chapter 10 compares the three approaches to understanding parental partnership. Chapter 11 is the sibling group model which finds that only those children with older half siblings are at an increased risk of poor reading ability relative to those children with no full, half or step siblings. Chapter 12 shows that an interaction model is not a good way to understand the way that parental partnership and sibling group work together as family complexity in relation to reading ability. Chapter 13 is the family complexity model and suggests that families which have been blended by the birth of the focal child and the families with the most complex histories are the only ones in which there is a significant association between family complexity and children's reading ability. Chapter 14 does not have any significant results for poor reading ability.

When considered as a whole the analysis presented in this thesis suggest that the composition of a child's sibling group has a greater association with the likelihood of

reporting poor outcomes for a child than the history of their parent's partnership. This association appears to work in different ways for externalising, internalising and reading ability. For the externalising behaviour there is a clear difference between those children who have a stepparent between those who have younger half siblings and who do not have younger half siblings, with problematic externalising behaviour only apparent for those children with younger half siblings. There is no association between family complexity and children's propensity to display problematic internalising behaviour. For poor reading ability, children who have older half siblings have an increased propensity to display poor reading ability for age, regardless of their parent's partnership when compared with other children.

Chapter 16. Discussion

This chapter locates the findings from the parental partnership trajectory, transitions and status analysis in the general literature and highlights areas in which the findings differ from some of the existing literature. This is the case for cohabitation, which is significantly associated with poorer outcomes in my analysis, and is discussed widely in the literature. The findings about complex sibling groups are located in the existing literature. The findings for family complexity from the various different analytical approaches are interpreted in relation to the relevant literature. No examples of the application of the concept of family complexity to British children at the age of seven in this way have been identified in the literature, and the extent to which this is a useful way of understanding children's experience and outcomes is discussed.

Chapter 17. Relating the findings of the thesis to theory and policy

This chapter relates the findings of the thesis back to Chapters 2 (Theory) and 3 (Policy). If the findings of the thesis are consistent with the family stress and incomplete institutionalisation of complex families theories used to provide a framework for the thesis is explored.

The implications for public policy are outlined with particular reference to the consequences of experiencing family complexity. The distinction is drawn between policy problems which affect all complex families, and policy problems which affect only some complex families, but to which complex families may be especially vulnerable. These two different aspects have different roles in explaining the importance of family complexity for children's well-being and development and policy interventions will have different impacts

on this association depending on whether they address a problem universal to all complex families, or one to which only some complex families are vulnerable.

Chapter 18. Limitations of the thesis

This chapter discusses the limitations of the thesis, and expands upon the degree to which these limitations form the basis for future research or if such limitations are due to difficulties in answering these particular types of research question.

Chapter 19. Conclusion

This chapter draws together the discussion, how the thesis relates to policy and theory and the limitations of the thesis to provide an answer to the research questions posed in Chapter 1.

Chapter 2. Theoretical perspectives on family complexity and children's well-being and development

2.1 Introduction

Chapter One has outlined the relevance of family complexity as an area of study and this chapter deploys theoretical perspectives on the association between growing up in a complex family and poorer well-being. This chapter begins by exploring some of the theories which have been used to relate children's well-being and development to characteristics of their families. This will provide the underpinnings necessary to understand why this thesis links children's well-being and development to their family structure. Theories that were considered but were not used in the final thesis are discussed before the final theoretical basis of the thesis is outlined.

Family complexity is not particularly widely investigated with regard to children's socio-emotional well-being or cognitive development because parental partnership has been the most commonly used measure of family structure investigated by researchers. Structural characteristics of the child's sibling group have been researched, but combining parental partnership and sibling group structure is rare. It would seem obvious that parental partnership and children's sibling group composition was intrinsically linked but one important reason why parental partnership and sibling group structure are jointly considered is that the two aspects of family structure are linked to children's outcomes using different theories. Parental partnership structure is linked to children's outcomes using family stress theory (e.g. Kiernan and Mensah, 2010) whereas sibling groups are linked to children's outcomes using family investment theory (e.g. De La Rochebrochard and Joshi, 2013). Family stress theory and family investment theory are difficult to combine, as they have different positions on the mechanism which links economic stress to children's outcomes. Family stress theory understands economic stress as an environmental characteristic which makes mental aspects of parenting harder, whereas family investment theory understands economic stress as an environmental characteristic which reduces the availability of physical resources. When attributing an important role for family complexity in children's well-being and development it needs to be on the basis of one of these two theories, which means differing on the theoretic basis from much of the existing field in at least one of the dimensions of family change. This section outlines the

two theories of family stress and family investment before explaining which theoretical understanding has been used.

To summarise the longer explanation of the theoretic basis of this this thesis family stress theory is used as the basis of understanding of how family complexity may be linked to children's well-being and development, but this is used in combination with a number of other relevant theories, namely boundary ambiguity theory (Carroll et al, 2007), ecological theory (Bronfrenbrenner, 1979) and attachment theory (Bowlby, 1991). Boundary ambiguity describes the specific source of stress for the complex family, ecological theory explains how social norms which surround the complex family are related to children's well-being and development, and finally attachment theory offers an explanation as to how family complexity can directly affect children's well-being and development. As well as these mid-level theories of family functioning micro-level theories emerging specifically from the study of family complexity are reviewed and their application to this thesis outlined.

2.2 Family investment theory and family stress theory

As outlined above researchers primarily looking at parental partnership and those primarily looking at complex sibling groups differ in their theoretical perspectives. Parental partnership uses the theoretical perspective of family stress theory (e.g. Kiernan and Mensah, 2010). In contrast researchers examining complex sibling groups use the theoretical perspective of family investment theory (e.g. De la Rochebrochard and Joshi, 2013)

2.2.1 Family investment theory

Family investment theory is derived from economics and conceptualises children as productive units of parental utility in which parents must decide if to invest in quality or quantity of children (Becker, 1981) and that parents primarily promote their children's development through the provision of developmentally appropriate stimuli and environments (Becker and Tomes, 1994; Mayer, 1997; Blau, 1999). Family investment theory suggests that children of lone parents have poorer outcomes because their parents are less able to provide the appropriate environment for development. The environment for children in stepfamilies depends on the extent to which stepparents are good substitutes for biological parents in terms of providing this appropriate environment. The literature suggests that stepparents are not good substitutes for biological parents (e.g. Schoon 2011) and do not invest in stepchildren as much as biological parents this explains their poorer outcomes relative to children in intact biological families. This explanation is highly structural, and uses the preferences of the parents in terms of maximising their utility from their children to explain the different outcomes for children on an individual level. Family investment theory postulates that parents have preferences as to if they wish to invest in the quality or the quantity of children (Becker, 1981), and their decision about their family size is the expression of these preferences. Note that the different economic resources available to families, and their expectations about their future economic circumstances complicates interpreting family size as an indicator of quality or quantity preferences for children. The distinction between quality and quantity is most useful in explaining any difference in outcomes for children between stepfamilies who choose to have children in a higher order partnership and those who do not because of the implication that parents who create family complexity are taking a quantity approach to maximising their utility from their children. This theory emphasises that children's

development is primarily the result of the material environment of children. The idea that child development is mainly the result of material advantage would suggest that the established disadvantage of children growing up in poverty (Brooks-Gunn and Duncan, 1997) is solely the result of material features of the child's environment, and that quality of parenting or attitudes towards parenting are largely irrelevant. Material disadvantage has a strong association with child development, and some aspects of these poorer outcomes relate to the material circumstances of the family (Field, 2010), but empirical and psychological literature find that family economic circumstances are not straightforwardly determinative of children's outcomes (Shonkoff and Philips, 2000). When economic characteristics are tested in association with child outcomes and possible mediators introduced, the strict material advantage and quality/quantity trade off of family investment theory do not seem to be a satisfactory explanation of the link between children's well-being and development and family poverty (Kiernan and Huerta, 2008). In the child development literature the importance of the association between child development and family poverty is well established, but this is not necessarily solely the result of material disadvantage (relative or absolute) but is a result of the more complex interplay between poverty, parenting and environment of which material disadvantage is only one part (Blau, 1999).

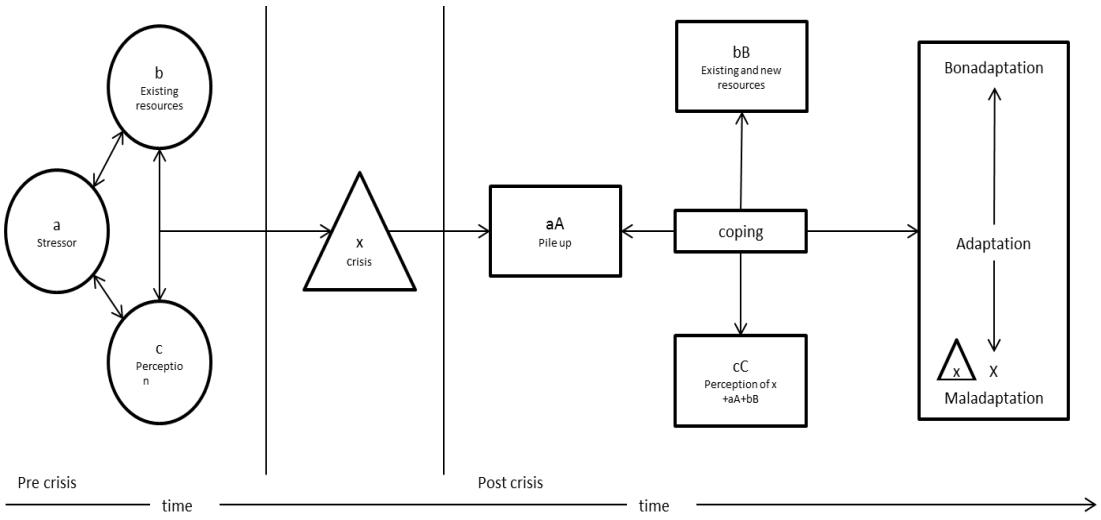
2.2.2 Family stress theory

Family stress theory emerged from psychology, which has substantial schools devoted to both stress and coping and child development (Shonkoff and Phillips, 2000). Family stress theory relates how stress on individual members can lead to stress for the whole family. (Malia, 2006). Family stress theory is not a theory of child development and uses ecological theory (Bronfrenbrenner, 1978) to relate children's outcomes to family stress. Family stress is more flexible that family investment theory as it allows a range of possible stressors, of which material disadvantage may be one (McCubbin and Paterson, 1983). Family stress theory gives an active role to parents, rather than representing them as passive victims of circumstance, and as such is responsive to the different abilities of families to overcome difficulties which may disrupt children's well-being and development and as such is more equipped to explain the different outcomes of families facing similar circumstances than family investment theory. It is the intrinsic flexibility and differentiation between families which has led me to use family stress theory as the structure for

understanding the association between family complexity and children's well-being and development.

It is important to note that the stress in family stress is more broadly defined than just mental stress of members of the family, but refers to stress in the sense of a structural test on the integrity of the family. The most common articulation of the family stress model, the ABCX model of family stress, originates with Hill (1958) and was subsequently refined to the double ABCX model of family stress by McCubbin and Patterson (1983). It is the double ABCX model of family stress which is initially used to explain the association between family complexity and children's well-being and development. The double ABCX model refines on the ABCX model by introducing time into the model, but the basic definition of ABCX remains the same. The ABCX model assumes that families are most of the time in a state of broad equilibrium, in their internal functioning and in their relationships with external actors. Family stress upsets this equilibrium and family stress models explain how families develop a new equilibrium, it is not necessary for either of these equilibriums to be well adapted. A is defined as the demands on the family, this could be any event which disrupts the current equilibrium, the various ways in which families become complex are a demand on the family. B is defined as the resources that the family have to address the stress provoking event. C is the meaning that the family give to the crisis. X is the family adaptation to the crisis, which may be positive adjustment or negative adjustment. The double ABCX model expands this process by allowing the initial stressor to introduce consequent stressors onto the family system all of which need to be absorbed. This is referred to as pile up. Family stress theories are explicitly based on family system theory (McCubbin and Patterson, 1983) which conceptualise a family as not only a collection of interrelating individual parts but as having a distinct collective identity which is more than the sum of its parts (Klein and White, 1996). Figure 1 shows the double ABCX model of family stress; from McCubbin and Patterson (1983) p12:

FIGURE 1: THE FAMILY STRESS MODEL



From McCubbin and Patterson, 1983 p.12.

In terms of how family stress can explain family complexity's effects on children's well-being family complexity can be a stressor in itself (aA), as well as having significant impacts on the family's perception of itself (cC).

First addressing why family complexity may be important in determining the family's perception of itself (C factor) boundary ambiguity theory is used. Boundary ambiguity was originally articulated in the context of families who were uncertain as to if a family member was alive or dead, it has been abstracted into the ABCX model of family stress (Boss and Greenberg, 1984) and has subsequently been deployed as a theoretic construct explaining some of the coping difficulties stepfamilies have (Carroll et al, 2007). When families are characterised by boundary ambiguity it means that neither the family nor observers are sure who constitutes part of the family, and that when a crisis occurs in the family the coping mechanism is impaired as the family has a confused perception of itself, reducing the chances of successful adaptation to the crisis.

Family complexity can be understood as a stressor (A factor) using ecological theory, as espoused by Bronfrenbrenner (1979). The ecological model of the family views the development of the child as happening in a number of linked spheres; namely these levels are the microsystem which is the, the mesosystem, the exosystem, and the macrosystem (Smith et al, 2003). A microsystem is defined as a setting in which meaningful face to face interactions take place, such as the home or school (Bronfenbrenner, 1979). A mesosystem

is a system of microsystems and the rules governing interactions between the various microsystems to which the child is exposed, for example the child's school diary would link the home and school microsystems (Bronfenbrenner, 1979). The exosystem are systems in which the child does not actively participate but in which their actions are taken, and actions taken in this sphere may impact the child, examples of this would be the parent's workplace or a sibling's school. Finally, there is the macrosystem, which is broadly the underlying cultural identity of an individual child's ecology and exists independently of any individual child for example the country the child lives in (Bronfenbrenner, 1979). Children's development can only be influenced by proximate factors in the microsystem, but distal factors elsewhere in the system can in turn influence proximate determinants of the child's development and as such children's development is structurally embedded (Shonkoff and Phillips, 2000). A stressor is created when a complex family does not fit into the ecological milieu in which it finds itself (Melson, 1983). It is in this context that family complexity can be viewed as a stressor event. The misfit could be at the microsystem, mesosystem exosystem or the macrosystem level, but would result in the same process in the family.

Attachment theory is a wide ranging theory which looks at the importance of responsive and reciprocal emotional relationships between children and their caregivers (Bowlby, 1991). This theory can be specifically applied to the theory of family stress, and acts as the link between the family's development and the child's development. Families which are under stress and adjusting to change may not be as responsive to their child's emotional needs, and this could have long term effects on the child's development.

2.3 Specific theories of complex families

As well as abstracted mid-level theory I have chosen to look at the generalised findings of other researchers of family complexity, which have proposed general findings about the effects of family complexity on children without specifically invoking an abstract theoretical system to contextualise these findings. These are micro-level theories. In terms of the ABCX model of family stress these theories broadly relate to the B factor which is the family's resources for dealing with stress.

2.3.1 Incomplete institutionalisation

The single most relevant contribution to this micro level theory of complex families was made by Cherlin (1978) who introduced the concept of 'incomplete institutionalisation' of stepfamilies. This paper highlighted the shortcomings of institutions and social norms designed for simple families or families formed after the death of a spouse as applied to families formed by remarriage. The thesis of incomplete institutionalisation highlights the lack of normative relationships between members of complex families, for example the lack of consensus about the relationship between step parents and step children, and current and previous spouses. The paper focuses on language, law and custom rather than economic or mental stress, and does not discuss children's outcomes at all. Cherlin's incomplete institutionalisation is widely cited in this field but there is little work which tests this thesis but what there is finds the concept of incomplete institutionalisation to be well-grounded in experience and incomplete institutionalisation is widely accepted by families who experience it (Grizzle, 1999). Since Cherlin articulated incomplete institutionalisation family life has changed greatly, most significantly with the growth of cohabitation as a setting for childbearing, which if anything makes incomplete institutionalisation more relevant. To demonstrate the incomplete institutionalisation thesis is relevant the lack of institutions has to be demonstrated. Chapter 3 of this thesis offers an outline of the institutional context of complex families and Chapter 17 relates these findings to incomplete institutionalisation.

As discussed above Cherlin (1978) is broadly taken as a starting point in explaining why stepfamilies/complex families are different to simple families. Sweeney (2010) in a review of the previous decade's work on stepfamilies highlighted four micro-theoretical perspectives which have been used to understand the association between stepfamilies and children's outcomes and which lend themselves to being used to understand the

relationship between family complexity and children's well-being and development. These four proffered explanations are the economic resources of complex families, the parental resources of complex families, the mental and emotional stress in complex families, and finally the selection of vulnerable families into complexity (Sweeney, 2010). It is worth noting that these perspectives are not mutually exclusive and researchers can and do combine them at will. Broadly speaking these are all B factors, family resources, in the mid-level theory of family stress as they determine the resources available to the family to cope with family complexity.

2.3.2 Sources of stress specific to complex families

Emotional stress in the family is associated with decreased functioning and reduced ability to cope with life events (George, 1993). This means that as family complexity evolves, the resources of the family to deal with family complexity decline making adjustment even more difficult. There are spill over effects where stress in one relationship damages another relationship (Cox and Paley, 1997).

Stepfamilies are economically better off than lone parents, but they are not as well off as two biological parent families (Bradshaw and Holmes, 2010) and as poverty is known to be associated with poorer outcomes for children it is postulated that this causes the poorer outcomes of children in stepfamilies in line with family investment theory (Schoon et al, 2011). This does not explain why children in stepfamilies have poorer outcomes than children in lone mother families. Stepfamilies may be exposed to non-monetary forms of economic disadvantage, in particular the complex partnership histories of the parents may have led to transfers out of the household and disrupted parents engagement with the labour force more than in other types of families (Thomson and McLanahan, 2012; Kiernan and Mensah, 2011). The history which has led to the formation of a stepfamily is also possibly associated with problems securing affordable good quality family housing (Feijen and van Ham, 2010), which a snapshot measure of economic circumstance would not necessarily highlight. Lone parents who find it particularly difficult to cope financially may be more likely to repartner than those who find it easier (Beck et al, 2010). The economic difficulties of complex families can both reduce the resources available to a family under stress, and cause a pile up of demands on the family.

2.3.3 Parenting resources of complex families

The parenting resources of stepfamilies are the third possible explanation for the poorer performance of children in stepfamilies. This is for two reasons, firstly step parents are not considered to be a perfect substitute for biological parents, and secondly biological parents in partnership with someone who is not a biological parent are more focussed on establishing and maintaining their partnership than biological parents who are in partnership with each other. The first explanation, that social parents are not a substitute for biological parents, relies on evolutionary perspectives that parents are only interested in the continuation of their gene line rather than being altruistically interested in the development of children (Emmott and Mace, 2014). Evidence of this is mixed and ignores that humans freely choose not to continue their gene line, e.g. adoption and voluntary childlessness, which is counter to an evolutionary approach derived from animal behaviour. More relevant is the commitment of social parents to children who are primarily appendages to their partner, which is associated with their lack of biological relationship but not caused by it (Tach et al, 2010). Biological parents who repartner after relationship breakdown are likely to place a greater importance on partnership than those who do not, and this may be to the detriment of their relationship with their children and it may be that this is the cause of the poorer outcomes seen for children in stepfamilies (Jensen and Howard, 2015; King et al, 2014; Cassoni and Caldana, 2012).

Parental emotional stress is the widely cited resource based explanations for the distinctiveness of the outcomes of children in stepfamilies (see for example Crosbie-Burnett, 1989; Delongis and Preece, 2002). As well as reducing the resources available to the family to cope with the stress emerging from developing complexity, the need for emotional adjustment to any change to the family system can lead to pile up within the family. As family complexity is a process and a highly emotionally charged one emotional stress to the parents can accumulate as the changes accumulate before previous stresses can be adjusted too. The pile up of accumulated parental emotional stress is associated with long term damage to children's outcomes (Lee and McLanahan, 2015; Hakvoort et al, 2011; Kelly and Emery, 2003; Hetherington et al, 1998).

Selection into complex families broadly suggests that adults differ in their propensity to form complex families and they differ with respect to their children's outcomes, and that these propensities co-vary to some extent (Sweeney, 2010 reviews this). This does not imply any causation or directionality and the importance of this covariance is open to

interpretation. It is possible that parents with children with poor well-being and development have fragile partnerships because of their children's difficulties (Panico et al, 2014). The counter to this argument most unequivocally appears in the case of children being raised by their biological parents alongside their older half siblings that the parent's partnership difficulties predate the children's poor well-being and/or development. There is a better case for children's poor well-being or development to be a direct consequence of living in a complex family as referring back to the models of child development cited above this seems more theoretically supported, and as such it seems unlikely that there is a there is a one way direct causal link between the two, but it remains possible. It is more plausible that children's difficulties and parent's propensity to create complex family structures have a shared underlying cause and this is the selection into family complexity which explains why children in complex families have poorer well-being and development than children in simple families. It is not possible to randomly assign families to being complex or not, nor is it possible to fully quantify the factors which make some families complex. Where data is available a family fixed effect model could be used which would use the different experiences of family complexity experienced by children within the same family to account for family level differences in propensity to display poor outcomes, however individual level variance cannot be accounted for in this type of design and the data required may be difficult to collect. The research design selected to investigate the association between family complexity and children's outcomes must state the extent to which any findings reported can be attributed to the selection of families into complexity.

2.4 The theoretical perspective of this thesis

The previous subsections of Chapter 2 outlined the theoretical perspectives used to understand the various aspects of family complexity and outlined the theory which informs my expectations about the role of family complexity for children's well-being and development, this section explains what expectations about the role of family complexity for children's well-being and development I have subsequently derived from the theory.

My understanding of the role of family complexity for children's well-being and development is an elaborated version of the double ABCX model of family stress (McCubbin and Paterson, 1983). My theoretically informed research questions did not look at the 'A' part of this model, the stressor, or the 'C' part of the model, the family's perception of the stressor. The 'A' and 'C' parts of the model are undoubtedly important in explaining how the family adjusts to complexity, but this thesis has focused more on the 'B' part of the model, namely the family's resources to adjust to family complexity. This is because the thesis focuses on how policy can promote children's outcomes in the presence of family complexity and the family's resources are most amenable to intervention by policy actors in order to improve the adaptation of the family unit and consequently the child's outcomes.

A number of different interpretations of how family resources were defined and deployed in the presence of family complexity can be made. These are selection of families on the basis of both their propensity to develop complexity and their children's propensity to have poorer outcomes; the incomplete institutionalisation of complex families; the emotional, financial and parenting stress endured by the family.

Turning first to the idea of selection being an important characteristic of the family's resources, this means that families were selected into complexity with regard to their propensity to display poor well-being and behaviour in their children. Perhaps adults with externalising behaviour problems are more likely to create family complexity (Stroud, 2015), and their own tendencies to display problematic externalising behaviour are reflected onto the child (Smith, 2004). Alternatively lone parents who wish to repartner may systematically have less confidence in their own parenting resources, and a step parent may not substitute for this, and it is this lack of confidence which is behind the observed association (Beck et al, 2010). To address the selection of families into complexity I will define controlled models for all of the outcomes which control for the demographic

characteristics of mothers and children, economic characteristics of the household, maternal mental health and parenting variables. The control variables are intended to represent important dimensions of the child's environment but these are selected highlights to avoid over controlling the models. Evidence suggests that the development of family complexity is emotionally stressful for parents and this affects their ability to foster their child's development (Blekesaune, 2008; Goldberg and Carlson, 2014; Delongis and Preece, 2002). The process of forming a complex family may well lead to economic stress, as this expands the number of children in a household and raising a child will divert time away from the labour market as well as requiring economic inputs (Elder and Caspi, 1988). Repartnering and having a child with a new partner may also alter the economic relationship with other households, with changes to the money flowing into and out of the household relating to children living in other households. Some of these economic stresses are common to all families, but the network of economic exchanges beyond the household which surround the complex family do create a unique challenge. Economic stress does affect complex families, but the evidence reviewed here would suggest that in the main the economic stress affecting complex families is not unique to the structure of the family, but relates to family building.

The next type of stress is parenting stress which is a possible explanation of the association between family complexity and children's observed poorer well-being and development. Family complexity, particularly the poorer outcomes observed for children in stepfamilies dependent on if their mother and stepfather have children may well reflect variation in the parenting contribution of both non-resident biological and resident step fathers in this situation (Emmott and Mace, 2014). The acquisition of a social parent may reduce the willingness of a biological parent to parent their child in the household, and if this social parent acquires a biological child in the household, they may choose to focus on the joint child to the detriment of the stepchild; alternatively the non-resident parent may maintain a relationship with their biological child, but when the child acquires a half sibling may fear dilution of their parenting input to the benefit of the new child and withdraw from taking an active parenting role (Bronte-Tinknew et al, 2009; Tach et al, 2010). Alternatively focusing on mothers, it is apparent that they may struggle with the practicalities of co-parenting with current and possibly multiple past partners to the detriment of their own parenting input into all of their children, especially given that it is likely that the various biological fathers will have different parenting strategies and commitment to joint parenting (Carlson and Berger, 2013). To the extent that mothers are considered to be

gatekeepers to their children, it is possible that mothers can influence the degree to which biological fathers are able to actively parent their children, with perhaps mothers who have new children being less willing to facilitate access to previous partners (Cheadle et al, 2010). Focusing on the mother when explaining parenting stress explains the poorer outcomes of children with older half siblings, but fathers, especially non-resident ones, are so under researched they are a candidate for explaining the otherwise elusive.

The final candidate for explaining family's different resources in the face of family complexity is the theory of incomplete institutionalisation (Cherlin, 1978). Unlike selection and the emotional, economic and parenting stress, incomplete institutionalisation would create difficulties for all complex families. This is because it relies on social norms and its effect comes from violating these norms; these can be norms within the family, or relationships between the family and others, none the less these are exogenously determined to the family. Incomplete institutionalisation applies not only at policy institutions but also to social norms and behaviours. Evidence for incomplete institutionalisation is going to be found by looking at all complex families, rather than those specifically defined as vulnerable complex families.

Incomplete institutionalisation is present most noticeably in the legal sphere. In some regards the legal framework could be behind the differences in outcomes for children depending on their parent's partnership at the time of their birth. Importantly with regard to the children whose parents were cohabiting at the time of the child's birth the Millennium Cohort children (who form the population for this investigation) were born before automatic parental responsibility for unmarried fathers (which was introduced by the Adoption and Children Act 2002), when acquiring parental responsibility for these children required separate application for unmarried fathers under the Children's Act 1989. In principle parental responsibility is important and the absence of it in theory seriously reduces father's day to day rights, but it is unclear how much in settled partnerships and functioning co-parenting relationships this would be an issue. The incomplete institutionalisation of stepfamilies is undoubtedly of more importance when the relationship between parents breaks down. The lack of institutional structure for managing relationships between multiple co-parents means that the resources of the individual parents are important and there is a lack of agreed arbitration structure. In terms of social institutions there are no socially ascribed norms to relationships between members of a complex family, for instance, how do children relate to their older half siblings non-shared parent? How do current and previous partners relate to each other? This lack of norms

mean that relationships between family members, and who is considered to be a family member is constantly having to be negotiated rather than being deemed as they are in simple families. Constant negotiation of relationships can be exhausting and the energy expended on this will detriment the functioning of the family, which may lead to poorer outcomes for children. The contingent and negotiated nature of relationships within complex families implies that any changes within the family group are increasingly difficult to adjust to, because of the number of relationships in the family and the lack of norms. The lack of norms about relationships relates back to emotional and parenting stress, and suggests that because there is a lack of norms this becomes an additional source of stress to the family and this is what effects children's well-being and development. This seems to be a plausible explanation, and potentially explains the association between poorer reading ability and older half siblings, the difference between stepfamilies with and without joint children as well as the distinctively poorer outcomes of the most complicated families. Linking incomplete institutionalisation to emotional and parenting stress also explains the consistently poorer outcomes for children of cohabiting parents as these families are formed outside the institutions of marriage and may struggle to negotiate relationships, between themselves as well as with relevant third parties.

The thesis uses the double ABCX model of family stress to understand the reaction of a family to the stress caused by the development of family complexity. The recognition that complexity is a process rather than an event which can lead to pile up in the family system is important. The family's perception of themselves and their environment is in turn explained by boundary ambiguity and ecological theory, and how these relates to the focal child by attachment theory, which broadly come under the C part of the ABCX model. Characterising the resources of the family and how these enable the family to adapt either positively or negatively to family complexity is more difficult. Specific theoretical perspectives of complex families are used to offer possible explanations of how family resources systematically vary in families exposed to complexity which offer a rationale for believing that complex families have systematically poorer outcomes for children's well-being and development than simple families. With this consideration in mind this thesis will focus on the emotional stress/institutionalisation interpretation vs the selection hypothesis, with the ecology of the family environment and attachment underlying this evaluation. This focus is complicated because emotional stress/institutionalisation and selection are not mutually exclusive and can co-exist, none the less one ought to be dominant.

To summarise, key questions in the relationship between family complexity and children's well-being and development and which are addressed by this thesis are:

- Does emotional stress and incomplete institutionalisation describe the processes linking children's outcomes and family complexity?
- Does selection describe the processes linking children's outcomes and family complexity?
- Do emotional stress/incomplete institutionalisation and selection jointly describe the process linking family complexity and children's outcomes? Is one of these more important than the other?

Chapter 3. Locating family complexity in the policy environment

3.1 Is family complexity a policy issue?

Policy can relate to family complexity in two ways, firstly policy can work to change the incidence and type of family complexity experienced by children; alternatively policy can work to mitigate any consequences of family complexity for children. Family complexity in this thesis is defined as change(s) in parental partnership(s) and the related but distinct presence of multipartnered fertility in the child's sibling group. In the UK there is an underappreciation of the sibling aspects of complex families with policy makers focusing almost exclusively on the parental partnership aspect of family complexity. For this reason policy debates around family complexity have been policy debates around parental partnership with no policy ideas identified which relate to complex families.

In order to understand the policy debates around family complexity it is helpful to use a policy process model in order to understand how policy is formed and who the important actors in the policy process are. In order for a social problem to become the focus of an applied and sustained policy there needs to be a process which loosely starts with agenda setting before moving onto policy formulation (Cairney, 2012). As I show below changing children's exposure to family complexity by reducing the incidence of parental partnership change is on the policy agenda with a number of influential political groups on the right of the political spectrum taking a direct interest such as the Centre for Social Justice, The Marriage Foundation and The Relationship Foundation but there are few substantive policy ideas about reducing children's exposure to family complexity. With regard to the second way in which policy interacts with family complexity, noticeably mitigating the effects of family complexity on children this is a more active policy area, but it is less visible on the policy agenda, and hence less visible to observers of traditional policy arenas (i.e. parliament, political parties, think tanks etc.).

3.2 Policy debates about children's exposure to family complexity

To begin with policy which aims at reducing the incidence of children's exposure to family complexity, this is almost entirely phrased in terms of promoting partnership stability so that children live with their married biological parents as a normative family form. For example the Conservative party manifesto in 2010 contained the commitment "We will recognise marriage and civil partnerships in the tax system in the next Parliament. This will send an important signal that we value couples and the commitment that people make when they get married." (Conservative party, 2010 pp 41) and "To give families more control over their lives, we will put funding for relationship support on a stable, long-term footing and make sure couples are given greater encouragement to use existing relationship support. We will review family law in order to increase the use of mediation when couples do break up" (Conservative party, 2010 pp 42). This commitment to family by the Conservative Party has continued in the 2015 Conservative manifesto which includes a specific commitment to £7.5 million a year for relationship support and counselling and a restatement of the importance of recognising marriage in the tax system (Conservative Party, 2015). This view has support (probably) from the Conservative think tank the Centre for Social Justice "The UK's fiscal system should therefore not penalise two-couple families." (sic) (Centre for Social Justice, 2015). The most active policy actor in the debate around family complexity the Centre for Social Justice a socially conservative Conservative party aligned group, which has an entire policy agenda around family complexity or family breakdown as it prefers to term these events. The Centre for Social Justice puts family complexity at the centre of its analysis of a wide range of social ills and focuses on strongly on promoting married couple parent families as the normative setting for children's upbringing. It is worth noting that the academic and analytical material it bases its conclusions on is methodologically mixed with some of it poor, some of the conclusions are spurious and no attempt has been made to separate opinion and evidence based analysis (The Centre for Social Justice, 2014). The Centre for Social Justice goes further than other think tanks by making specific policy ideas in order to reduce children's exposure to family complexity, such as providing relationship education at a number of points in the life course such as in schools, to adults wishing to get married, in the ante and post-natal period and to parents of older children; reorganising children's services into family services and attempting to involve fathers more closely in children's services (Centre for Social Justice, 2014 pp 20-1). A final reservation about The Centre for Social Justice Report is that it confuses family breakdown, which is broadly children not living with their biological

fathers with troubled families. Troubled families are a tiny minority of families suffering a range of complex problems which require the intervention of social services in no way are these synonymous with family complexity a result of family complexity (Department for Communities and Local Government, 2014). This confusion highlights the importance of clarity of conceptual thinking, which is lacking in some analysis examining the incidence of and consequences of family complexity.

Having located policies which aim to reduce the incidence of family complexity in the policy agenda, and those policy ideas which have been suggested by policy networks I now examine if and how any of these policies have been implemented by the coalition government. When in opposition Prime Minster David Cameron pledged to make his government the "most family friendly ever" (Conservative Party, 2010 pp 41). In terms of actual changes to policy there are two high profile policies personally introduced by the Prime Minister and Chancellor with the stated aim of reducing family complexity. The Prime Minister introduced a programme of investment in relationship support in August 2014 with the explicit aim of reducing parental partnership breakdown (Cameron, 2014), this promised £7.5 million a year for relationship counselling throughout a Conservative led administration, which is ultimately symbolic rather than substantive, working out at around £80,000 per unitary/county council (inc Greater London). The second policy explicitly aimed at family stability is the introduction in the 2013 budget of a transferable tax allowance between married (or civil partnered) couples to begin in the tax year 2015-6. This allowance is intended to bolster marriage in general being as it is specifically linked to being married, rather than to married parents. This tax allowance allows an individual who earns less than the income tax threshold transferring some of their allowance to their basic rate tax paying spouse. Whilst this policy is cited by Cameron in his speech as a way in which the government aims to promote stable parental relationships in which to raise children it is not immediately that this policy will actually do that as it will benefit couples without dependent children as much as those with children and the actual gains to couples will be minimal (in the region of £200 a year). It is most likely to benefit pensioner households given the profile of marriage and income.

Reducing the incidence of family complexity is not a mainstream policy concern and is only of interest to a small group of social conservatives (e.g. Centre for Social Justice). This is reflected in how little policy has been identified which aims to reduce the incidence of family complexity. This reflects how widespread and longstanding family complexity is in society which is reviewed in section 3.6 where a historical contextualisation of family

complexity is outlined. Finally that the effects of family complexity are subtle, see for example the opposing conclusions reached about the effects of parental partnership on children's well-being reached by Kiernan and Mensah, 2010 and Crawford et al 2013 addressing very similar questions and using much the same data. It is possible that that the benefits of marriage are the benefits of a steady income, education and broad social engagement as these family characteristics have been established in the literature as being highly important for child outcomes and parental partnership status is not independent of these characteristics (e.g. Bradshaw and Holmes, 2010; Ford et al, 2004; Goldberg and Carlson, 2014, Hawkes and Joshi, 2012).

3.3 Policy addressing the secondary aspects of family complexity

Having examined policies which directly address reducing children's exposure to family complexity it now remains to move onto policies which are related to the consequences of family complexity. The relevant policy areas include mediating in disputes between separated parents and enforcing parental obligations, but there are more subtle policy interfaces with family complexity. Any service which comes into contact with children and families will have to relate to complex families, particularly schools, paediatric health services and housing providers. Whilst this thesis focuses on the social costs to children of family complexity there is distinct concern in policy dialogues about the economic cost of family complexity. It is therefore necessary to consider the economic consequences because it is often the indirect costs to public services of family complexity which leads to a particular policy being adopted.

To use the language of the policy cycle the consequences of family complexity are implemented policies, and whilst they are subject to adjustment and debate they are none the less established areas of public policy.

Starting with the financial child maintenance services there are obligations on non-resident parents to maintain their biological children, which are legally enforceable. In recent years these obligations have been much changed with a shift from a government funded agency to a user funded agency (Child Maintenance Options, 2015). The actual rules for child maintenance are actually fairly responsive to family complexity and make reasonable allowances for multipartnered fertility, in that maintenance required is judged as a paying parent's income for the number of children and then split proportionately in payment to the children's resident parent, with child related variations applied to this sum (Child Maintenance Service, 2013). For receiving parents who have children with multiple non-resident parents they have to make a maintenance agreement with each individually but this agreement is not affected by the terms of any other agreement they may have with the parent(s) of their other children (Child Maintenance Service, 2013). The child maintenance rules follow the family courts is assigning paternity, and are independent of contact agreements, although adjustments to maintenance payments are made for the number of care provided by the non-resident parent (Child Maintenance Options, 2015).

The next area of policy which addresses the consequences of family complexity are services which facilitate contact between parents and non-resident children. In most cases

arrangements between parents and children who live apart are made voluntarily by separating parents, as the expense of going to court is deliberately intended to keep contact mutually determined (gov.uk, 2015). There is a difference between married and cohabiting parents when it comes to children's access agreements as couple who divorce are forced in order to legally dissolve the marriage to have contact with courts and are routinely offered mediation to reach agreement about child access, whereas cohabiting couples are under no such obligation and as such any disagreement about access to children has to be separately brought to mediation or a family court rather than as part of separation package as for children whose parents divorce. Sibling complexity and relationships between children and former stepparents are unaddressed by family courts, and this is related to a broader unease about the lack of legal ability for children to have contact with their extended family. For example if siblings are raised apart (but not adopted) there is no legal mechanism for ensuring that they continue to have a relationship, when the older child reaches adulthood they can apply for a child arrangements order, or their guardian can apply for one, but there is no assumption of contact (gov.uk, 2015). This applies in the same way to half siblings and as these siblings are more likely to live apart this is a more acute problem. This is the same issue as is more vocally raised by grandparents in that there is no straightforward legal channel for them to access grandchildren. This thesis only considers the well-being and cognitive development of one child within the family but the fractured nature of relationships within complex families may well be a mechanism by which family complexity is associated with children's outcomes.

Finally there are policies which relate to the broader consequences of family breakdown such as housing, education and children's health services. Family breakdown is a possible cause of children becoming homeless and having to be rehoused by their local authority, and other types of family complexity such as the repartnering of a parent may lead to them living in an overcrowded home (Shelter, 2015). Housing policy has an interface with family complexity, and demand may change as a result of trends in family composition however a fairly small proportion of children will be drawn into contact with statutory housing services as a result of change in their families so whilst this is a policy area which has an interface with family complexity it is a relatively marginal one.

Family complexity impacts on the day to day interface between schools and medical services and a child's parents. There is no legal framework for how schools should interface with children's family and neither is such a framework available to medical service

providers. In practice health and education services are highly personalised to the child in the delivery and as such the issues of family complexity are dealt with generally successfully at the point of service delivery (Lepkowska, 2013).

In conclusion there are important social policies which relate to family complexity and children's experience of it. As there is little known about family complexity in the UK it is necessary to examine the consequences of family complexity for children's well-being and development it is necessary to wait until the analysis of this is reported before making suggestions as to the role of policy in ameliorating the consequences of family complexity for children, but this section has outlined the policy space available to any such policies. With regard to our other aim of establishing how institutionalised in policy complex families are there are gaps in policy as regards family complexity, particularly as regards legal contact and support arrangements.

3.4 Children's experience of family complexity and the life chances agenda

Policy makers are increasingly conceptualising of childhood adversity as being formed of a range of childhood circumstances, so as well as income poverty there is a shift underway to consider children's social environment. The Prime Minister, the Department of Work and Pensions and the Department of Education have sought to rephrase the debate about opportunities for children in terms of broad life chances rather than only family income poverty (Cameron, 2016). Originally outlined in 2011 (Department of Work and Pensions and Department of Education, 2011), and stalled during the period of coalition government, the current administration is moving towards replacing measures of child poverty with a broader life chances index (Department of Work and Pensions and Department of Education, 2015).The precise composition of the life chances index is yet to be determined but it is likely that family relationships will be included in this. The rationale for including family relationships is based on the body of evidence which shows that parental conflict is a strong predictor of poorer well-being and development for children (EIF, 2016). As inter-parental conflict requires the use of a psychometric instrument to measure and it is not practical to measure inter-parental conflict universally the absence of one biological parent appears to be being substituted for parental conflict in the Life Chances Agenda (Department of Work and Pensions and Department of Education, 2011), which although related are by no means the same thing either in origination or in effect. As is further explained in the literature review of this thesis there is evidence linking living apart from a biological parent with poorer outcomes for children, but this is substantially mitigated by income poverty (see section 4.1, 6.5). The complexity of the association between living apart from one biological parent and children's later lives, means including this in the life chances index may mean that the life chances index lacks predictive power for substantive outcomes in later life. As mentioned in the introduction to this thesis living apart from one biological parent is a current in society with complex roots in values and ideals and changes in these values and ideals are unlikely to be responsive to typical government interventions so including this in the index means that the index is sensitive to aspects of children's lives which are not necessarily sensitive to policy interventions. The life chances index does not take account of children's sibling groups, so only includes one aspect of family complexity as understood by this thesis.

3.5 Where does family complexity fit into the policy agenda?

Family complexity is a topic of policy concern, but despite the pressures of some commentators there is a mainstream political consensus that reducing the incidence of complex families is not an area in which policy makers feel comfortable in intervening in. Family complexity is sometimes used as in policy debates as an indicator of poor family functioning, and there is some evidence to suggest that family complexity is an indicator of poor outcomes for children (Crawford et al, 2013). This simplifies the uncertainties about the association between family complexity and children's well-being and does not distinguish between family complexity as a cause, a consequence or a covariate of poorer outcomes for children. Without understanding the association between family complexity and broader social trends such as poverty, housing insecurity and social mobility policy addressing family complexity may not meet the objectives expected of the policy. Family complexity is used as an indicator of poor family functioning because family complexity is relatively straightforward to measure and aggregate and is therefore suitable for both area level funding decisions and macro level policy indicators. If family complexity is to be used by policy makers as an indicator of poorer outcomes, and then as a basis for making decisions about the amount of support that a community or an individual family needs policy makers need to understand what aspects of family complexity are important for children's well-being and development as otherwise interventions can be ineffectively targeted and fail to achieve their defined goal. This thesis aims to understand what aspects of family complexity are important for children to enable policy makers and the children's workforce to more effectively support children experiencing what the analysis presented in Chapters 7 to 14 as the most disruptive aspects of family complexity.

3.6 The socio-demographic context of family complexity

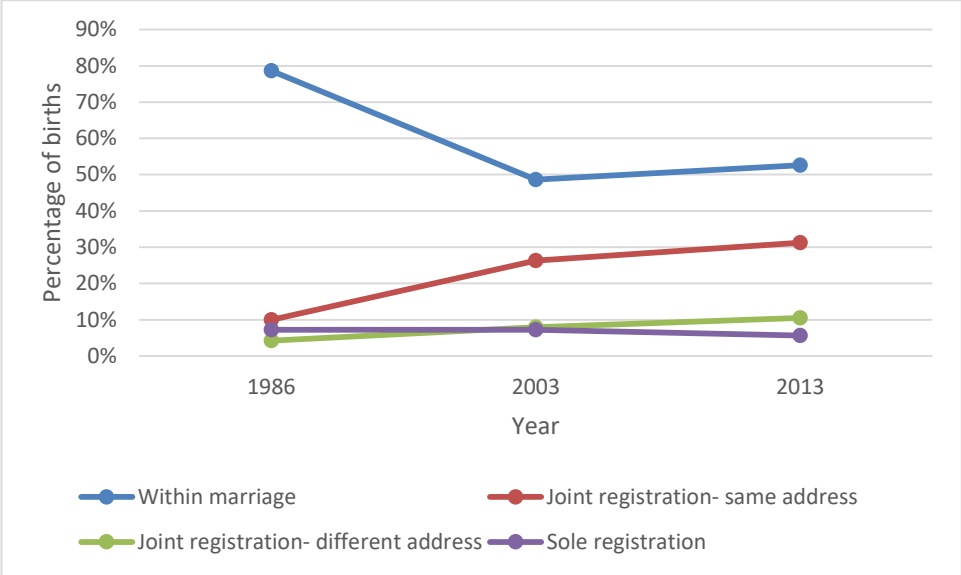
Family complexity is not new, and neither is policy interest in the consequences of family structure for children's well-being. This section outlines the long term historical trend in incidence of family complexity before exploring how common family complexity is and what the current trends on family complexity are.

Considering the long term trend in family structure is a significant body of historical demography literature looking at (amongst a wide variety of other demographic trends) the incidence of marriage and remarriage in the UK (Wrigley and Schofield, 1989; Tranter, 1985; Levine, 1987; Wood, 1995). Stepparents and half siblings have never been uncommon, although in the past most of these stepfamilies will have been formed after the death of one of the partners with remarriage of the widowed more common as the widowed were generally younger than today (Tranter, 1985). Although some step families will have been formed after the desertion of one of the parents, or an illegitimate birth this is impossible to evaluate using historic data (Wood, 1995).

The current trends in family structure may lead to the same outcomes i.e. stepparents and half siblings, as seen in history, but the process is different. Contemporary nationally representative demographic data is much stronger at describing partnership of both parents and non-parents than it is at describing complex sibling groups. This is because sibling relationships have not been included in vital or national statistics. As a result this description of the socio demographic context of family complexity is focused only on trends in parental partnership over time as there are few reliable estimates of multipartnered fertility in the national population available.

The way that vital registration is carried out in the UK means that unlike some European countries there is no way to cross reference births with parental partnership and previous births to the parents using registration data. National estimates of trends in household composition and family formation can be informed to an extent by vital registration data, but only about children's parental partnership at the time of their birth.

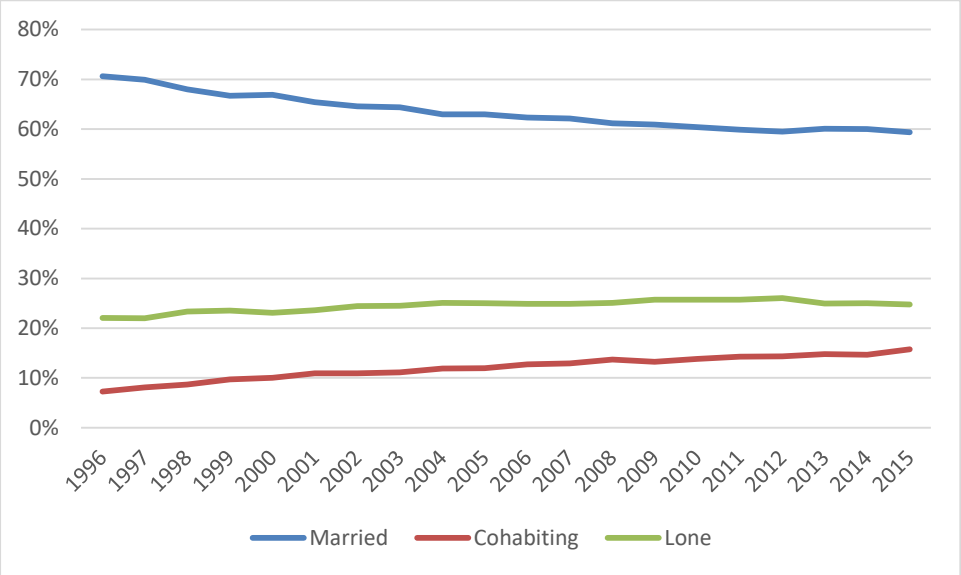
FIGURE 2: TRENDS IN PARENTAL PARTNERSHIP AT BIRTH (ENGLAND AND WALES)



Source: Office for National Statistics, Live Births in England and Wales by Characteristics of Mother 1: 2013 available at: http://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/bulletins/livebirthsinenglandandwalesbycharacteristicsofmother1/2014-10-16 (accessed 8/5/16)

Figure 2 links cross sectional snapshots of the partnership status of parents registering the birth of their infant at three time points, 1986, 2003 and 2013. There is a trend that births are increasingly taking place outside of marriage and in cohabiting partnerships, there is a small increase in the proportion of births taking place outside of any residential partnership, but the overall trend is away from marriage and towards cohabitation. The Labour force survey includes data on household composition which allows us to infer the composition of families. Looking at all families with dependent children over the period 1996-2015 will indicate if this is a shift away from marriage or if a shift in the relative timing of marriage. The Labour Force Survey does not distinguish stepfamilies from biological families

FIGURE 3: MARITAL STATUS OF FAMILIES WITH CHILDREN IN THE UK FROM THE LABOUR FORCE SURVEY

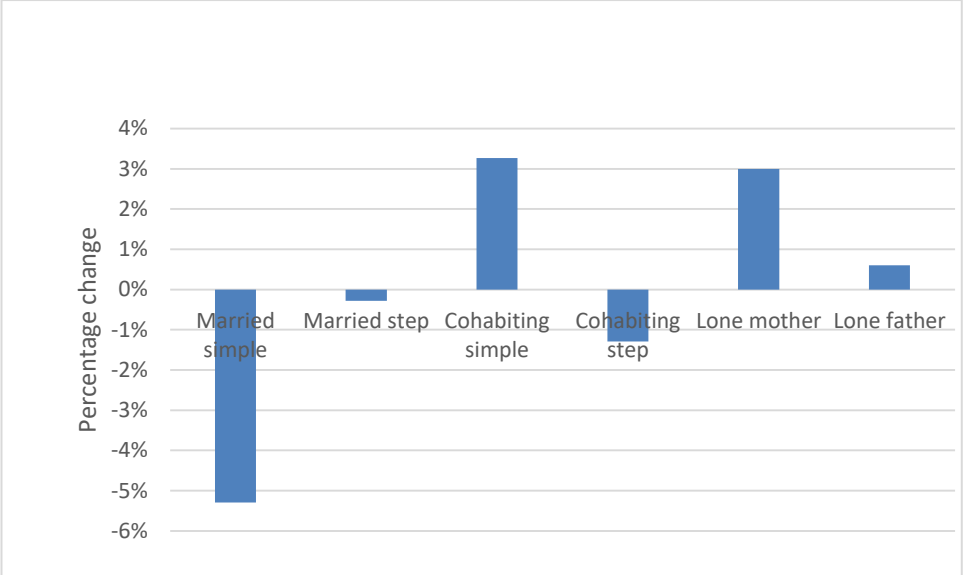


Source: Office for National Statistics: Families and households bulletin http://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2015-11-05 (accessed 8/5/16)

The proportion of families which are headed by lone parents grew a little in the early part of the period covered by Figure 3 but has remained relatively stable since the early 2000s. The proportion of families headed by a married couple has steadily fallen, and this seems to have been mainly at the expense of families headed by cohabiting couples. This suggests that there is a long term shift towards relatively more families bringing up children within a cohabiting partnership, none the less, marriage remains the dominant setting for dependent children. The Labour Force survey data by not distinguishing between families in which biological parents are married/cohabiting and those which contain a stepparent does not actually address the degree to which families are getting more complex.

The ten year census includes a household grid, which relates all members of a household to a nominal member of the household who is household reference person. This is the most complete national or nationally representative picture of household composition for all families available, but is only available every ten years. The use of a single household reference person means that information is not available about complex sibling groups. To look at trends in family formation between the 2001 census and the 2011 census Figure 4 shows the changes in the numbers of different types of families with dependent children between the two time periods.

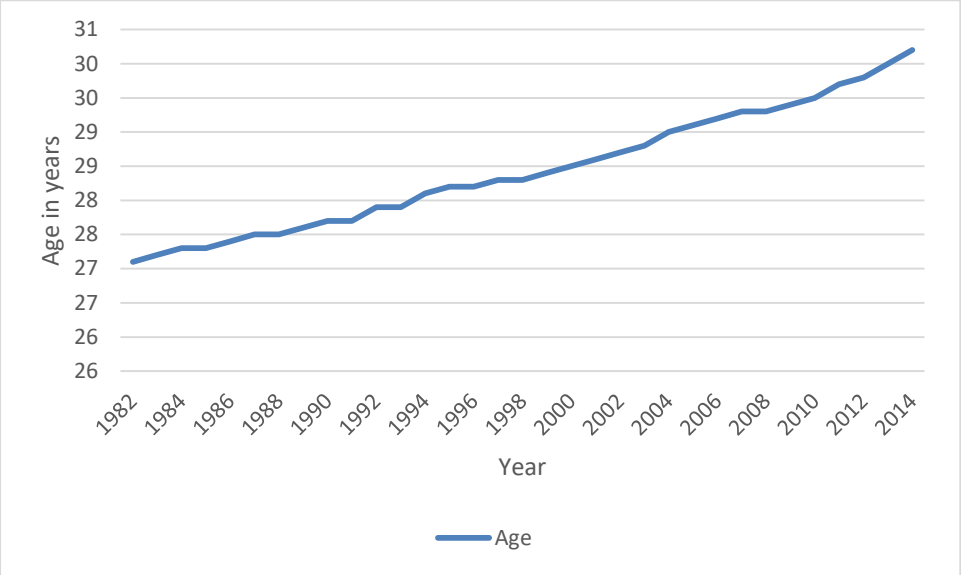
FIGURE 4: RELATIVE CHANGES IN PARENTAL PARTNERSHIP AMONGST FAMILIES WITH DEPENDENT CHILDREN (ENGLAND AND WALES) 2001-2011



Source: Office for National Statistics: Stepfamilies. Available at http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-358913 (accessed 8/5/16)

Figure 4 interestingly shows that between the two census periods the number of stepfamilies declined. The figures for lone parents are consistent with those shown in Figure 3. One possible reason why there are fewer stepfamilies in the 2011 census in comparison to the 2001 census is an increase in the age of mothers at maternity. This is explored in Figure 5.

FIGURE 5: TRENDS IN AGE OF MOTHER AT MATERNITY (ENGLAND AND WALES)



Source: Office for National Statistics Live Births in England and Wales by Characteristics of Mother 1: 2014 available at http://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths (accessed 8/5/16)

Firstly, mothers age at maternity are getting older as shown in Figure 5, so they have potentially invested more in building their partnership before having children, increasing the stability of their partnership.

Secondly, stepfamilies are more common as children get older, and because of the rapid increase in fertility postponement in the late 1990s and early 2000s families in the 2011 census generally had younger children than families in the 2001 census, who are less at risk of being a stepfamily because of where they are in the lifecycle of the family.

To conclude, there is no government data about multipartnered fertility. This thesis by using the nationally representative Millennium Cohort Study can provide some estimates of multipartnered fertility for families with young children. The parental partnership aspect of family complexity has conflicting trends, with increasing numbers of families cohabiting, which are known to be less stable than cohabiting families (Kiernan and Mensah, 2010), but fewer numbers of stepfamilies are actually being observed. The future long term trends in family complexity therefore seem to be particularly difficult to project, but it is likely to remain an important transmitter of disadvantage intergenerationally.

Chapter 4. Literature review

4.1 Why use socio-emotional well-being and cognitive development as outcomes?

4.1.1 Introduction

Before turning to the main literature review it is worth reviewing why children's socio-emotional well-being and cognitive development have been chosen as the key outcomes for my evaluation of children's response to family complexity. There are a range of possible outcomes, and whilst socio-emotional well-being and cognitive development are widely used in the field alternative ways of measuring well-being and development could have been used, such as the child's physical health and development.

4.1.2 Well-being or well-becoming?

Well-being can be studied from both a subjective and an objective perspective. It is common for studies often use both subjective and objective measures (Bradshaw et al., 2007; Bradshaw and Richardson, 2009). Objective measures of child well-being focus on indicators that reflect observable aspects children's lives, such as their skills and knowledge. Subjective measures of child well-being relate to either the child's own perception or an observers perception of their own attitudes. In terms of the focus of this thesis, the child's social and emotional well-being is best measured by a subjective measure of well-being, as it relates to the child's state of mind, whereas measuring the child's cognitive development can use an objective measure as development is more amenable to direct observation.

In determining how to measure well-being the distinction between children's present well-being, and their well-becoming i.e. future well-being (Ben-Arieh, 2006; Frønes, 2007) needs to be considered. This division represents the sometimes conflicting concerns for children's lives as they are experiencing them in the present and the lives they are likely to have as adults, with objective measures tending to focus on child well-becoming. Well-being and well-becoming not mutually exclusive aspects of children's lives (Ben-Arieh and Frønes, 2011). Whilst it is not necessary to consider both well-being and well-becoming when studying children it is important to be aware of the limitations of only considering either well-being or well-becoming. Considering only the child's well-being in the present

does not take account of childhood as a period of developmental stages, some of which may be unpleasant but necessary (e.g. learning rules of social engagement), whereas solely focusing on measures of well-becoming does not take account of the child's current happiness which is intrinsically important, as well as being of importance for their life course. Many policies, in particular the Early Intervention agenda focus exclusively on children's well-becoming (Allen, 2011). Research on children's current well-being necessarily requires children's involvement and opinions of their well-being, and their needs and priorities may vary from those of adults, (Ben-Arieh et al., 2001; Ben-Arieh, 2005; NicGabhainn and Sixsmith, 2006). This leads to methodological challenges for investigators as the important dimensions of present well-being as articulated by children (reviewed by Ridge, 2011) are not well captured by large scale surveys in particular for younger children (Bradshaw et al, 2013). Research into child well-being therefore tends to be qualitative (Ridge, 2011) or to relate to older children and adolescents (Bradshaw et al, 2013; Unicef Office of Research, 2016). As the focus of this thesis is on children in middle childhood this lack of appropriate measure of children's own views of their well-being for a quantitative study means that this thesis focuses exclusively on measures which are indicative of well-becoming rather than well-being in the present.

There is evidence for childhood social and emotional well-becoming being linked with adult outcomes some of which is summarised here. Children who have poorer adjustment in childhood have less satisfaction with life as adults (Frijters et al, 2011), and a greater risk of depression in adulthood (Mensah and Hobcraft, 2008). Children with behavioural problems have less academic success (regardless of ability) and disproportionately suffer adult disadvantage and poverty (Wilkinson and Marmot, 2003). Children who suffer from poor socio-emotional well-being in childhood tend to live in families with lower incomes than their peers with similar background who did not have poor well-being in childhood, which seems to be associated with being less likely to be in work, less likely to change job when they do work, and less likely to be stably partnered (Goodman et al, 2011). Children's cognitive development in childhood is strongly predictive of later cognitive ability (Shonkoff and Phillips, 2000). Childhood cognitive scores are associated with life satisfaction and likelihood of experiencing mental health problems as an adult (Gale et al, 2009; Feinstein and Bynner, 2004; Mensah and Hobcraft, 2008).

4.1.3 Origins of social and emotional well-being and cognitive development

Socio-emotional well-being and cognitive development are an expression of more than just a child's genetic inheritance and their environment but are subject to a complex interplay of relationships between the two (see Shonkoff and Phillips, 2000 for a review). This has excited the interest of researchers interested in relating family processes to children's well-being and development, however due to the paucity of high quality data as yet there are few studies which specifically examine the interplay of genetic characteristics and family processes (Salvatore and Dick, 2015).

4.2 What is already known about family complexity?

This literature review summarises the existing literature in the area of family complexity; and highlights the limitations of the findings and gaps in understanding if and how family complexity is associated with outcomes for children. From the highlighted gaps in the literature the aims of the thesis will be derived. As well as the gap of what we want to know the literature review also provides an opportunity to examine how earlier researchers have analysed family complexity. The methods used and how appropriate they are to the research questions of previous researchers will be examined in order to inform the methodological strategy used in this thesis. The methods used are in the main regression models, although there are examples of fixed effects, multilevel models, hazard models and ANCOVA – the methods used are discussed in more detail in section 4.3.

There have been a number of studies which examine various aspects of family complexity using US data, and a small number which use Swedish data. Some of these studies are descriptive in scope or seek to link this to other outcomes such as family poverty (Brown et al, 2015; Cancian et al, 2011) but there are others which address children's well-being and development. As there is a limited literature about family complexity this section reports on the extant literature, and whilst it is all relevant to children's outcomes, some are more relevant to my specific interest in young children's well-being and development than others. The following section outlines the relevant studies and evaluates their methodology before reporting their relevant conclusions.

Bjorklund et al (2007) used data from both Sweden and the US to examine educational outcomes of teenagers in relation to their family structure as well as wage differentials when they were adults. The measure of family change is based on the most complex parental partnership that the child experienced and a comparison between full and half siblings. This measure does not therefore take account of the timing of these changes in the individual's childhood or the degree of disturbance experienced. Surprisingly despite the significant differences between the two nations the outcomes for adults who lived in a complex family as children are broadly similar, however once unobserved heterogeneity is controlled for via fixed effects models the negative effects of having half siblings and experiencing non-normative parental partnerships disappears. This highlights the importance of careful model design when considering family complexity, but the shortcomings of the measure of family complexity and the measurement of outcomes in adulthood are distinguishing factors between this study and the one proposed here.

Brown, Manning and Stykes (2014; 2015), take a similar approach to integrating sibling groups and parental partnership to create a multidimensional measure of family complexity as this thesis does. Their work differs in that it does not look at children's outcomes, but rather focuses on the circumstances of family complexity. Using the United States Survey of Income and Program Participation they provide the first US nationally representative estimates of family complexity in the US (Manning et al, 2014), indicating differences by parental education and ethnicity. This work also finds that whilst sibling complexity and parental partnership history are linked, there is no necessary association between the two. Their results suggest that with the exception of Hispanic families' levels of family complexity were similar between the mid-1990s and late 2010s. This ethnicity finding is probably not relevant for UK based work, and family complexity may be following different time trends in the UK however the importance of parental education may be similar cross nationally. The same researchers have also investigated the association between family complexity and the economic well-being of complex families (Brown et al, 2015) and ascertained that complex families are economically disadvantaged relative to their simple families and that this is most pronounced amongst those complex families headed by two married biological parents. This finding is unexpected and emphasises the importance of focusing on family complexity per se rather than one aspect of family complexity.

Cancian et al (2011) is a more traditional demographic paper in that it maps the development of children's sibling groups over time. The sample is based on detailed administrative data from Wisconsin looking at the first ten years of the firstborn child of unmarried mother's lives. This paper estimates that 60% of children have at least one maternal or paternal half sibling by the time that they are 10, and that when children have half siblings on one side, they are much more likely to have half siblings to the other parent. Half siblings are more likely when parents are younger, poorer, have fewer children together and if one or both parents are black. The distribution of half siblings is such that a substantial minority of children, around 15% have very complex sibling structures, with at least five parents to the children of their sibling group. Mothers who receive child support and fathers who pay child support are more likely to have children with a new partner.

Case et al (2001) is the earliest paper identified which looks at some aspects of complex families. The paper uses data from the US Panel Study of Income Dynamics to compare the

outcomes of biological and step children raised by the same woman. They find that the step children receive a year less education than the biological children. This result should be treated with caution however as even adolescents tend to live with their mothers and those who do not may have a more complex background leading to both them living with a stepmother and leaving education earlier than the stepmothers biological children.

Evenhouse and Reilly (2004) also use the National Longitudinal Study of Adolescent Health to compare children across different types of families. They use 33 different outcomes, which will not be discussed in detail but are intended to provide a good range of well-being and development outcomes for the teenagers studied here. This research suggests that step children have poorer outcomes than biological children in the same family. Additionally they suggest that children who have a step parent regardless of having any half siblings fare worse than children who live with their biological parents, again net of half siblings. This research has a tendency to regard step parents as highly negative in children's development, something not necessarily supported by their own analysis, but this is perhaps a function of this research being early on in the study of family complexity.

Gennetian (2005) uses data from the children's panel of the US National Longitudinal Study of Youth. The children in the panel are all aged between 5-10 years old and their cognitive development as well as the positive features of their home environment are the dependent variables. This study found a modest effect on children's achievement once family poverty had been taken into consideration. In the models which looked at family status a negative effect of having a stepparent was found but after sibling group had controlled for in the analysis this disappeared. There was no significant differences found between half siblings in blended families relative to their respective relationships to the resident parents. This may be because the children are relatively young, and given the age of the study's focal children, and cautions against over interpreting my findings.

Ginther and Pollack (2004) examine teenager's educational outcomes using US data from the Panel Study of Income Dynamics and the National Longitudinal Study of Youth. Their outcomes are years of schooling, high school graduation, college attendance, college graduation all using data collected around the year 1990. When simple correlations are used there is a strong correlation between living in any non-traditional family and poorer educational attainment, however once controls such as family income are included this association is mitigated. Once control variables are added there ceases to be a disadvantage associated with living with a lone mother but children who live in a blended

family, regardless of whether they are a step child or a biological child in the family continue to have poorer educational outcomes as young people.

Halpern-Meekin and Tach (2008) looked at teenagers distinguishing three types of children; those living with their biological parents and full siblings only, those living with their biological parents and at least one half sibling from a previous partnership of their parent(s), and those children living with one biological parent and a step parent and at least one half sibling who was a shared child of their biological and step parent. This distinction is important as typically all children who live with their biological parents would typically be considered as one group. The data used was from the US National Longitudinal Study of Adolescent Health, which includes children who were aged 13 to 18 in the mid-1990s. Four outcomes were considered, delinquency, depression and school detachment (broadly well-being) and Grade Point Average (broadly cognitive development). The study showed that the shared children in the blended families had significantly worse outcomes across all domains than the children living in simple families and, with the exception of Grade Point Average, shared children in blended families were indistinguishable from stepchildren in blended families.

Harcourt et al (2015) use data collected from a sample of US school children about their family structure, identifying separately those who grew up with biological parents and no half siblings, those who grew up with biological parents and half siblings and those with a social parent and half siblings. Those who grew up with an unpartnered parent are excluded, and there is no information about the age of the participants, aside from being adolescents. Self-reported coping ability, drug use and sexual activity were used as outcome measures, note that these are controversial outcome measures. Teenagers with a step parent were more likely to plan to engage in sexual activity and alcohol and drug use than children living with biological parents only. Teenagers with half siblings were more likely than those without to plan to engage in sexual activity, use drugs or alcohol and to have lower self-reported coping ability. When having a step parent and having half siblings was combined there was a hierarchy of outcomes with children in biological parent families with no half siblings being least at risk of negative outcomes, then children in a stepfamily with no half siblings, then children in a biological parent family with half siblings before finally children in a step family with half siblings.

Hofferth (2006) also uses data from US Panel Study of Income Dynamics to investigate children's achievement and behaviour amongst children aged 3-12 with regard to their relationship to their resident father, and the relationship between the resident parents, biological and stepchildren are also compared. This analysis found that children who lived with a social father had poorer achievement than children who lived with their biological parent but this was entirely explained by the demographic and economic characteristics of social fathers and biological father families. In terms of achievement those children living with married biological parents had least problematic behaviour. Children in stepfamilies had similar levels of poor behaviour, and this was similar regardless of if the child was a stepchild or a biological child to the parents in the family.

Strow and Strow (2008) use the 1994 wave of the US National Longitudinal Study of Youth, the sample is limited to children living with their biological mothers. The outcome variables were the children's behaviour, reading ability and maths ability; these scores are age adjusted but it is not clear what age range was included in the study and if more than one child per mother was included. They find that children with at least one half sibling have more behavioural problems than children who live with their biological parents and no half siblings, this holds regardless of the focal child's relationship to the head of the household; additionally there is no difference between children without half siblings in biological two parent families and one biological and one social parent families. The results for the reading outcome are broadly similar to those for the behavioural outcome. The only significant result for maths scores is that children living with a lone mother have poorer outcomes than other children. This is unexpected but mathematical ability is a relatively unusual outcome measure.

Stundstrom (2013) uses a sample of Swedish children born in the 1960s and matches them with their half siblings to look at their outcomes in adulthood, specifically the number of years schooling that the children received. The analysis showed that children living with a stepfather were disadvantaged relative to those who grew up with both of their biological parents, however this disadvantage disappears once the sibling groups are controlled for, with children in step families with no half siblings less disadvantaged than children who grew up in stepfamilies with half siblings. Joint children who live with their biological

parents in blended families have better outcomes than their half siblings who are the stepchildren in blended families in this analysis.

Tillman (2008) uses data from the US National Longitudinal Study of Adolescent Health to look at how having 'non-traditional' siblings affects a teenager's Grade Point Average and their school related behaviour problems. This analysis considers separately the effects of living with a social parent, living with half siblings, living with step siblings, living with both half and step siblings and finally living with both a social parent and half siblings. The results show that there are negative associations with all of the outcomes for children who live in stepfamilies (as is well established), living with half siblings is associated with more behavioural problems and living with step siblings is associated with more behavioural problems and poorer academic outcomes, although living in the most complicated sibling groups with both half and step siblings has no poorer outcomes than living with only one type of 'non-traditional' sibling. When living with a social parent and living with half siblings and/or step siblings is jointly specified in the model the disadvantage of living with a married social parent disappears and the disadvantage of living with a cohabiting social parent is significantly attenuated, with the negative associations of the sibling group remaining. This indicates that a substantial portion of the disadvantage of living with a social parent is actually disadvantage resulting from living in a complex sibling group.

Turunen (2014) uses Swedish register data to examine how the likelihood of a 16 year old continuing in education is affected by the birth of a younger half sibling. A hierarchy of outcomes is found with those children in two biological parents having the highest likelihood of continuing in education, with those whose parents have separated having the next highest likelihood with those who have experienced parental separation and having experienced the birth of a half sibling having the lowest likelihood of continuing on in education. It does not appear to make a difference if the half sibling is a maternal or paternal half sibling or if there are both types of half siblings in the sibling group. The analysis suggests that girls are more sensitive to boys to the presence of a half sibling, and that this is particularly the case for maternal half siblings. There is a reduced likelihood of continuing on in education for children who have older half siblings than those who have a simple sibling group, and this effect appears to be strongest for paternal half siblings than maternal half siblings. The analysis is limited by the register data being unable to identify which children live with a lone parent and which live with a social parent if they have no children as the register data does not include this. This means that the sibling effects

outlined are not separated from stepfamily effects which is a limitation of the conclusions and means that the research does not directly address family complexity.

Vogt Yuan (2009) used data from the US National Longitudinal Study of Adolescent Health to explore how sibling structure was associated with teenager's mental health. The outcome used was teenager's self-reported depressive symptoms and positive well-being. The measure of sibling structure took into account the biological relationship between siblings, the gender composition of the siblings, the number of siblings and the relative age of the siblings. This study found that there were no associations between sibling structure and mental health. This result could be due to the complex sibling measure used which may have unnecessarily complicated the association.

The best evidence on family complexity suggests that there is an association between family complexity and poorer behavioural outcomes (Halpern-Meekin and Tach, 2008; Harcourt, 2015; Hofferth, 2006; Strow and Strow, 2008; Tillman, 2008) however this association is not universally found, with some non-negligible evidence suggesting that the association is attenuated once other characteristics of families are accounted for (Evenhouse and Reilly, 2004; Vogt Yuan, 2009). The evidence linking family complexity with children's educational outcomes suggests that for young children there is an association between living in a complex family, in particular having half siblings with poorer outcomes (Gennetian, 2005; Strow and Strow, 2008). This conclusion is also found in the larger body of evidence which looks at the educational outcomes of teenagers (Case et al, 2001; Ginther and Pollack, 2004; Halpern-Meekin and Tach, 2008; Stundstrom, 2013; Tillman, 2008; Turunen, 2014) however this conclusion is not universal (Bjorkland, 2007; Hofferth, 2006). There is also evidence that family complexity is highly concentrated, (Cancian et al, 2011) and is strongly associated with economic disadvantage, even when the family complexity is outside the child's residential household (Brown et al, 2014; 2015). The research evidence indicates that the field is both small and non-conclusive and relates entirely to US and Swedish children, and in the main to teenagers. There is a need for further evidence in this field and additionally work which looks at younger children and British children.

Unaddressed by these studies but none the less a possible counter argument to the associations observed between sibling type and children's well-being is the degree of biological relatedness between the children. As discussed above it is widely acknowledged

that children's well-being and development outcomes are a consequence of both their genetic inheritance and their environment. This can be interpreted to suggest that any associations between children's complex sibling groups and their well-being and development is the result of differences in the parentage of the children in the family. There are a few ways of addressing this suggestion, most obviously to compare adoptive sibling groups in which the children are not biologically related to each other. Evidence suggests that biological relatedness does not make any difference to the relationship between siblings (Stocker et al, 1989), and that any associations between sibling group composition and children's well-being and development is more likely to be the result of the social and environmental circumstances of these families rather than the genetic similarities or differences between the children.

None of the research above uses data about British children, and if social relationships rather than biological ties are the key determinant of the association between family complexity and children's outcomes this is a serious drawback of the research. Whilst there is no research that directly addresses family complexity in the UK there is range of research by Dunn and colleagues using the Avon Longitudinal Study of Parent and Children and in particular the Avon Brothers and Sisters supplement which looks at siblings. Most of this work includes some allowance for degree of relatedness between siblings, but for various reasons this is of limited applicability for this study. Some of this work looked at how maternal relationships with children was associated with sibling relationships between the children (Jenkins et al, 2012; Gass et al, 2007; O'Connor et al, 2006), this doesn't fit with the structural definition of family complexity. Another research strand looked at how children adjusted in stepfamilies and if this was tempered by the presence of siblings, whilst this sounds relevant to the definition of family complexity, there are few transferable conclusions that can be taken from this research. It was focused on stepsiblings and there was a lack of clarity about relevant dimensions of the half sibling relationship, namely if the half sibling was older or younger and if the half sibling was a child of the current stepparent (Dunn, 2002; Deater-Deckard et al, 2002; Dunn et al, 2000; Dunn et al, 1999). The selected outcomes were generally about emotional closeness to other family members as a function of other family relationships, which could inform socio-emotional well-being and cognitive development, but is not immediately relevant for this research design. In brief the findings from the ALSPAC study are that stepsiblings are less emotionally close than siblings who share at least one parent, and this does not appear to

change as a function of the relationship between the child and the resident parents (Dunn et al, 2002; Deater-Deckard et al, 2002; Dunn et al, 2000; Dunn et al, 1999).

This review of the literature on family complexity has indicated three main areas in which this thesis can add to the stock of knowledge:

- There is no consensus about whether having half siblings or having a stepparent is responsible for the negative outcomes observed amongst children in stepfamilies, this research will add to the body of evidence one way or the other.
- The research is heavily concentrated on US data, and much of it uses the same data sets, limiting the general applicability of the findings on family complexity.
- Nearly all the existing research relates to the outcomes of teenagers with little known about younger children, who may be more vulnerable to their family structure.

This thesis aims to contribute to filling these gaps in the existing literature.

Family complexity considers two aspects of family structure jointly, and in order to fully explore family complexity I am going to consider these two aspects individually. This literature review will now explore parental partnership history and children's sibling group composition. There is a vast literature on parental partnership history with much known about the association between parental partnership and children's well-being and development, however there is still some disagreement in the field about how parental partnership should be evaluated. There is far less known about the composition of children's sibling groups and how these relate to children's well-being, there is a literature about multipartnered fertility which addresses why some parents have children with multiple partners and this literature will be reviewed as the most relevant to the question of children's sibling groups.

4.3 Methodology used in the family complexity literature

The first section of the literature review identified the gaps in the literature which this thesis seeks to address. The next section of the literature review addresses the question of how to fill the gaps in the literature that have been identified and what methods are appropriate. To begin this process a rapid review of the methods used by other papers reviewed in the literature review will be made. Reviewing the methods used by other studies will inform enable an appropriate established way of understanding the association between family complexity and child well-being and development.

The literature shown in Table 1 investigates the association between family complexity and children's well-being and development has two main ways of looking at what aspects of family complexity are important for children's outcomes. The first method is to look at multiple children per family, and the second method is to look at one reference child per family. The multiple children per family method has the advantage that factors which vary per family can be held constant and only the specific effects of child's parentage relative to the partnership heading the family can be isolated. However, in the literature review some authors have chosen to consider children who are shared children in both simple and step families together (e.g. Vogt Yuan, 2009; Hofferth, 2006) and some authors have distinguished between children who are shared children in step families and simple families (e.g. Halpern-Meekin and Tach, 2008; Harker-Tillman, 2007; Ginther and Pollack, 2004). The effects of having family complexity on children's well-being and development differ depending on if this distinction is made, with studies which compare biological with stepchildren finding fewer associations with outcomes than studies which distinguish between biological children in simple and step families. This finding suggests that using children from the same family to allow the various unmeasurable factors about the family environment to be held constant to examine differences in children's outcomes by relationship to the parent dyad heading the family may lead to misleading results when the distinctiveness of stepfamilies as environments for child well-being and development are not explicitly considered, i.e. it is necessary to make the distinction between simple and stepfamilies as environments for joint biological children which comparisons of siblings within families do not allow.

TABLE 1: METHODOLOGY USED IN THE FAMILY COMPLEXITY LITERATURE

Author	Year	Country/ Data	Research question	Outcome	Controls	Method	Clustering
Bjorklund, Ginther and Sundstrom	2007	US National Longitudinal Study of Youth US Panel Study of Income Dynamics Sweden Population Register data	A comparison of the lifetime effects of growing up in a complex family in the US and Sweden.	Number of years of schooling Annual earnings as an adult	Gender, age, ethnicity, proportion of life lived with full and half siblings, number of siblings, parental education	Initially ordinary least squares. Fixed effects models are used to decompose the error term into a family specific component and an individually specific error term. Children in who are shared children are compared with their siblings who are stepchildren in this approach	Only pairs of siblings are included.

TABLE 1: METHODOLOGY USED IN THE FAMILY COMPLEXITY LITERATURE

Author	Year	Country/ Data	Research question	Outcome	Controls	Method	Clustering
Brown, Manning and Stykes	2015	US survey of Income and Programme Participation	Does family complexity have unique associations with child well-being net of standard measures of family structure	Family income to needs ratio, family receipt of public assistance	Family structure (referred to elsewhere as parental partnership) Ethnicity Child's age Mother's age Parental education Number of children in the family	Ordinary least squares regression for income to needs ratio Logistic regression for family receipt of public assistance	Standard errors were estimate which accounted for clustering within families

TABLE 1: METHODOLOGY USED IN THE FAMILY COMPLEXITY LITERATURE

Author	Year	Country/ Data	Research question	Outcome	Controls	Method	Clustering
Cancian, Meyer and Cook	2011	State of Wisconsin administrative data – mainly child support enforcement system. Children birth to 10 years	Tracing the evolution of sibling group complexity amongst a cohort of firstborn children born to unmarried mothers in Wisconsin over the first ten years of their lives	Birth of full, maternal or paternal half siblings	Maternal earnings, maternal education, maternal work status, welfare receipt, age of mother, ethnicity of mother	Hazard models	N/A as cohort approach, and only one child per multiple birth included

TABLE 1: METHODOLOGY USED IN THE FAMILY COMPLEXITY LITERATURE

Author	Year	Country/ Data	Research question	Outcome	Controls	Method	Clustering
Case, Lin, McLanahan	2001	US Panel Study of Income Dynamics	Do children raised by stepmothers have poorer education attainment than the mother's biological children?	Years of schooling received	Child's gender, age of child, mother's education, father's education, firstborn child, lastborn child, age gap, number of coresident siblings	Ordinary least squares regression Sibling fixed effects were used to account for the mother.	Not clear
Evenhouse and Reilly	2004	US National Longitudinal Study of Adolescent Health	To identify step parent effects by comparing biological and step children in blended families	Parental investment, education measures, measures of risky behaviour, relationship quality, social networks	Not clear	Ordinary least squares regression. Sibling fixed effects were used to account for children being in the same family.	Siblings compared

TABLE 1: METHODOLOGY USED IN THE FAMILY COMPLEXITY LITERATURE

Author	Year	Country/ Data	Research question	Outcome	Controls	Method	Clustering
Gennetian	2005	US National Longitudinal Study of Youth – Child	Do children without two biological parents have poorer outcomes than children in other families? Does the presence of half or step siblings affect child well-being	Peabody reading scores, Peabody maths score, HOME inventory (cognitive subscale)	Family income, mother's age, mother's education, mother a teen mother, father's age, father's education, mother's cognitive ability, child's ethnicity, child's gender, child's birth weight, child's birth order, number of siblings	Ordinary least squares regression	Not clear

TABLE 1: METHODOLOGY USED IN THE FAMILY COMPLEXITY LITERATURE

Author	Year	Country/ Data	Research question	Outcome	Controls	Method	Clustering
Ginther and Pollack	2004	US National Longitudinal Study of Youth US Panel Study of Income Dynamics US National Longitudinal Study of Youth – Child. Outcomes in early adulthood	Using economic theory as a basis for differential investment in children in families, looking for correlation between family structure and educational outcomes. Comparing biological and step children in blended families.	Years of schooling, high school graduate, college attendance, college graduate	Child's age, child's gender, ethnicity, number of siblings, religion, income, mother's education, birth weight	Ordinary least squares regression, probit regression of categorical dependent variables.	Standard errors estimate to take account of clustering in a family

TABLE 1: METHODOLOGY USED IN THE FAMILY COMPLEXITY LITERATURE

Author	Year	Country/ Data	Research question	Outcome	Controls	Method	Clustering
Halpern-Meekin and Tach	2008	US National Longitudinal Study of Adolescent Health. Focal child aged 13 to 18	Do shared children in blended families have poorer outcomes than shared children in blended families? Do shared children in blended families have similar outcomes to stepchildren in blended families?	Children's Grade Point Average (school achievement) Scale of delinquency Depression symptoms School detachment	Parental education, parents age, receipt of welfare, marital relationship quality, quality of relationship with parents, quality of sibling relationship, parental investment, shared activities with parents, number of siblings, healthcare received, residential stability, number of marriages, age at first marriage, length of current relationship,	Ordinary Least Squares regression on each of the outcome	Standard errors calculate to take account of clustering within schools and sibling groups

TABLE 1: METHODOLOGY USED IN THE FAMILY COMPLEXITY LITERATURE

Author	Year	Country/ Data	Research question	Outcome	Controls	Method	Clustering
Harcourt, Adler-Baeder, Erath and Pettitt	2015	US Education project for adolescents (not further specified)	How does growing up in a blended family effect coping, substance abuse and sexual activity delay	Problem focused style of coping scale, sexual activity delay, alcohol and drug use	Ethnicity, gender, parental education, age	ANCOVA	Not clear

TABLE 1: METHODOLOGY USED IN THE FAMILY COMPLEXITY LITERATURE

Author	Year	Country/ Data	Research question	Outcome	Controls	Method	Clustering
Hofferth	2006	US Panel Study of Income Dynamics. Families with two resident parents. Focal children aged between 3 and 13	Does children's achievement differ by residential father type? Can children's observed differences by father family type be explained by unobserved differences between families or by differential treatment of children by step and biological parents Within family comparisons between couples biological children and child who is a stepchild	Child socio emotional outcomes using Behaviour problems index, calculation and passage comprehension subtests of Woodcock-Johnson revised test of basic achievement	Parental involvement was key and measured using time diaries of engagement. Also race, ethnicity, age of father, age of child, gender of child, number of siblings, income and working hours amongst others.	Ordinary least squares regression was used with test scores and total behaviour scores as the outcome.	To account for sibling clusters Stata cluster command used

TABLE 1: METHODOLOGY USED IN THE FAMILY COMPLEXITY LITERATURE

Author	Year	Country/ Data	Research question	Outcome	Controls	Method	Clustering
Manning, Brown and Stykes	2014	US Survey of Income and Programme Participation	How is family complexity distributed in relation to other aspects of disadvantage	Trends in family complexity between 1996-2009	Ethnicity, parental education level	Descriptive	Estimates at the per family level

TABLE 1: METHODOLOGY USED IN THE FAMILY COMPLEXITY LITERATURE

Author	Year	Country/ Data	Research question	Outcome	Controls	Method	Clustering
Strow and Strow	2008	US National Longitudinal Study of Youth - child	How is children's behaviour and achievement impacted on by the presence of half siblings and maternal partnership	Behaviour problems index, Peabody maths score, Peabody reading scores	Mother's return to work, mother's age at first marriage, mother's age at first birth, number of children, antenatal care, smoking or drinking in pregnancy, child's ethnicity, child's age, birth order of focal child, household income, mother's education, birth weight of child	Ordinary least squares regression	Not clear

TABLE 1: METHODOLOGY USED IN THE FAMILY COMPLEXITY LITERATURE

Author	Year	Country/ Data	Research question	Outcome	Controls	Method	Clustering
Sundstrom	2013	Sweden Population Register data	Effect of step or blended family on children's outcomes, including both resident and non-resident half siblings	Years of schooling completed, completion of pre-university course	Not clear	Ordinary least squares regression. Sibling fixed effects used.	Sibling differences explicitly compared, and the family fixed effects controlled for

TABLE 1: METHODOLOGY USED IN THE FAMILY COMPLEXITY LITERATURE

Author	Year	Country/ Data	Research question	Outcome	Controls	Method	Clustering
Tillmann	2008	National Longitudinal Study of Youth. Focal child aged 13-18	Children living in stepfamilies have poorer academic outcomes than children in simple families. Children living with step or half siblings will have poorer outcomes. Step siblings will have more perception of completion for family resources. The presence of half/step siblings explain the poorer outcomes of children in stepfamilies. The association between living with half o step	Grade Point Average School related behaviour problems	Child's ethnicity, age, number of co resident siblings, immigration status, education of co resident parents, total family income, welfare receipt, mother working, proportion of life in current family.	Ordinary least squares regression of the outcomes	Standard errors take account of clustering within families

TABLE 1: METHODOLOGY USED IN THE FAMILY COMPLEXITY LITERATURE

Author	Year	Country/ Data	Research question	Outcome	Controls	Method	Clustering
Turunen	2014	Sweden Register data identifying the birth of any siblings and school exam results at age 16.	If the presence of younger half siblings is associated with school achievement in Sweden, and if this differs by shared parent	Eligibility for higher secondary education, overall grade score	Mother's education Mothers number of births Mother's age at first birth Immigrant status Union status at birth of focal child	Logistic regression for eligibility for secondary OLS regression for overall grade score	To account for sibling clusters Stata cluster command used

TABLE 1: METHODOLOGY USED IN THE FAMILY COMPLEXITY LITERATURE

Author	Year	Country/ Data	Research question	Outcome	Controls	Method	Clustering
Vogt Yuan	2009	US National Longitudinal Study of Adolescent Health. Children aged 13-18	How does sibling structure, including the number of siblings, the degree of relatedness of siblings, relative age of siblings and gender of siblings effect influence children's mental health	Depressive symptoms, as measured by CES-D.	Sibling relationship quality, age, gender, ethnicity, parental partnership, receipt of welfare, parental education, and family income.	Multilevel modelling	Three levels are included in the model; within families, within schools, and within school districts

The majority of research into family complexity and children's well-being and development has used regression models. This is because the data sets which have been used are population data or large scale survey data, which are reasonably representative of the population under study. These models can be criticised as being descriptive only, and to allow an unnecessarily wide source of variance into the models. It is notable that the family complexity literature is generally reliant on linear regression models, rather than the more complex modelling techniques which have been used in other areas of demographic enquiry.

Some of the studies (e.g. Ginther and Pollack, 2004) are described as stylized facts, this is a term from economics referring to a general macro level trend. This thesis could be described as studying families at the macroeconomic level, as it looks society wide and trends and attempts to identify trends in prevalence and associations with children's well-being and development rather than specifically identifying processes and causes in family complexity. As outlined in section 4.1, little is known about how common family complexity is in the UK and if there are any widespread structural associations between family complexity and children's well-being and development. This thesis does not set out to establish how this association is structured, but instead seeks to establish the best possible estimates of family complexity including both parental partnership over time and the structure of children's sibling groups in British children in their early years. This thesis then goes on to attempt to establish if there is any association between family complexity in the early years and children's well-being and development and which are the most important aspects of this for children's well-being and development. Whilst the relationship between children's well-being and development and family complexity is the result of processes at the level of an individual family which are hypothesised about in the theory section of this thesis (Chapter 2), set within the policy context outlined in the policy section of the thesis (Chapter 3). The main aim of this thesis therefore is to outline a modern social trend, and to outline why this trend might possibly matter for the children of families who experience it. Possible processes and circumstances which explain this observed relationship are outlined and how they could possibly relate family complexity and child well-being and develop discussed with reference to the findings of this thesis and the findings of other relevant literature. As such at least part of the aim of this thesis is to produce these stylized facts about family complexity in contemporary Britain.

The methodology selected must therefore be able to evaluate which aspects of family complexity are the most relevant to children's outcomes. The regression models used in the literature reviewed above are suitable for this aim as this study is examining an area which does not have a significant body of evidence associated with it. The association between children's well-being and development will be evaluated using regression models using different forms of the parental partnership variable will be outlined, with a comparison of the results made to establish if simplification loses salient detail of the variable. The associations between the sibling group variable and children's outcomes will be evaluated in order to establish which sibling groups, if any, have an association with the outcomes as there is limited evidence about the role of sibling group relatedness of children on their well-being and development. The next step is to establish if sibling group and parental partnership have independent effects on children's well-being and development, or if one aspect appears to dominate another. Regression models with interaction effects between the two variables will be used to answer this question, and the results inform a single variable which will then be included in a regression model. Finally, in order to understand if parental partnership or sibling group structure are the most important aspects of children's well-being propensity score models will be specified for children with the most disrupted parental partnership type with the presence of absence of half siblings being allowed to vary to establish what is the most relevant.

As the MCS is cohort data, and each family has only one cohort ID there is no need to account for within family clustering as only one child per family will be included amongst the small number of multiple birth families. As there is only one birth per family it is not possible to use families as natural experiments and compare children's outcomes on the basis of their relationship to the resident parents, and as outlined above, this may not be advisable.

4.4 What is already known about parental partnership?

Parental partnership is broadly speaking the partnership status of a child's parents, but this can and does change over the child's life. Historically this was a simple measure of married, separated or unmarried. Early studies concluded that experiencing a parental separation at some point during childhood is detrimental for children's outcomes across a range of domains including cognition and behaviour (Amato and Keith, 1991; Amato, 2001). More modern work has taken a subtler approach to classifying family structure and looks at the outcomes for children living in a wider range of family types, including cohabiting parents and stepparents as well as distinguishing the never partnered from the formerly partnered. In general this work has found that children of lone parents are at higher risk of psychosocial malaise, as are children of stepfamilies, however it appears that the effects of lone parenthood on psychosocial well-being are the result of maternal malaise and poverty (McMunn et al, 2001; Dunn, 2002; Landsford, 2009; Hofferth, 2006; O'Connor et al, 2001; Schonkoff and Phillips, 2000). Children of cohabiting mothers appear to have poorer behavioural outcomes than children who live with married parents, however as with lone parents a substantial part of this seems to be a selection effect with cohabiting mothers suffering from more malaise and cohabiting families being poorer than their married counterparts (Brown, 2004; Dunn et al, 1998). Children's cognitive ability has an association with family structure with children from lone parent families and stepfamilies showing poorer attainment, but when allowance for pre-existing maternal ability and family poverty is included this association disappears (Carlson and Corcoran, 2001; Schonkoff and Phillips, 2000). Outcomes for children raised in lone mother families formed by divorce have been found to have poorer outcomes than their otherwise similar peers raised in similar families that were formed after the death of the father (Biblarz and Gottainer, 2000), with similar findings for stepfamilies (Ferri, 1984; Kiernan, 1992). This evidence suggests crudely that children's outcomes are largely unaffected by the structure of the family in which they grow up, with the exception of children who grow up in a stepfamily. The evidence on stepfamilies consistently suggests a small but robust association between living in a stepfamily and poorer outcomes in each of the domains child well-being. As stepfamilies have more complicated histories than the other families here research has subsequently focused on a dynamic measure of family structure.

Developing from this parental partnership change over time and how it is associated with child well-being has been considered by a number of studies, however the requirement for

either longitudinal data or accurate recall by respondents creates a methodological challenge. This study will be using the Millennium Cohort Survey of UK children to relate parental partnership change to children's outcomes across the three domains), but is by no means the first study to do so. In order to differentiate the current study from the existing study it is necessary to explore what the existing studies have determined.

To date there have been a number of studies which have looked at parental partnership change using data from the Millennium Cohort Study). Firstly, Crawford et al (2013) which used data from waves 1-4 (children aged 0-7) of the Millennium Cohort Study to examine the association between cohabitation, marriage and partnership stability and children's socio-emotional well-being and academic outcomes. There have been three studies which have used Millennium Cohort Data from waves 1-3 (0-5 years) one of which looked at children's emotional well-being (Kiernan and Mensah, 2010), one which looked at children's cognitive development (Schoon et al, 2011) and one which looked at both emotional well-being and children's cognitive development (Fomby, 2011). Each of these studies addresses the question of how family complexity up to that point affects the development of children at the age of five.

Crawford (2013) conceptualises parental partnership change using a partial trajectory approach. The Crawford (2013) study is chiefly investigating the differences between children who are born to cohabiting parents and are born to married parents. The trajectory that is used to investigate this question only includes children who had cohabiting or married parents at their birth and do not have a stepparent up to an including the age seven wave, and as such is best considered a partial trajectory. The trajectory captures the initial partnership status of the parents, any temporary separation and breakdown of the parents' partnership. The dependent variables used for child outcomes are the total difficulties score of the Strengths and Difficulties Questionnaire and the total score of the British Ability Scales at age 7. Using the Total Difficulties Score of the Strengths and Difficulties Questionnaire is relatively unusual, as subscales are more usually reported. The total score on the British Ability Scales sums scores for the reading, maths and picture recognition tests to give an overall score of academic ability. Using probit models the association between parental partnership change and children's outcomes was analysed whilst controlling for the economic status of the household and a range of maternal and child characteristics which can be conceptualised as fixed with respect to the likelihood that families experience parental partnership instability. The results of the analysis find that children whose parents were married at birth, but separate before the

child is seven are the only group with statistically significant poorer performance on the tests of academic ability at age seven than the reference group of children with continuously married parents once the model includes all controls. For the social and emotional development outcome there is a statistically significant poorer outcome for children at the age of seven who have experienced the breakdown of their parent's initial cohabitation relative to the children of the continuously married parents in the model which includes all controls.

The studies varied in whether or not they found family instability to be a significant factor in determining children's outcomes at the age of five. Schoon (2011) found that family complexity had no effect on children's outcomes on the naming vocabulary and pattern construction sections of the British Ability Scales once the family's poverty experience had been included in the model. Fomby (2011) also looked at children's scores on the British Ability Scales also found that there was no significant association between family instability and pattern construction but did find a significant relationship between naming vocabulary and family structure transitions. Given that all the studies used exactly the same data and method (OLS regression) this seems a perverse finding, however it probably originates from the different constructions of family complexity used by each study and different control variables included in their models. Schoon et al (2011) used a categorical variable for family complexity which only captured mothers who dissolved their baseline partnerships and lone mothers either remained single or entered partnership, one of the transitions included was biological cohabiting parents getting married, which is not usually considered to be a family transition in the family transition literature. This simplification meant that the analysis was not addressing family complexity, and was little more informative than the widely used family status variable. Fomby (2011) operationalised family complexity as the number of times a mother's romantic partner moved in and out of the child's household, giving a linear count measure. This measure is more informative about the overall level of change experienced by a child in the household, but does not measure the trajectory of the family, for instance a disruption to a parental partnership is likely to have different effects on a household that the dissolution of a parental partnership and a maternal repartnering, but under this scheme these different events would be analysed in the same category. The different evidence presented by these studies looking at how the cognitive development of children up to the age of five is affected by parental partnership instability is not conclusive about the existence or otherwise of any association between cognitive development and experience of parental partnership change. The evidence is inconsistent and even the

seemingly consistent evidence is beset with limitations and offers no conclusion about how parental partnership instability may affect cognitive outcomes.

There have been two studies which have examined the link between family instability and child's emotional well-being, that of Kiernan and Mensah (2010) and Fomby (2011). The studies examined if family instability was associated with emotional problems, with the distinction made between internalizing/emotion symptoms and externalising/conduct problems with both studies deriving the variables from the strengths and difficulties questionnaire completed by the main carer of each child meaning that both studies were using similar dependent variables. Kiernan and Mensah, 2010 used the externalising scale and the emotion symptoms subscale of the Strengths and Difficulties Questionnaire. Fomby, 2011 used the emotion symptoms and conduct problems subscales only of the Strengths and Difficulties Questionnaire. The two studies differed in how family instability was specified and what control variables were included and how they were introduced. The methodology used also varied with Kiernan and Mensah (2010) using logistic regression and identifying children who were in the top quintile of scores for these behaviours comparing the odds that the children would be in the top group for externalising or internalising behaviour against the odds that they would not be. Fomby (2011) used Poisson regression looking at the overall score of the child on the conduct problems and the emotion symptoms sections of the strengths and difficulties questionnaire.

The Fomby (2011) study used the same specification of family instability as was used in relation to cognitive performance as discussed above. The Kiernan and Mensah (2010) study took a different approach and mapped the trajectory of families. Children were initially categorised by the relationship of their parents at their birth, and any subsequent change in their family including periods of separation between their parents which subsequently led to a reconciliation was included, as it was for mothers who were lone at the birth of the child and at age five any intervening periods of partnership, finally children who did not live with their mothers at the age of five were also included. This was a more sophisticated breakdown than to look just at the numbers of partnerships experienced by the mothers of the children, but for the small number of children who had experienced more than two transitions were not separately analysed.

Fomby (2011) and Kiernan and Mensah (2010) find a significant association ($p<0.05$ but no stronger) between family instability and externalising behaviour/conduct problems, but no association between family instability and internalising behaviour/emotion symptoms. This

conclusion and significance level was shared across the studies despite the different methodology used.

The evidence presented by the three studies about the relationship between family complexity and children's emotional well-being is fairly consistent and robust to the differing methodologies used. It is not therefore the intention that this study would replicate the results of these studies but would rather build on them to address the question of family complexity and emotional well-being at the age of seven and to see if the associations established at the age of five continue at the age of seven when the children's families have experienced even more change.

The studies, Kiernan and Mensah (2010), Schoon et al, (2011) and Fomby (2011) are the only studies to have looked at family instability and child outcomes using the Millennium Cohort Study, but they are by no means the only studies which have looked at how family complexity relates to children's outcomes. Robson (2010) uses data from the Youth Panel of the British Household Panel Study to look at changes in self-reported happiness and self-esteem by children aged 11-16 who experience a change in family structure. This analysis suggests that happiness is reduced when children leave a two parent family or join a stepfamily and self-esteem is lowest amongst children who live in a stepfamily. Whilst this study looks at older children and focuses on experience of change amongst a given age group rather than lifetime change it usefully examines the changes in subjective well-being reported by children in the event of family complexity. The perspective that family complexity is associated with changes in subjective well-being may be a possible mechanism through which changes in child outcomes are affected by family complexity.

British work addressing the role of family complexity in the outcomes of young children is limited to that above, but the topic has been researched more by US researchers who have used a variety of data sources to assess a range of outcomes for children in relation to parental partnering and repartnering. The magnitude of family instability is far greater in the US, and there are some differences in observed outcomes for children in the US associated with family instability in comparison with the UK, but the relationship between family instability and children's outcomes appears to follow a similar pattern in both countries (Kiernan et al, 2011).

Ackerman et al (2002) used a small scale longitudinal study which looked at how disadvantage and instability relate to children's outcomes between the ages of four and nine, distinguishing between past, recent and chronic instability suggests that chronic

instability led to externalizing behaviour problems for both boys and girls and internalizing behaviour amongst girls only, whilst recent instability appeared to be only related to negative behaviour in the presence of harsh parenting; children who were most resilient to family instability where those with a higher verbal ability.

Cavanagh and Huston (2006; 2008) used data from the National Institute of Child Health and Human Development study of Early Childcare and Youth Development to look at how family complexity in early childhood (<7 years old) was related to social development both as children started formal schooling at the age of seven and when they left elementary school at the age of eleven. At the younger age children who had experienced parental partnership instability displayed more negative externalising behaviour than their peers from intact families, an association which was tempered by the economic resources of the family and the mothers own resources. When these same children were followed up at the age of eleven, early family instability still retained a significant association with current behaviour even once a range of intermediary factors were included, an effect which was particularly strong for boys.

Fomby and Cherlin (2007) used mother-child pairs from the National Longitudinal Study of Youth, originally recruited in 1979, which has rich information about the child's outcomes and the mother's history. Children's cognitive development and internalising and externalising behaviour was assessed. The wealth of information about the mothers own early life allowed a wide range of control factors to be included. The analysis suggested that children's aggregated behavioural scores (encompassing both internalising and externalising behaviour) were positively associated with the number of partnership transitions the child had experienced. An association between cognitive ability and partnership transitions was found to be entirely the result of selection into partnership instability of families who had lower cognitive outcomes to begin with.

The most common source of data for studying parental partnership instability and its effects on young children has been the Fragile Families and Child Wellbeing Study. This is a longitudinal study of a sample of children born in US urban areas between 1998 and 2000 with a particular focus on unmarried parents. This study has been particularly useful for the study of family instability because its design oversampled children who were most likely to experience instability and most likely to leave the survey. The resulting sample was representative of births in major US urban areas, however it is important to note that many of the characteristics of the sample were fundamentally different to the wider US

population, including the ethnic make-up of respondents which was heavily non-white, and the high levels of poverty amongst the group. This means that the findings from the Fragile Families study ought not be used to generalise to the US population, or a less ethnically diverse or poor population, as such the findings ought to be used as informative rather than prescriptive. The Fragile Families study included information collected at the birth of the focal child, and updated at age one, three and five and includes information across all three domains of health, behaviour and cognitive development. Importantly the survey included information about the family structures children were born into and the change that they experienced in these structures as they grew up enabling evaluation of the relative effects of family structure and family instability. The evidence suggests that parental partnership instability is more important for some outcomes than others, and that children's parental partnership status at birth is a potential mediator in the relationship between instability and outcomes. A consistent relationship was found between family instability and externalising behaviour problems for both boys and girls (Cooper et al, 2011; Osbourne and McLanahan, 2007; Fomby and Osbourne, 2010; Waldfogel et al, 2010; Craigie et al, 2012) however this effect seems to be stronger for children born to partnered mothers, with all children of lone mothers regardless of the degree of instability experienced having more problematic externalising behaviour (Craigie et al, 2012; Waldfogel et al, 2010). For internalising behaviour the evidence on family instability was less consistent with one study finding that instability did yield a significant effect on boys' internalising behaviour (Cooper et al, 2011) but others finding no association between partnership instability and children's internalising behaviour (Craigie et al, 2012; Osbourne and McLanahan, 2007; Waldfogel et al, 2010). Regardless of if the change in parental partnership is coresidental or not the same pattern of relationship between frequent transitions and children's outcomes emerges (Cooper et al, 2011; Osbourne and McLanahan, 2007), with the magnitude of the effect lower for non coresidental partnership transitions but remaining statistically significant. For cognitive outcomes the suggestion is that instability across the lifespan has a significant negative association with cognitive outcomes at the age of five (Craigie et al, 2012; Cooper et al, 2011; Craigie 2008; Waldfogel et al, 2010), and that this relationship does not seem to be different for children who started life in different family structures.

Important potential mediators identified in the studies of the FFCW study were maternal stress (Osbourne and McLanahan, 2007) and quality of the resident parent's partnership (Fomby and Osbourne, 2010). All of the studies using the FFCW study identified family

stress as their preferred theory linking parental partnership instability and child well-being, and all made strenuous efforts to combat the effects of selection into different types of families, however the relative paucity of information about parental mental health and financial and social resources in the FFCW study has limited the conclusions drawn to an extent. The information contained in the MCS is much more complete in this regard happily.

The evidence from larger body of US evidence is generally consistent with the UK evidence reviewed above as regards children's behavioural and psychological well-being with studies from both countries finding a relationship between parental partnership instability and children's externalising behaviour and little evidence of a general relationship with internalising behaviour. The evidence of a gender divide with boys' psychological well-being seemingly more affected than girls suggests that analysis by gender in the UK may prove instructive. The US and UK evidence diverges with regard to children's cognitive outcomes with an apparent association between children's cognitive outcomes and their experience of parental partnership instability in the US and a constant (as far as is possible from just two research articles) finding of no relationship in the UK. This may just be because UK research is comparatively less comprehensive, or because the tests used to measure cognitive ability were fundamentally different, or because the UK educational context with earlier universal commencement of formal education ameliorated some of the effects of family instability on early years learning for British children. Answering this question firstly requires confirmation that British children's cognitive development is not associated with instability they experience, which this study will attempt to confirm or otherwise.

4.5 What is already known about sibling group type?

There are different ways of considering the structural aspects of a sibling group and how this is associated with children's well-being and development. The three main structural characteristics of sibling group which have been considered by researchers are birth order (e.g. Lawson and Mace; Yucel and Yuan, 2015), sibship size (e.g. Blake, 1981; Downey, 1995; De La Rochebrochard and Joshi, 2013) and more rarely degrees of relatedness amongst siblings (e.g. Deater-Deckard and Dunn, 2002; Yucel and Yuan, 2015). There are theoretical reasons (see discussion of family investment theory in section 2.1.2) for believing that family size is important in children's outcomes and good quality evidence to support this (Blake, 1981; Downey, 1995; De La Rochebrochard and Joshi, 2013), however there is also good quality evidence (Ford et al, 2004; Lawson and Mace; Yucel and Yuan, 2015) that other aspects of the sibling environment are also good explanations of the outcomes of families with larger groups of siblings. Other aspects of sibling group which have been suggested as important are characteristics of parents (Ford et al, 2004) birth order (Lawson and Mace, 2010) and relationships between siblings (Yucel and Yuan, 2015). Birth order and sibling size are not of course mutually exclusive with larger families necessarily containing more children who are later born. Similarly families characterised by complex relationships between the siblings are likely to be larger than families in which the relationships are simple. These three different aspects of the structure of children's sibling groups are difficult to disentangle because of the co-dependencies between them. The theoretical basis of this thesis gives rise to the contention that it is the biological relatedness of the sibling group which is the most important aspect of the sibling group for children's well-being, because this creates a stress on the family systems through its influence on parenting behaviour and parenting mental health. Where parents are attempting to coparent with multiple coparents who may not wish to cooperate with each other this will act as a stress on the whole family system to the detriment of child development and well-being. Birth order and sibling group size are not independent of the biological relationships between the children in a family, but they are none the less different concepts. I have therefore chosen to consider the relatedness of siblings as the key dimension of sibling structure I wish to examine, but I recognise that other, interlinked, aspects of the sibling group are relevant for children's social and emotional well-being and cognitive development.

As sibling relationships form part of family complexity which has already been discussed in section 4.2, this section of the literature review considers only the link between complex sibling groups and children's social and emotional well-being and cognitive development without reference to parental partnership.

Complexity of sibling group is distinct from parental partnership, however it is closely related, hence there has been little literature which considers the relationship between complex sibling group and children's outcomes alone. There is some relevant literature conceptualising complex sibling groups as those characterised by multipartnered fertility. Rather than using the child as the reference point this uses the adult's fertility history to express the structural characteristics of the sibling group. Multipartnered fertility is far more frequently defined in reference to male fertility than female fertility, this seems to reflect a lack of distinction between the paternity of a woman's children. The implication of this is that women parent without regard to the paternity of each child, which is ignores how children relate to their fathers, and even children with the same mother will have different developmental environments if they have different fathers. When multipartnered fertility is not linked to the children's outcomes it does not seem necessary to review it given the focus of our thesis. There is no research which looks at multipartnered fertility in the UK, and research which relates multipartnered fertility to children's outcomes is rare, with only one relevant study identified.

Bronte-Tinkew et al, (2009) examined the relationship between children's externalising behaviour and overall physical health and an indicator that by the age of three their father had had children with other partners than the focal child's mother. The analysis showed that there was a relationship between externalising behaviour and the father's experience of children with different women and that this appeared to work through his depression. There was a weak link between physical health and paternal multipartnered fertility and this appeared to work through less engaged parenting by the father.

4.6 Gap in the literature addressed by this thesis

This examination of the extensive literature on parental partnership and the less extensive literature about sibling groups and children's well-being has revealed some gaps which this thesis will seek to address. The review of the family complexity literature has also highlighted some gaps that this thesis will seek to address.

Parental partnership is well covered but the variety of different ways in which it is formulated can be confusing and there is no structural comparison of these different methods and their implications for what can be concluded about the associations between well-being and cognitive development. This thesis will add to the literature by examining the association between children's well-being and development and parental partnership at the age of seven. As there are a variety of different ways of conceptualising parental partnership used in the literature, i.e. trajectory (Kiernan and Mensah, 2010); transitions (Schoon et al, 2011); and status (reviewed by Amato, 2001). Comparing the results obtained for the association between parental partnership and socio-emotional well-being and cognitive development using the different measures for the same dataset and methodology will illustrate the implications for other researchers of how they operationalise parental partnership for other research questions.

There is a limited body of evidence looking at associations between sibling group and children's well-being and development and extending this will be informative. The majority of the sibling group research identified has focused on birth order and sibling group size as the key link between sibling group and children's well-being and development. This thesis uses a different structural categorisation of sibling relationships and includes these other important aspects of sibling group as control variables to examine if they have a joint impact, or tend to cancel each other out.

Family complexity is an emerging concept, and this thesis applies the concept to the UK and for young children, neither of which are well served in the existing literature, with most existing literature using data from the US and focusing on teenagers. Investigating family complexity with British children in early childhood will begin to establish if family complexity is also relevant to British children's well-being and development.

Chapter 5. Dataset, sample and statistical techniques

5.1 Dataset

This thesis uses the Millennium Cohort Study as the source of data to investigate the association between family complexity and children's socio-emotional well-being and cognitive development. The key aims of this thesis are to investigate the multiple dimensions of family complexity in modern British children's lives. This firstly means categorising families and providing some estimates about how common family complexity is and secondly evaluating if this family complexity has consequences for children, in particular their well-being and development. The MCS provided the best available data for meeting these aims.

The Millennium Cohort is a sample of ~19,000 children born in 2000-2 across the UK, which aimed to include all children born within selected wards between the relevant dates. Wards with high ethnic minority populations were oversampled in order to obtain a sufficiently high sample of non-white children. Wards categorised as being disadvantaged were also oversampled because previous research had identified a higher likelihood of those living within these wards to be lost to the survey over time, as well as a lower initial engagement rate. To compensate for the oversampling of some groups and the differential attrition of groups over time, sampling weights are available for the MCS (Ketende and Jones, 2011). The frequency tables for variables used in the analysis discussed in Chapter 6 do not make use of these weights. The analysis using logistic regression presented in Chapters 7-13 uses the appropriate sampling weights. Chapter 14 which explores the data using propensity score matching does not use the sampling weights.

Sampling dates and sample size varied from the English design in Scotland, Wales and NI because of an avoidance of overlap with other surveys of infants and because of a shortfall in births during the period. The survey data consists of an interview with parent(s) or carer of cohort members when the child was aged 9 months, 3 years, 5 years and 7 years. The children's health was assessed at each wave and cognitive and socio-behavioural tests administered at age 3, 5 and 7. Information is collected about the makeup of the cohort member's main household, and a parent interview and a partner interview (either in person or by proxy) where applicable is carried out at each wave. The interview data covers a variety of relevant topics including poverty, parenting and family environment, physical

and mental health of the child and the parents, education and attitudes (Hansen, 2012; Johnson, 2012)

There are a number of families with more than one cohort child (253 sets of twins and 10 sets of triplets were originally recruited), in this case outcomes for the first child are used because of the disproportionate weight using outcomes from multiple children with the same experience of family complexity would give to their particular experience of family complexity.

5.2 Sample

Only children who lived with at least one biological parent have been included in the sample for analysis. This means that children who live with their grandparents without their biological parents and children who have been adopted are excluded.

There is a case that children who were adopted before the initial wave ought to be included in the sample. I have chosen to exclude the children adopted in infancy for two reasons, firstly because children who are adopted even in infancy in this period are likely to have experienced adversity both before and after birth because it is uncommon for children to be adopted without significant problems with the biological parents and such significant problems are outside of the scope of this study (Masson et al, 2008). Secondly, there are a number of children who experienced the breakdown of their parents partnership between their birth and the age nine months wave and these children are regarded differently to those children who were born with parents not in union it would be inconsistent to treat children who were adopted in infancy as having not experienced a change in their family when these children who have experienced a lesser transition are treated as having experienced family complexity. The small number of children who have been adopted by a stepparent are not distinguished from those who have not been adopted by their stepparent. The number of children thus excluded are shown in Table 2.

TABLE 2: CHILDREN'S RELATIONSHIP TO THEIR MAIN CARER

Child's relationship to carer in household	Frequency	Percentage
At least one biological parent	13793	99.5
Two adopted parents	9	0.07
Non parent relative	55	0.40
Total	13857	100

5.3 Statistical techniques

5.3.1 Statistical techniques considered

This thesis will examine the association between socio-emotional well-being and cognitive development and parental partnership alone; complex sibling groups alone; and overall family complexity. In order to evaluate this association I use logistic regression models, some of which include interaction effects and finally propensity score models. This section provides a brief outline of other potentially suitable techniques and explains why the techniques that have been used were selected.

Section 4.5 highlighted that the use of regression models was the most common way of evaluating the association between family complexity and children's well-being and development in the existing literature. Regression models are not the only analytic approaches that could have been used, however and fixed effects models, ANCOVA/ANOVA and multilevel models are all potentially suitable.

No family complexity studies were identified which used fixed effects models this is none the less a potentially suitable method for looking for the type of association under discussion here. Fixed effects models compare change on a within person case on the basis of the instrumental variable rather than between people as is the case with standard regression models. I have chosen not to use fixed effects models because there is not currently enough known about how family complexity relates to children's well-being or development to be able to state what the change of interest within person ought to be. This study is an exploratory study attempting to identify if there is an association rather than developing an understanding of the association which fixed effects models would be more suitable for. An ANCOVA or ANOVA method is a possible approach to examining the association between family complexity and children's well-being and development and looks for association in a non-directional fashion, meaning that where the designation of independent and dependent variables is uncertain an association can still be uncovered and development of which variables are independent and dependent can be made. I have chosen not to use ANCOVA/ANOVA because there are good theoretical reasons for believing that on the whole the child's environment (of which family complexity forms one part) shapes a child's social and emotional well-being and cognitive development, rather than the child well-being and development necessarily shaping their environment. Finally, some of the studies identified in section 4.5 used multilevel modelling, this technique is

broadly unsuitable for this type of question in this type of data set as there is no meaningful clustering of children with regard to their experience of family complexity. This technique would be useful if we thought that there were geographic or ethnic differences in how family complexity was associated with children's well-being or development, but at present there is little suggestion of any such effects.

5.3.2 Selection of logistic regression

Logistic regression is used in the first instance because my research question relates to finding an association between family complexity and children's outcomes, and as there is no research examining family complexity as defined here and relatively little research about the association between parental partnership change and none which examines sibling groups in this way this research is exploratory and logistic regression is methodologically sufficient for this purpose. Logistic regression it is easily understood and responsive to the underlying sampling structure of the data to get generalizable results. Logistic regression also has the advantage that it gives an effect size for the difference between the reference category and other categories of variables. The exploratory aim of this thesis to establish prevalence of family complexity suggests that this relatively simple method is appropriate.

As discussed in section 4.5 the aim of this thesis is to investigate macro-level trends in family complexity and relate them to children's general well-being and development, rather than to specifically explore processes and individual level experiences. As such this thesis will lead to the development of stylized facts and logistic regression is a good technique for this.

Logistic regression was chosen rather than ordinary least squares regression as it is more meaningful to consider the likelihood of children to be struggling rather than the overall progress of all children.

5.3.3 Selection of propensity score models

The choice of propensity score models to investigate the question of how family complexity is associated with children's well-being and development is not justified by any of the studies outlined in section 4.5, and has never to my knowledge been applied to family complexity before. Propensity score matching is a useful method for cohort data sets. Propensity score matching is a technique which is intended to replicate the effects of a

randomised controlled trial where a randomised control trial is not possible or ethical. In essence, instead of being randomised at a baseline (as in an RCT) propensity scores are generated for all children for their likelihood for the test condition to happen to them (here for their mother to have a younger half sibling by the time they were seven years old). Propensity scores are particularly good for cohort data because a baseline is taken before the exposure to the test condition, making baseline matching straightforward. The idea is that all observed variation in likelihood to be exposed to a particular outcome is removed, meaning that the true effect of a test condition can be observed.

The matching process is key, and as not all children will be even exposed to the possibility of having a younger half sibling this analysis will be restricted to only those children who have a social parent by the time they are seven. This is because otherwise balance of propensity scores between the treated and untreated would not be possible invalidating the analysis. As the propensity score needs to be generated on as many a priori variables as possible it is not possible to investigate the effects of older half siblings on children's well-being and development in this way.

The use of propensity score models is intended to disentangle the effects on children of step parents only and step parents and half siblings on their well-being and development.

5.3.4 Fitting the logistic regression models

Analysis was undertaken using Stata12 for the logistic regression models, and Stata 13 was used for the propensity score analysis, as Stata 13 became available during the course of completing the thesis and included a better range of commands for propensity score matching. The logistic regression models used are appropriately weighted using Ketende and Jones, 2011 for guidance as to the Millennium Cohort Study survey weights. The logistic regression models will be weighted to reflect the original sampling weights of the survey.

Analysing the two aspects parental partnership and complex sibling group jointly as family complexity will be done firstly in a jointly controlled model and then in an interacting model. The purpose of this will be to see to what extent the two aspects of family complexity have an independent association with each of the outcomes using the joint control model, before adding in an interaction effect which evaluates how the two aspects of family complexity interact in association with the outcomes. The two aspects of family complexity will then be combined to create a single measure of family complexity for

analysis. The single variable will then be analysed using logistic regression models in the same way as the logistic models were developed for the parental partnership only analyses and subsequently used for the complex sibling group variable.

The analytical chapters present both unadjusted and adjusted models to evaluate the association between the particular aspect of family complexity and children's outcomes. The adjusted models are fitted by taking a set of candidate control variables which have been determined by the literature review. The adjusted logistic regression models will be fitted using a backwards stepwise method, with all variables of interest initially included and a Wald test used to ascertain the overall significance of the model and the significance of each individual variable. Variables which do not attain the threshold of a significance level of 10% will then be dropped from the model. Where more than one variable does not reach the threshold significance of 10% the variable which is least significant will be dropped from the model first, and the model rerun with all the remaining variables. This process will be iterated until only variables with a significance level of 10% are included in the model. In practice this means that although models will have some of the same variables, each model will have a slightly different specification of covariates with the main variable of interest which reflects the results of this iterative process.

Logistic regression models have no model fit statistic analogous to R^2 used in linear regression. For model fit, individual variables will be assessed via Wald tests, as above, which only says if an individual variable should be retained in the model, rather than giving an indication of the improvement in model fit attributable to alternative specifications of the model. Three options for assessing overall model fit have been considered for assessing model fit, two of which are based on comparing the log likelihood of the constant and controlled model and one which compares predicted and observed patterns of covariate residuals. The final selection of Pearson χ^2 test to assess goodness of fit in all logistic regression models is explained, and limitations of this measure discussed.

Options for goodness of fit include McFadden's pseudo R^2, which is the measure reported by Stata in the standard output from a logistic regression model. This fit statistic reports the inverse of the ratio of the log likelihood of the full model to the log likelihood of the constant only model. This statistic is bounded by 0 and 1 and as in linear regression the higher the value of the pseudo R^2 the better the model is said to fit the data, however unlike in linear regression, this number should not be interpreted as proportion of variance explained by the model. The pseudo R^2 is a widely used and accepted method of evaluating

the fit of a logistic regression model, however when a logistic regression model is run using the svy (subset) commands, as is necessary for the analysis presented in this thesis, Stata does not include a measure of pseudo R^2 for the model. There is no alternative command which generates any pseudo R^2 for svy weighted data.

An alternative assessment of measure fit can be provided by the AIC or BIC, which again compare the log likelihood of a constant only model, with the model with controls (i.e. the variables). AIC or BIC are usually used to assess variable fit during the model building phase, and I have chosen to use Wald tests to assess model fit. As such it seems inconsistent to evaluate overall goodness of fit using AIC or BIC. In addition to this, AIC and BIC cannot be reported by Stata after a svy (subset) logistic regression model and there is no alternative command which does report this for models generated using the svy (subset) commands.

An alternative to pseudo R^2 measures are those based on the Pearson residuals. These models compare the number of observations with a particular covariate pattern with the number of observations that were predicted by the model to have that particular covariate pattern. The overall model fit can then be assessed using a χ^2 test comparing the observed versus expected pattern of covariate pattern. This test does not use log likelihood to approximate the proportion of variance explained, but is based on the sensitivity of the model. When a Pearson χ^2 test for the difference between the predicted covariate pattern and the observed covariate pattern is carried out, the appropriate hypothesis that is being tested is that the difference between the predicted and observed pattern of covariates cannot be explained by chance. Failing to reject the null hypothesis would suggest that the model was incorrectly specified, and that more than chance could explain the pattern of covariates observed in the model. This test is not sensitive to the underlying theory upon which the model has been built, the Pearson χ^2 test of model fit, should be interpreted with reference to the aims of the model as well as the absolute decision as to if the null hypothesis can be rejected. Finally, these model fit statistics can be calculated after a svy (subset) logistic regression in Stata.

The Pearson χ^2 test of model fit can be unsuitable when the number of covariate patterns is close to the number of observations in the model. In this case the Hosmer-Lemeshow test can be used as an alternative. In this case the data is grouped into equal sized groups by the predicted covariate pattern. The Pearson χ^2 test is then done by each decile before the overall result computed.

Examination of the covariate pattern for the data and the size of the sample have indicated that the Hosmer-Lemeshow adjustment is not necessary for the assessment of goodness of fit of the analysis presented in Chapters 7-13. As a further confirmation of this position, an initial investigation of the results from Hosmer-Lemeshow goodness of fit and standard Pearson χ^2 tests has uncovered no difference in goodness of fit between the two approaches when applied to the data here.

As a result of these considerations the goodness of fit of the models is calculated using a Pearson χ^2 Goodness of Fit test. This test gives an indication of poor fit, rather than an indication of good fit. The Pearson χ^2 Goodness of Fit compares the observed pattern of covariate responses against the expected pattern, with the null hypothesis that the difference between the observed and expected pattern of covariates can be explained by chance. So if the null hypothesis is rejected i.e. $p<0.05$ the goodness of fit statistic suggests that the model is a poor fit as the difference between the observed and predicted covariate pattern cannot be explained by chance, the model should be rejected.

The use of Pearson χ^2 test of model goodness of fit has a serious limitation when assessing models with only one variable included, i.e. the unadjusted model. In models in which there is only one predictor included, the covariate pattern will necessarily be identical between that predicted by the model and that observed in the data, meaning that the goodness of fit will be apparently perfect. This limitation must be tempered by an assessment of what the purpose of the unadjusted model is for, i.e. it is in order to gauge the degree to which family complexity is confounded by other variables established as being associated with poorer outcomes for children. For the sake of completeness the Pearson χ^2 test for goodness of fit is presented for all the unadjusted models, but cannot convey meaningful information about the model fit.

5.3.5 Fitting the propensity score models

To further examine what aspects of family complexity are important for children's well-being and development a propensity score matching analysis will be undertaken. Propensity score matching is a quasi-experimental method which matches a treatment and control group on the basis of predefined characteristics and provided this is done appropriately allows the difference in outcomes between the groups which can be attributed to the effect of the condition that has been designated the test condition to be established. Propensity score matching will be used to compare families in which the child's

biological mother has a partner who is not the biological parent of the child the presence of a child to the new partnership with families with those in which there are no subsequent children and how this relates to the well-being and development of children born to the women's previous partnership.

The process of fitting the propensity score models is explored in the analysis Chapter 14 as I have chosen to present this method as a worked example, given its relative novelty as a method.

5.4 Operationalising family complexity

To execute the analytical plans of this thesis it is necessary to appropriately operationalise the core concepts at the heart of this research project, these come in three different groups. Firstly there are the concepts of family complexity (the variable of interest), secondly children's socio-emotional well-being and cognitive development (the dependent variable) and finally the control variables. The variable of interest and the dependent variable are defined by the research question, but the control variables are not and there is an explanation of the strategy applied to the selection of them outlined in section 6.5.

Family complexity is intended to be composed of an accurate representation of the parental partnership history that the child has been exposed to, and an accurate recording of the siblings who are resident with the child at the age of seven.

It is important to control for variables which may be confounding the association between family complexity and the socio-emotional well-being and cognitive development outcomes. Whilst some researchers include a large number of variables as controls, and there are appropriate research designs for this, I have chosen to use a relatively limited group of control variables. This is because I want to focus more directly on how policy can reduce the effects of family complexity on children.

Propensity score matching requires the use of a number of variables to match the treatment and control groups on, whilst many of these variables are the control variables used for the iterations of logistic regression some variables were only used in the context of the propensity score matching.

The next section explains in detail the derivation of the variables used, starting with the key independent variable, before moving on to the dependent variable, before turning to the control variables included. Finally this section concludes with a more detailed exposition of the analytical techniques to be used in the analysis section.

The two main operative variables used to represent family complexity were derived totally independently of each other. The parental partnership variable was a legacy variable, which I was kindly given permission to use, whereas the sibling complexity variable was entirely derived from scratch from the MCS household grid files.

Chapter 6. Variables

6.1 The partnership variables

6.1.1 Introduction

For the partnership variables I made use of the variables derived by Dr Fiona Mensah and Dr John Holmes for Professor Kiernan, used in previously published work on the Millennium Cohort Study (Kiernan and Mensah, 2010; Holmes and Kiernan, 2011) which is closely related to this work. The variable was initially derived by Dr Mensah up to the age five wave of the MCS and subsequently extended by Dr Holmes up to age seven. I did not alter the variable in any way, I merely renamed it to fit in with my own naming schematic. The partnership variable derived by Dr Mensah and Dr Holmes was a comprehensive trajectory measure tracing the children's experience of parental partnership change over the first seven years of their lives. I used this trajectory variable to create a transitions measure of family change which was consistent with the trajectory measure. The status variable was separately derived for all children who were present in the survey at age seven...

The wave by wave measures of family status have to be combined to create a longitudinal measure. As the analysis undertaken using this variable is intended to focus on the child's experience of change this has led to a strict view being taken about the data required to classify a family. As a result all families who joined the MCS at wave two ('the new families') have been excluded as there is no information about their family status at age nine months. Any families who missed a wave of the survey and subsequently returned to the survey have been excluded as there is no information about their family status at their missing wave. This has led to the creation of a significant unknown group as the number of families who do not have complete enough information to be included in the analysis is large. The unknown group also includes a small number of families who were present at all four waves but about whom not enough information is available to reliably describe the parental partnership history of the family.

Consideration has been given to reducing the size of this missing group in the parental partnership trajectory variable, as it is large. The size of this group has a number of implications for the analysis, as it means that the categorisations are not exclusive, with families in the unknown group having actually experienced one of the trajectories which are explicit elsewhere in the model. This acts to reduce the size of the effect of each of

these trajectories. In order to combat this problem ways to classify families in this unknown group were considered. The most obvious one was to include all those families with a stable parental partnership trajectory over time in that parental partnership group. This method could be extended to assume that parental partnership status which changes between waves has only changed in the way which we observe and that there are no changes in the time between the waves at which they were observed. The problem with this is that changes in parental partnership trajectory may not be missing at random with regard to parental partnership status. As Table 3 indicates parental partnership trajectory does not appear to be missing at random with regard to parental partnership at age seven. This suggests that any imputation may misrepresent these children's experience of parental partnership in their lifetime.

TABLE 3: ASSOCIATION BETWEEN MISSING PARENTAL PARTNERSHIP AND PARENTAL PARTNERSHIP STATUS AT AGE 7 FOR CHILDREN WITH EITHER A KNOWN PARENTAL PARTNERSHIP TRAJECTORY OR STATUS

	Parental partnership status at age 7					
	Married	Cohabiting	Lone parent	Repartnered	Unknown	Total
Parental partnership trajectory present	7,167	1,611	2,181	680	15	11,654
Parental partnership trajectory missing	920	290	714	211	0	2,135
Total	8,087	1,901	2,895	891	15	13,789

Pearson chi2(4) = 339.2539
Pr = 0

6.1.2 Three measures of parental partnership

The concept of validity is at the heart of why multiple conceptions of parental partnership have been derived. I need to ensure that my conception of parental partnership accurately measures the life experience of the focal child. In order to enhance the validity of my ideas of parental partnership I need to ensure that the measure reflects the underlying concept, objectively this should be straightforward as parental partnership status at any given time

should be recorded categorically. This however is rather simplistic and it would appear that parental partnership has its effect on children's well-being as both a process and by shaping of the child's broader environment. This means that for example, children can go from seeing their fathers daily to seeing them weekly thus reducing the frequency of their meaningful interaction, with the associated detachment of the father from the child's normal routine and consequent disruption to the child's learning routines, one exemplar mechanism is that a separated father may find it harder to keep up with the child's schoolwork than a father from an intact family. This is broadly why and how parental partnership may be associated with children's socio-emotional well-being and cognitive development, but in determining how to measure parental partnership to reflect these aspects is more difficult. This is where the examining the validity of the measures is useful. If I want to reflect how changes in the (biological and social) parent's relationship lead to changes in the parent-child relationship and changes in the child's broader environment I need to find an appropriate measure. Parental partnership seems like a good candidate as after all I am implying that it is the change in the relationship between parents which is the determinant of the changes in the proximate causes of the child's well-being and development. How to maximise the validity of the measure of parental partnership is therefore the focus of this chapter and looks at a number of conceptions which emphasise different aspects of parental partnership change. Evaluating the different conceptions will allow a view to be taken as to if they are a valid measure of parental partnership as it relates to children's well-being.

6.1.3 Parental partnership trajectory

The trajectory measure uses two sources of data to address the relationship between the parents in the focal child's household. These are the household grid and the report of the interview respondents, at age nine months and seven years this is the main respondent only and both the main and (if applicable) the partner respondent at age three and five years. The relationship between the parents is thus derived at each wave, and has been checked for consistency against the other report. Where these reports differ the relationship is considered unknown. Whilst the trajectory measure uses data only from the first four waves of the Millennium Cohort Study, there are five time points for parental partnership represented, with the retrospective recall of interviewees of their relationship with the child's other biological parent at the time of the child's birth included. Relationships between the child's coresident parental figures are then recorded in one of

five categories at birth and one of nine categories at nine months, three years, five years and seven years. At all waves parents were recorded as being married, cohabiting, being a lone biological mother or not known, in the later waves, coresidential but relationship unknown, lone biological father, biological mother and step parent, biological father and step parent and neither natural parent were added to the classification. The measures were checked for consistency across time. Parents reported as married at the child's birth but subsequently observed to be cohabiting were recategorised as cohabiting at the earlier time point. Where the relationship between parents was given as being unknown but coresident (this is a different unknown to information being available but inconsistent) any earlier or later information on their relationship was used to categorise the family. This led to a partnership history at each wave. Further detail to the partnership measure could be added because each wave of the survey included a number of questions about between wave partnerships. The main respondent was asked if they had had a coresidental partner who was not the biological parent of the focal child for any period longer than a month since the last wave, and if more than one period was reported if this was with multiple partners. The main respondent was asked if they had spent a period of more than a month living as a lone parent since the last wave, when they were partnered at both waves. Lone parents at two waves were asked if they had spent more than a month living with their child's biological parent between waves. This information is intended to tease out between wave partnership changes which would otherwise be missed. There are two significant drawbacks to this approach, firstly this assumes that the main respondent is the same person as last time; and secondly is relies on participant recall which may not be complete, particularly of temporary changes.

Combining the known parental partnership histories of the families to create a longitudinal measure of parental partnership history gives rise to 14 substantive categories of parental partnership trajectory. This is necessarily a simplification of the history of families, particularly those which are particularly complex. It is not possible to reliably tell if a stepparent observed at one wave is the same stepparent as observed at a subsequent wave, this is because there is no specific information provided to researchers to identify individuals. On occasion it appears that when mistakes are made in the household grid the procedure appears to be to correct them by introducing a new person. This is exemplified in the 10 families in which three biological parents have been recorded, with only a difference in the year of birth between the two fathers, these men are present one at a time, which I have interpreted as a correction of information about an individual rather

than an initial mistake in ascribing paternity. It is therefore only possible to reliably state if a stepparent has joined the family and those cases where there has been more than one stepparent cannot be distinguished. Those cases in which parents have dissolved more than one partnership are not separately identified due to their rareness and are included with the still ongoing stepfamilies, as appropriate from their parent's initial partnership. Where parents are observed either at waves or between waves to separate and subsequently reunite this temporary change in their partnership is reported. The 14 resulting categories are continuously married, married with periods of separation, married to lone parent, married to repartnered, continuously cohabiting, cohabiting to married, cohabiting with periods of separation, cohabiting to lone parent, cohabiting to repartnered, continuously unpartnered, unpartnered to married, unpartnered to cohabiting, unpartnered with periods of partnership and finally unknown. The distribution of the partnership categories is in Table 4.

TABLE 4: PARENTAL PARTNERSHIP TRAJECTORY FOR ALL CHILDREN

Parental partnership trajectory	Freq.	Percent	Cum.
Married Stable	6,220	44.89	44.89
Married with periods of separation	171	1.23	46.12
Married to lone	708	5.11	51.23
Married to repartnered	193	1.39	52.62
Cohabiting stable	1,105	7.97	60.60
Cohabiting to married	624	4.50	65.10
Cohabiting with periods of separation	148	1.07	66.17
Cohabiting to lone	572	4.13	70.30
Cohabiting to repartnered	222	1.60	71.90
Unpartnered stable	573	4.14	76.03
Unpartnered to married	201	1.45	77.48
Unpartnered to cohabiting	310	2.24	79.72
Unpartnered to repartnered	271	1.96	81.68
Unpartnered with periods of partnership	337	2.43	84.11
Unknown	2,202	15.89	100
Total	13,857	100	

6.1.4 Parental partnership transitions

The transitions approach removes parental partnership status and is based on a theoretically different view that parental partnership status is of itself not useful for

understanding children's response to parental partnerships but instead that it is the number of changes that children experience and the disruption engendered by these changes which results in any observed association between parental partnership and children's well-being. Operationalising this means that children's experiences of parental partnerships are categorised according to the number of transitions that they have experienced over their lifetime. Whilst parental partnership transitions might be considered suitable for analysis as a count measure it is more appropriate to analyse transitions as a categorical variable. This is because firstly, interruption to parental partnership is a two event transition as is the dissolution of the parental partnership and repartnering with a stepparent, but resuming the partnership of the natural parents is less disruptive than the parent repartnering with a new partner.

There are five categories of parental partnership transitions, firstly no parental partnership transitions – including consistently married, consistently cohabiting, cohabiting to married, and consistently unpartnered trajectory; secondly interruption to parental partnership namely married with periods of separation, and cohabiting with periods of separation; thirdly single change to parental partnership, namely married to lone, cohabiting to lone, unpartnered to married and unpartnered to cohabiting; fourthly repartnering of resident parent, namely married to repartnered, cohabiting to repartnered, unpartnered to repartnered and unpartnered with periods of partnership; finally the unknown transition which is those families who were not present at every wave but were present at age 7 wave and do not have a complete partnership history available. Table 5 shows the frequency of each category of parental partnership transition for all children.

In all models the reference category is the no parental partnership transitions category. This is a different reference category than the married stable reference category used in the parental partnership trajectory models.

TABLE 5: PARENTAL PARTNERSHIP TRANSITIONS FOR ALL CHILDREN

Parental partnership transitions			
	Freq.	Percent	Cum.
Stable	8,522	61.5	61.5
Interrupted	319	2.3	63.8
Breakdown	1,791	12.92	76.73
Repartnered	1,023	7.38	84.11
Unknown	2,202	15.89	100
Total	13,857	100	

6.1.5 Parental partnership status

Historically analysis of the association between family type and children's well-being has been done using the child's family structure at the survey point (reviewed by Amato and Keith, 1991; Amato 2001), thus not distinguishing those children who have had different numbers of transitions or those who have different starting points. In most data sets the only information available about a child's parental partnership is status. By expressing parental partnership as status as well as the more sophisticated trajectory and transitions measure using the same underlying data is intended to allow a comparison of the implications of using each measure of parental partnership.

The parental partnership status variable is a cross sectional variable which groups children according to the type of partnership their parents are in at the time of the age seven wave, in the main this maps onto the trajectories derived earlier the large unknown category is reduced to a rump where the relationship between the main and the partner respondent cannot be derived or where there is a parent in the household who is not interviewed as the main respondent. Note that for simplicity the earlier variables were based on the main and partner respondent.

Table 6 shows the parental partnership status at age seven only for all children.

TABLE 6: PARENTAL PARTNERSHIP STATUS FOR ALL CHILDREN LIVING WITH A BIOLOGICAL OR ADOPTED PARENT AT AGE 7

Parental partnership status			
	Freq.	Percent	Cum.
Married	8,096	58.62	58.62
Cohabiting	1,901	13.76	72.38
Lone parent	2,898	20.98	93.37
Repartnered	893	6.47	99.83
Unknown	23	0.17	100
Total	13,811	100	

6.1.6. Relating parental partnership trajectory, parental partnership transition, and parental partnership status

This section explains how the three measures of parental partnership trajectory, transition and status relate to each other and how family circumstances are classified differently in each of the parental partnership variables. How important these different classifications are for outcomes is further explored in Chapter 10 of this thesis.

TABLE 7: PARENTAL PARTNERSHIP CLASSIFICATION BY TRAJECTORY, TRANSITION AND STATUS

Trajectory	Transition	Status
Married stable	No partnership transitions	Married
Married periods of separation	Interruption to continuing partnership	Married
Married to lone	Breakdown of parent's partnership	Lone parent
Married to repartnered	Repartnering of resident parent	Step parent
Cohabiting stable	No partnership transitions	Cohabiting
Cohabiting to married	No partnership transitions	Married
Cohabiting periods of separation	Interruption to continuing partnership	Cohabiting
Cohabiting to lone	Breakdown of parent's partnership	Lone parent
Cohabiting to repartnered	Repartnering of resident parent	Step parent
Unpartnered stable	No partnership transitions	Lone parent
Unpartnered to married	Breakdown of parent's partnership	Married
Unpartnered to cohabiting	Breakdown of parent's partnership	Cohabiting
Unpartnered to repartnered	Repartnering of resident parent	Step parent
Unpartnered periods of partnership	Repartnering of resident parent	Lone parent
Unknown	Unknown	Married or Cohabiting or Lone or Step parent as appropriate

Table 7 maps how each of the categories are related to each other so it possible to trace a particular set of family circumstances across the different models. Only the unknown category remains the same in the both the trajectory and transition model and this

category is split up in the status model. The highlighted groups would typically form the reference group in each of the parental partnership variables when analysed.

TABLE 8: CLASSIFICATION OF ALL CHILDREN BY THE THREE PARENTAL PARTNERSHIP VARIABLES (PROPORTIONS)

	N = 13811	Married stable	Married separation periods of	Married to lone	Married to repartnered	Cohabiting stable	Cohabiting to married	Cohabiting separation periods of	Cohabiting to lone	Cohabiting to repartnered	Unpartnered stable	Unpartnered to married	Unpartnered to cohabiting	Unpartnered to repartnered	Unpartnered periods of partnership	Unknown		
Married	Stable	44.6					4.5										49.1	
	Interruption		1.1					0.2									1.3	
	Breakdown											1.5					1.5	58.6
	Repartnered																	
	Unknown															6.7	6.7	
Cohabiting	Stable					8.5											8.5	
	Interruption							1.0									1.0	
	Breakdown												2.2				2.2	13.78
	Repartnered																	
	Unknown															2.1	2.1	
Lone parent	Stable										4.1						4.1	
	Interruption																	
	Breakdown			5.0					4.1						2.4		11.6	20.98
	Repartnered																	
	Unknown															5.1	5.1	
Step parent	Stable																	
	Interruption																	
	Breakdown																	6.46
	Repartnered				1.3					1.5				1.9			4.9	
	Unknown															1.5	1.5	
Unknown	Stable																	
	Interruption																	
	Breakdown																	0.17
	Repartnered																	
	Unknown															0.1	0.1	
		44.6	1.1	5.0	1.3	8.4	4.5	1.1	4.1	1.5	4.1	1.4	2.2	1.9	2.4	15.6		

Table 8 shows the distribution of the sample with regard to the three different formulations of the parental partnership variable. The married stable group is the single biggest group and around half of the sample follows this trajectory, in all the models the married stable group is the foundation but not the entirety of the reference group. In the trajectory model the reference group is the married stable group, for the transition model

the no partnership transitions group is the reference group and for the status model is the reference group – the components of which are highlighted above. There are differences across models as a result of changing the reference group but this is necessary because of the theoretic differences each model represents a test of. This means that there will be differences between the models as a result of the changing reference group and will change the implications of the model however if the conceptions are different this will not be the limit of the altered model.

6.1.7 Limitations of the parental partnership measures

Of the three parental partnership variables both trajectory and transitions require longitudinal analysis and are as such relatively complex to derive. The trajectory variable does attempt to capture between wave changes, but this is not necessarily a complete record of these changes, additionally in the small minority of cases which have followed particularly complicated trajectories, for example those who have had multiple step parents are not easily discernible because the identity of step parents is not reliably traceable between waves (because of the way in which mistakes in the household grid are corrected in follow up waves). The transition variable suffers from the same difficulty in identifying complicated transitions. This means that even for a resource as detailed as the MCS there are three main reservations to be made about the accuracy of longitudinal parental partnership measures. Firstly; identification of very complex patterns such as those which include multiple step parents is difficult and as such has not been attempted so the step parent category will include the small number of children whose parent has dissolved more than one partnership. Secondly; the waves of the study take place at 2 to 3 year intervals and changes in parental partnerships which take place between waves are reported by the recall of the interviewee so it is quite feasible that there are many short lived parental partnership changes which are missed, this will particularly understate parents who have a temporary separation. Thirdly; there are only longitudinal parental partnership measures available for those children who participated in all waves of the survey and the assumption has been made that regardless of who completed the questionnaire they are in the continuous custody of at least one parent i.e. if they live with a lone parent at one wave and also with a lone parent at the next it is the same parent in both waves. These reservations highlight why a cross sectional measure of parental partnership status is a simpler approach. The cross sectional measure just needs information at the same wave as the outcome measure, and categorises children by their

parental partnership status, it also suggests that parental partnership status is a static measure. This type of measure is considered lacking in current academic discourse which conceptualises the effects of parental partnership on children as being a process rather than an event (Kiernan and Mensah, 2010). Status has an advantage over the longitudinal measures of parental partnership change as it is far easier to derive from data, and where parental partnership status is being used as a control variable it is often used because it is easy to derive and simple to understand in understand.

As well as the how the variables are derived it is important to examine how easy they are to analyse across a range of contexts and this means comparing the number of categories they give rise to and how they are distributed. The trajectory measure gives rise to a large number of categories some of which are quite small meaning that in the context of a small study which does not recruit with respect to family complexity there will structurally be a large standard error for these groups which can possibly compromise attempts to investigate associations with outcomes of interest, particularly when the data set is relatively small to begin with. The transitions measure would have a similar problem if used in a small sample not recruited with respect to family complexity, although the smaller number of groups in comparison with the trajectory measure would mitigate the problem to some extent. The status measure does not suffer from this problem as the simple four category measure means that it is easy to assign children to one of these categories, which will lead to larger n groups and robust standard errors in most research designs.

There are theoretical considerations as to which of the three conceptions of parental partnership change is preferable. The trajectory approach considers that the amount of change that a child has been exposed to and the status of these partnerships is important, so for instance there are structural differences between outcomes in children who experience the breakdown in their parent's marriage when compared with those who experience the breakdown in their parent's cohabitation. This relies on the experience of marriage being different to cohabitation, with for example lower relationship quality and broader social support for married and cohabiting couples, as well as the established selection into marriage of the older, wealthier and better educated which is controlled for as appropriate (Crawford et al, 2013). The transition approach as conceptualised here removes partnership status as the selection into marriage, cohabitation and lone parenthood is controlled for by other variables and instead considers only the changes in partnership the child has experienced, broadly this means a count measure but this is not possible if interruptions to partnership are to be considered. This conception explicitly

places instability at the core of why parental partnership change matters for children's outcomes. The transitions approach implies that the direction of the change is not important, so children whose initially unpartnered mother cohabits with their biological father would have the same parental partnership transition history as a child who lives with their initially cohabiting biological parents and then moves to living with their unpartnered mother. The status approach is almost the complete opposite of the transitions approach and the history of the parent's partnership is only implied and is never explicitly considered despite the implications of different partnership histories found in each of the current statuses. This approach interprets the effects of parental partnership as being entirely transient and that differences between partnership statuses are as a result of the arrangement around the child rather than the circumstances which led to that arrangement.

There are theoretical and practical reasons in favour and against all of the conceptions of parental partnership arising from the derivation of the variables considered here. The status measure is limited, regarding parental partnership change as an event not a process but it does have the advantage of being easy to operationalise. Trajectory is the most complete way of conceptualising parental partnership change including all the relevant dimensions of family complexity but is intensive to derive and potentially difficult to analyse and interpret. The transition measure includes the key change aspects of parental partnership change and is less difficult to analyse and interpret than the trajectory measure but is nearly as difficult to derive as the trajectory measure. It is difficult to distinguish trajectory from transitions, and to understand why transitions would be considered, given that they are less informative than the trajectory approach and offer little improvement in terms of usability or ease of derivation. The transitions approach removes parental partnership status from the model and this is particularly important because there is a view that the difference between marriage and cohabitation is simply a result of selection of the older, wealthier and better educated into marriage and appropriate controls should remove the observed differences between cohabitation and marriage, and this is probably the reason for some scholars use of transitions. The literature on family complexity as a transition is bigger than that which uses trajectory and this is probably because of the relative simplicity of deriving and working with transitions over trajectory. Importantly the reduction in categories in the transitions measure compared to the trajectory approach makes meaningful results easier to find. This is not to downplay the theoretic differences between the two conceptions but the practical considerations of doing research should not

be ignored. Comparing the results derived from the three conceptions of parental partnership change will highlight the different results obtained depending on how parental partnership change is phrased in the model. This will further enhance understanding of which conception is the best representation of parental partnership change. The three variants of parental partnership change are all related to the same outcomes and models are built up using the same variables and methods in order for a comparison to be made. As well as a theoretic exercise in translating a concept into an operational variable the overall results will shed light on the key associations between children's socio-emotional well-being, cognitive development and parental partnership.

6.2 The sibling variables

6.2.1 Deriving my own variables or using the derived variable variables

The MCS has a range of derived variables in the data sets provided to researchers, some of which relate to family structure and can be used to impute the central measures of family complexity (Rosenberg, 2012); however I have chosen to derive my own measures of sibling complexity direct from the household grid for reasons outlined below.

Each of the MCS waves come with a range of derived variables including some which indicate the siblings of the focal child in the household, from which the structure of the sibling relationship in the child's household can be broadly determined. By cross referencing to the relationship between the respondents and siblings in the household about the relationship between members of the child's household can be derived. There are distinct limitations to this method of deriving the relationship between household members.

The derived variables only use information about the relationship between family members and the cohort member – dhcrel. This ignores relevant information contained in the cohort member's row in the columns which record the relationship between individuals and other household members. Deriving sibling composition using the full range of data allows a number of inconsistencies in the relationships between family members and the cohort member to be distinguished, and this implies that families may be different – in many cases more complex – than would otherwise have been apparent from just using the data which relates cohort members to household members.

In addition to the problems with the structure of the derived variables about the sibling structure of the cohort members household there is also relevant information contained in the parent interview about siblings and parents who live elsewhere which is not included in any of the derived variables, most importantly in identifying the number of non-shared parents that half siblings have.

6.2.2 Using the household grid to create a measure of sibling complexity

The household grid records the composition of cohort households and is collected from the main respondent during the main interview and is presented to researchers as a separate data file from the main interview data (Hansen, 2012). The household grid contains

demographic information about members of the cohort household, together with information about the relationships between household members. The household grid in the MCS is unusual among such grids in that it records all the bilateral relationships between household members rather than just relating the household members to a reference person as is common in most household based surveys. This enables a full set of relationships to be derived.

6.2.3 Typology of sibling relationships

The siblings living with the cohort member at wave four are used to create a typology of sibling relationships, once the relative age and shared parents of siblings are taken into account there are 82 different combinations of sibling relationships shared by the cohort members. Once similar categories are reduced, this gives a typology of 16 different types of sibling relationship.

The ambiguous case category includes those cohort members who live in households categorised by the contradictions in triangulated relationships outlined above. The missing information category includes households in which information about the parentage or age of siblings is missing. For analysis I will collapse the missing and ambiguous groups together, and whilst there are good reasons for viewing the remaining categories as distinct from each other, once other relevant dimensions of family complexity are included it may be necessary to create a heterogeneous 'other 'grouping to maintain the integrity of analysis. The frequency of each sibling group is shown in Table 9.

TABLE 9: SIBLING GROUP COMPOSITION FOR ALL CHILDREN

CM's sibling relationship	Freq.	Percent	Cum.
Ambiguous case	329	2.37	2.37
No full half or step siblings	1,862	13.44	15.81
Older full siblings only	4,332	31.26	47.07
Younger full siblings only	3,646	26.31	73.39
Older and younger full siblings only	1,804	13.02	86.40
Older maternal half siblings from one previous partnership	1,106	7.98	94.39
Older paternal half siblings from one previous partnership	85	0.61	95.00
Half siblings adopted by the CM's natural parent	20	0.14	95.14
Older maternal and paternal half siblings from one previous partnership respectively	22	0.16	95.30
Younger maternal half siblings from one subsequent partnership	418	3.02	98.32
Younger paternal half siblings from one subsequent partnership	8	0.06	98.38
Older maternal half siblings from multiple previous partnerships	69	0.50	98.87
Younger maternal half siblings from multiple subsequent partnerships	22	0.16	99.03
Older and younger maternal half sibling from multiple partnerships	79	0.57	99.60
Full and step siblings	16	0.12	99.72
Step siblings only	9	0.06	99.78
Missing information	30	0.22	100.00
Total	13,857	100	

6.2.4 The simplified sibling variable

The range of sibling relationships present amongst the MCS children is large, and not all the categories are large enough to meaningfully analyse. The sibling measure therefore needs to be simplified for analysis but without losing any of the important aspects of family

complexity. There are two important aspects of sibling groups which are difficult to establish and as such are not well studied; namely those sibling groups in which the shared parent has had children with at least three partners, and also if the relationships between family members are congruent with each other. Turning firstly to families in which the half siblings to the focal child are half siblings to each other, indicating that the parent in common has had children in more than two partnerships, the detail in the MCS household grid indicates if the focal child's sibling group includes children from multiple non shared parents. By using the household grid to derive the sibling relationship it was possible to cross check relationships between individuals in the household, so where if A was a full sibling of the cohort child and B the step parent of the cohort child, B should be a step parent of A. In some cases this was not the case, as for example B was shown as biological parent of A. In these cases it is impossible to establish the relationship between household members so these children are assigned to the unknown sibling group. In Table 9 this is the group called ambiguous with 329 cases. Ambiguity of relationships between household members will be much more likely in the most complex sibling groups and thus these groups are probably undercounted to some extent.

The simplified measure classifies families by the most complex aspects of their sibling relationship, so all those children with half siblings with multiple non shared parents are categorised together regardless of the relative age of these siblings and the presence of any full siblings in the family. Children with half siblings with only one non shared parent are categorised by their relative age to the MCS child, and any full siblings are ignored. The simple sibling groups are unchanged from the full typology of the MCS data. Table 10 shows the distribution of the measure of simplified sibling group structure.

TABLE 10: SIMPLIFIED SIBLING GROUP FOR ALL CHILDREN

Sibling group type		Percent	Cum.
No full, half or step siblings	1,862	13.44	13.44
Older full siblings only	4,332	31.26	44.7
Younger full siblings only	3,646	26.31	71.01
Older and younger full siblings only	1,804	13.02	84.03
Older maternal half siblings	1,126	8.13	92.16
Younger maternal half siblings	418	3.02	95.17
Half siblings with multiple non shared parents	170	1.23	96.4
Other	140	1.01	97.41
Unknown	359	2.59	100
Total	13,857	100	

6.2.5 Limitations of the sibling group variables

The sibling group variable has two relatively small groups, namely the maternal half siblings with multiple non shared parents and the other siblings group. The maternal half siblings with multiple non shared parents includes children who have older, younger and both older and younger half siblings, but all these children have mothers who have had children with at least three partners. The other group is far more heterogeneous than any of the other groups including as it does those children with older paternal half siblings, younger paternal half siblings, older paternal and maternal half siblings, full and step siblings, and step siblings only.

The siblings are almost entirely maternal siblings because the methodology for looking at siblings used only those siblings who were present in the household with the cohort child at the age of seven. Only looking at co-resident siblings tips the balance in favour of maternal half siblings and to some extent towards younger siblings. The vast majority of young children live primarily with their mothers (calculations not shown), and if assume that most siblings live with their mothers maternal half siblings are likely to be visible when using the household grid. Children who are older and may have left home or are living with family members other than their mothers are less visible. Paternal half siblings are relatively rare, partly because when these are younger than the focal child the focal child is more likely to be living with their (presumably separated) mother, and where these are older the half siblings are likely to be living apart from their shared father.

Creating family complexity variables which are only a measure of maternal half siblings is in part a reflection of which aspects of the sibling relationship that is anticipated as being important and in part a pragmatic decision to the difficulty in locating paternal half siblings. Sibling relationships are based on growing up in a shared environment rather than a biological connection, for example children who were conceived using the same donor's gametes are not considered a sibling group, whereas children adopted by the same adoptive parent(s) are. Looking at the sibling groups who are defined by their shared environment it might seem contradictory to define children in terms of their parentage however it is children's relationship with their parents which is represented by the precise degree of their sibling relationship and this is what I wish to examine. So where children have non shared parents this seems likely to affect both their relationship with their shared parent, their non-shared parent and their social parent (conventionally the non-shared biological parent of the younger child would be considered a social parent of the older child whereas there would not be a relationship between the younger child and the non-shared biological parent of the older child). Having children with multiple partners may also affect the capacity of the shared parent to parent the children through the difficulties of managing their relationships and joint parenting with multiple partners. When children have half siblings who live outside of the same household these are not recorded in the household grid; although the main respondent is asked about any children living elsewhere in the main this applies to biological mothers who are overwhelmingly likely to have their children living with them. There is no information about the children of non-resident biological parents, even when children spend substantial amounts of time with the non-resident parent. These reservations have made it necessary to restrict the analysis to those siblings recorded as living with the focal child when the focal child is aged seven as these are the children with whom the focal child will have most contact with on a daily basis.

The sibling group measure is analysed as a categorical variable, and as there is no obvious normative sibling group the no full, half or step sibling group has been selected as the reference group. All of the outcome variables are binary measures so logistic models reporting the odds of a group experiencing a poor outcome relative to the reference model are reported.

6.3 The family complexity variables

6.3.1 Introduction

This thesis addresses the question does family complexity matter for children's well-being and development. The way that family complexity is defined has two aspects, that of parental partnership and the child's sibling group which has been combined to create a measure of family complexity. As outlined in the Chapter 5, there are a range of possible ways of doing this, with models jointly controlling for the two aspects of family change and models including additional interactions effects. As well as considering parental partnership and sibling group jointly, a single variable combining both aspects of parental partnership and sibling group is required.

In order to create a responsive measure of family complexity which meets the aims of this thesis the findings of previous studies examining family complexity and the theoretic framework of this thesis will be reviewed to ensure that the final measure meets the initial aims of the thesis.

The analysis of the single variable model will be complimented by an exploratory propensity score analysis evaluating the effect of having a younger half sibling for those children who have a step parent. This analysis seeks to explore to what extent the poorer outcomes for children who have experienced family complexity is driven by the presence of a step parent. This section explains how the variable which defines the subset who have a step parent and form the population for the propensity score analysis has been derived and in turn how this relates to the single variable of family complexity, which is available for all children in the sample.

6.3.2 Recap of the findings of the family complexity literature

Section 4.2 reviews the family complexity literature but this section briefly recaps two important conclusions from this section which inform the development of the single measure of family complexity. There is evidence that children's response to half siblings is not driven by their biological relatedness, as there is evidence from studies of adopted children that biological relatedness makes no significant difference to sibling relationships (Stocker et al, 1989), so the difference in outcomes for children with half siblings appears to be driven by the social world inhabited by the child. Carlson and Berger (2013) examine the

patterns of engagement by parents and the overall intensity of engagement children receive in different family settings, the measures of engagement used are similar to the parenting measures used as covariates in this analysis. This study suggests that stepfathers who have biological children in the household are more engaged with their stepchildren than stepfathers who do not, however biological fathers are less involved with their children when their former partner has subsequent children with a new partner. Whilst mothers remain closely involved with their children the evidence presented by Carlson and Berger (2013) suggests that when children have multiple fathers mothers are slightly less involved with their children. To an extent this explains the role of parenting observed in the models, and particularly illuminates the role of fathers (as remember the parenting measures used here are only those relating to the relationship between the main – usually the mother – respondent and the focal child) as potentially contributing to the observed residual relationship.

Thus as explored more fully in section 4.2, there is an association between having half siblings and children having poorer outcomes, and this seems to be particularly acute in those families in which the children have multiple non shared parents, and this association seems to be explained by the difficulties in creating and maintaining positive co-parenting relationships when parents are spread across several households and parenting is shared by more than two parents.

6.3.3 Recap of the theoretic framework of family complexity

There is an emphasis on the social stress experienced by families characterised by non-traditional relationships between children in terms of both their incomplete institutionalisation (Cherlin, 1978) into society as a whole and the difficulties in managing relationships between those who constitute the child's family (Boss and Greenberg, 1984). The presence or absence of half siblings could be a marker for complicated families and their attendant relationship difficulties, rather it being poor relationships between the half siblings or a structural deficit in the care provided to children with half siblings which is postulated as being behind the association observed between co resident half siblings and poorer children's outcomes. Bronfrenbrenner's ecological theory (Bronfrenbrenner, 1978) suggests that children's development takes place within a series of settings and changes in these settings directly impact on the child's development. In this context the arrival of a half sibling alters the relationship between the shared parent and the parent of the older child and the parent of the younger child and it is the difficulties in negotiating these

relationships which provides the context for poorer development for both the older and younger half siblings. This related to the spill over model of the family system which suggests that as well as inter-parental relationships influencing parenting behaviour, the actual quality of the parental relationship has effects on child development (Stroud et al, 2015). The parents of a child struggle to establish and maintain positive relationships after the birth of a half sibling to the existing child which effects not only the existing child, but the new half sibling as this child grows.

6.3.4 Defining the key aspects of family complexity

The key lessons from the existing literature and theory need to be integrated into the development of our measure of family complexity in order for it to adequately represent the concept of family complexity. In order to evaluate the measures of family complexity and to find the most valid measure we need to consider what the measure of family complexity ought to represent, and how we wish to use the measure, as this will determine which of the measures we choose.

There is evidence from previous research reviewed in section 4.2 that having a step parent is consistently associated with poorer outcomes for children and that having half siblings is as far as can be seen associated with poorer outcomes for children. This strongly suggests that the measure of family complexity must be distinguish between stepfamilies which include subsequent children and those stepfamilies in which there are no subsequent children; and be able to distinguish the children from the first and the second partnerships, i.e. be able to see those children who are not stepchildren but none the less live in a stepfamily.

A new measure of family complexity needs to meet two criteria. Firstly, the new variable must not be a simple relabelling of existing variables and even if the categorisation makes use of the categories of existing variables the new variable must use a different rule to avoid producing a variation on existing evidence. Secondly, the new variable must reflect the aspects of family complexity which I have theoretically deemed to be important.

Combining parental partnership trajectory and sibling group complexity is by no means straightforward owing to the great diversity and small numbers in the most complex groups. There are 135 different categories theoretically possible when parental partnership and complex sibling group is combined. Parental partnership trajectory and the complex sibling measure have as would be anticipated an association. Table 11 shows the

association between the two groups which is significant when a chi square test is applied and is discussed in more detail below.

TABLE 11: ASSOCIATION BETWEEN PARENTAL PARTNERSHIP TRAJECTORY AND SIBLING GROUP TYPE (PROPORTIONS) AT AGE 7

n = 13770	Sibling group type									
	No siblings	Older full siblings only	Younger full siblings only	Older and younger full siblings only	Older maternal half siblings only	Younger maternal half siblings	Maternal half siblings with multiple non shared parents	Other	Unknown	Total
Married Stable	3.25	17.70	12.62	6.68	1.64		0.06	0.29	0.33	42.57
Married periods of separation	0.10	0.34	0.31	0.25	0.09			0.03	0.05	1.16
Married to lone	0.91	2.31	0.79	0.44	0.51	0.18	0.04		0.02	5.20
Married to repartnered	0.20	0.54	0.10	0.06	0.09	0.32	0.06	0.07	0.17	1.62
Cohabiting stable	1.17	2.00	2.84	0.95	1.12		0.05	0.20	0.17	8.51
Cohabiting to married	0.40	0.87	2.10	0.33	0.77		0.03	0.14	0.09	4.73
Cohabiting with periods of separation	0.20	0.15	0.36	0.17	0.10		0.03	0.08	0.12	1.18
Cohabiting to lone	1.40	0.99	0.96	0.22	0.78	0.33	0.06		0.06	4.81
Cohabiting to repartnered	0.43	0.18	0.15	0.06	0.22	0.48	0.09	0.08	0.20	1.89
Unpartnered stable	1.48	0.78	0.60	0.25	0.64	0.32	0.23		0.07	4.36
Unpartnered to married	0.07	0.20	0.29	0.17	0.25		0.01	0.01	0.06	1.07
Unpartnered to cohabiting	0.26	0.30	0.78	0.36	0.42	0.03	0.01	0.03	0.12	2.32
Unpartnered to repartnered	0.31	0.11	0.13	0.02	0.20	0.87	0.23	0.11	0.28	2.27
Unpartnered with periods of partnership	0.68	0.27	0.44	0.21	0.45	0.27	0.23		0.05	2.61
Unknown	2.64	3.80	3.65	1.97	1.36	0.93	0.32	0.20	0.83	15.71
Total	13.49	30.57	26.14	12.16	8.64	3.73	1.42	1.42	1.23	100

Pearson: Uncorrected chi2(112) = 5211.5687

Design-based F(62.97, 24497.06)= 31.5905

P = 0

Table 11 shows that aside from an expected correlation between having younger half siblings and the partnership of the child's biological parents having broken down there are a number of general points discernible, such as the children of cohabiting parents are more likely to have younger siblings than those of married parents. The cohabiting parents are on average younger than the married parents (results not presented here) so differences between married and cohabiting families may reflect parental generational shift as regards preferences for marriage and settings for childbearing as well as their socio-demographic characteristics. The tendency for children with lone parents who were cohabiting at the time of their birth to be only children is surprising, as is to a lesser extent is the tendency of the children of the never partnered to be only children, perhaps indicating the preference of those who conceived in fragile partnerships not to repeat the experience. Somewhat unexpectedly having half siblings with multiple non-shared parents is not particularly associated with any particular parental partnership trajectory, but as this sibling group does not include any reference to the relative age of the siblings there is no necessary connection between the focal child's experience of parental partnership and having maternal half siblings with multiple non shared parents. Whilst it is not practical to include all of these categories the single measure need to be sensitive to these relatively unusual combinations.

6.3.4 A single measure of family complexity

Table 12 shows how the full parental partnership transitions variable and full sibling group variable have been combined in order to give a six category single measure of family complexity. These six categories are firstly simple families (blue), the stepfamilies (yellow), the blended families as a result of the focal child's birth (orange), the blended within the child's lifetime (red), the reblended families (green), unknown/other (grey). The black cells are combinations not recorded in the data. The stepfamilies are those families in which a biological parent has acquired a new partner but there are no children to this partnership at the time of the survey, the two types of blended families reflect the relative position of the children in the blended family with children whose families became blended as a result of their birth being distinguished from those families in which the blending occurred as a result of subsequent children being born to their mother and a new partner. The reblended families are those families in which there is evidence of the mother having at least three fertile partnerships or a two fertile partnerships (before and including the one to which the focal child was born) and a non-fertile partnership within the child's lifetime.

TABLE 12: MAPPING OF RELATIONSHIP BETWEEN PARENTAL PARTNERSHIP TRAJECTORY AND SIBLING GROUP TYPE TO THE SINGLE MEASURE OF FAMILY COMPLEXITY

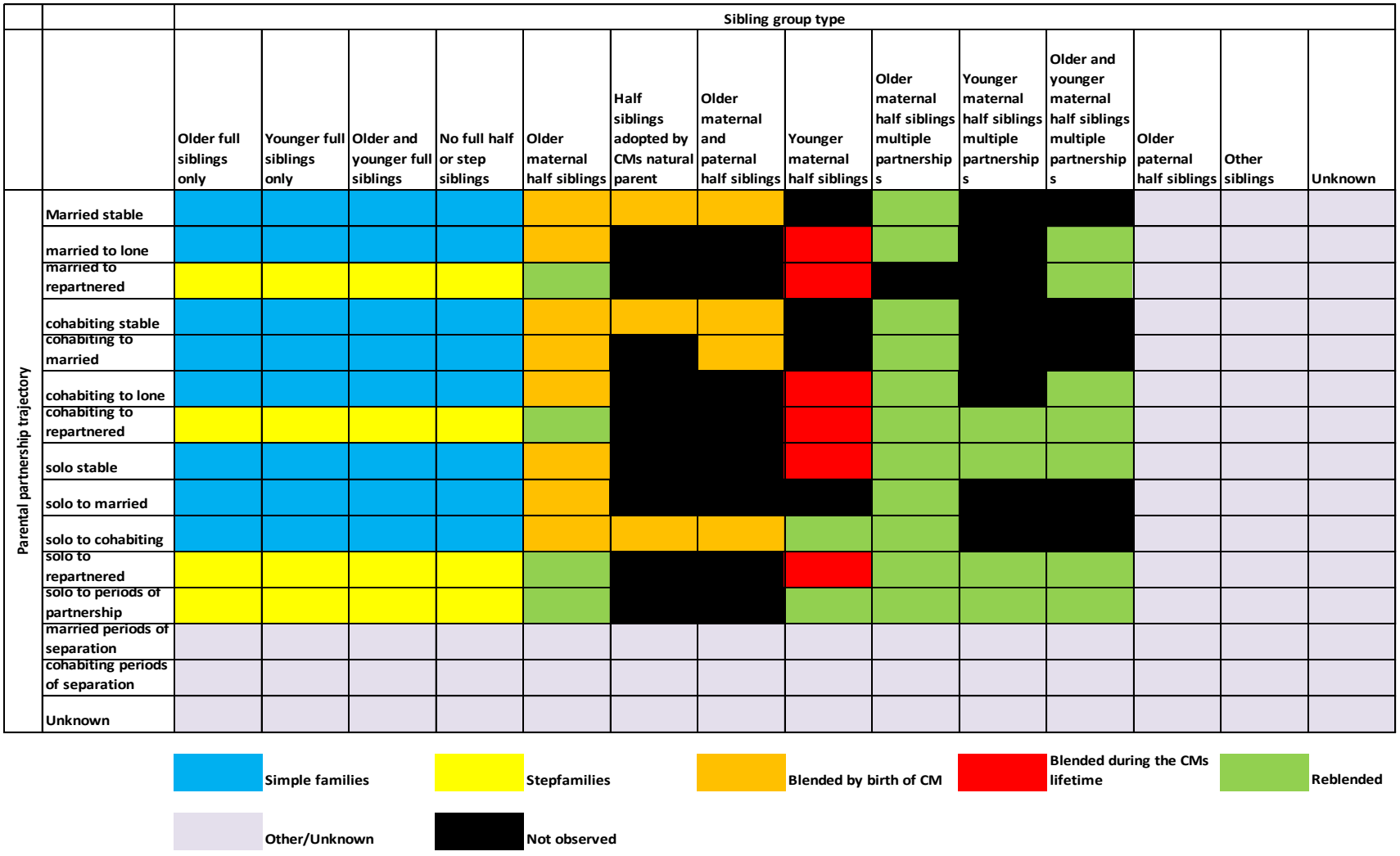


Table 12 indicates that I met my objectives for the single variable of family complexity outlined in section 6.3.2, 6.3.3, and 6.3.4 with regard to the classification of groups to distinguish those aspects of family complexity which are important in the literature review. There are two possible areas of overlap, firstly the repartnered transitions pathway, and the younger maternal sibling group and the half siblings from multiple partnerships in the sibling analysis. Whilst all the children categorised in the stepfamily group were in the repartnered transition, not all of the repartnered transition children are in this category making the two theoretically and functionally distinct. The younger maternal half sibling group in the sibling analysis is similar, in that all of the children who have experienced the blending of their family within their lifetime are to be found in the maternal half sibling group, however some children with younger maternal half siblings are not in this blended in the focal child's lifetime group, so as such the groups are distinct from each other. Finally, and potentially most problematically all the various half siblings from multiple partnership groups were combined in the sibling analysis in order to give a larger working sample, and all of these children are in the reblended group in the new variable, however the reblended group also includes children for whom there is evidence of their mother having two fertile partnership and a subsequent non fertile partnership within the focal child's lifetime, making the two groups theoretically distinct. This suggests that there is no reason to reject the single variable of family complexity on the grounds of repetition of earlier work.

As the single variable of family complexity is an evolution of earlier parental partnership and sibling group variables it has the drawbacks of both of these variables and the small but distinct groups and those which lack information have had to be considered as other/unknown- this makes up around 20% of the overall sample. It is worth noting that there are certain anomalies with regard to children who live with their biological father but apart from their biological mother. This is a rare group (<1% of the sample) and of these children only a small number of these children have acquired a step parent and even smaller number have half siblings. The two family complexity variables have different treatments of the children who live apart from their mothers. The parental partnership variables are blind as to which biological parent the child lives with when they only live with one biological parent, whereas the sibling group variables distinguish between maternal and paternal half siblings, with the small numbers of paternal half siblings included in the other/unknown group in order to allow the analysis to focus maternal half siblings about whom there is more information and greater numbers. Additionally, the vast majority of

maternal half siblings are likely to be captured by the household level data, whereas the vast majority of paternal half siblings are unlikely to be captured by household level data because of the established tendency of children to live with their mothers. This leaves the situation that combining the two variables all biological father only families with paternal half siblings will be 'other' or 'unknown', but those families in which the biological father is the only biological parent and has no subsequent children will be retained in the data. This implies that there is a difference between maternal and paternal half siblings but stepmothers and stepfathers have similar impacts on children's well-being and development. To treat stepmothers and stepfathers as having similar effects on children's well-being is a strong assumption given that there are established differences between parenting by biological and step parents and established differences in parenting roles most frequently assumed by parents by gender (Ferri, 1984). This suggests that biological father families living with partners ought to be considered together regardless of if they have children of their own (overall this recategorises 9 cohort members from stepfamily to other). The majority of children who live apart from their biological mother live with their biological father in single father families, (Calculations not shown), and as such these children are categorised as being in the uncomplicated category in the family complexity variable. Children in single father families are at a heightened risk of forming into one of stepmother families I have excluded as non-comparable it would be best to exclude them, because of the increased risk. However all children are at risk of moving into one of the excluded family types so excluding single father families is not supported. Additionally, the unpartnered biological fathers are relatively rather rarer in the large uncomplicated group so their overall effect on the analysis is smaller and thus the decision has been made to retain the unpartnered fathers without children from other partnerships.

As many of the control variables relate to the children's mothers, specifically the maternal characteristics element of the socio-demographic variables and more importantly the maternal mental health variable these children will naturally have a consistent response for these variables (i.e. mother not present) these families are going to result in some unwarranted association between these families and these variables, but as the numbers involved are relatively small this is a risk that will have to be addressed in the interpretation of the analysis, but does not fundamentally undermine the analysis.

The actual numbers in each complicated category of family complexity are relatively small as shown in Table 13.

TABLE 13: FAMILY COMPLEXITY FOR ALL CHILDREN

	Number	Percentage
Family complexity experienced		
Simple	9,119	66.11
Stepfamily	510	3.7
Blended by birth of CM	829	6.01
Blended in CM's life	277	2.01
Reblended	288	2.09
Other/unknown	2,770	20.08
Total	13,793	100

The numbers are small but the proportions indicate that even those with the most complex family histories are numerous enough to enable an analysis.

6.3.5 The subpopulation for exploratory propensity score matching exercise

The propensity score matching analysis uses the subpopulation of children who live with their biological mother and a stepparent and compares their outcomes on the basis of whether or not their mother has had a child with their new partner. This analysis conceptualises family change in a different way to the single variable measure of family complexity outlined in section 6.3.4 because it only looks at family complexity which has occurred in the child's lifetime. The propensity score analysis explores if the distinctiveness of stepfamilies is better explained by the presence of the stepparent or if childbearing in higher order partnerships is an important determinant of the association between family structure and children's outcomes. The analysis follows on from the single variable measure of complexity as it unpacks some of the differences between the categories identified in this variable, however the way families are categorised is different as it reflects an approach to family complexity which places the timing of family complexity as the key determinant of the association between family complexity and children's outcomes. For this reason the differences between these two ways of understanding the effects of family complexity on children's outcomes need to be explained as they rest on different assumptions about how family complexity is associated with children's outcomes.

The propensity score subpopulation consists of children who are living with (or have lived with) their mother and their mother's partner who is not their biological parent. The difference between the two groups within the subpopulation that is under investigation is conceptualised as fertility within this higher order partnership, therefore the subpopulation is divided into those children who have experienced the birth of a half sibling, and those children who have not experienced the birth of a half sibling.

There are a number of difficulties with determining which children should form part of the subpopulation for this analysis. Those children who have experienced the birth of a half sibling but whose mother has not had a co-residential partnership with the father of this child are included in the subpopulation as they can be identified by the half sibling. The most appropriate comparison for these children is children who live with their ostensibly unpartnered mother but their mother is none the less in a relationship (of whatever degree of commitment) with someone outside the household; however this group cannot be reliably identified and distinguished from the unpartnered mothers who are not at risk for a subsequent birth. Mothers who are in a partnership which is not coresidential are not included in the subpopulation for the propensity score analysis. Additionally it is possible that children born to unpartnered mothers are born as a result of an unpartnered mother seeking fertility treatment to extend her family, and the appropriate comparison group for children in these families is extremely difficult to identify.

Determining which group children in the subpopulation ought to be assigned to is generally fairly straightforward, however there are difficulties in which group to assign families in which the mother is currently pregnant. I have chosen to assign the small number of families in which the mother is currently pregnant with the first half sibling for the cohort member (based on the current composition of the sibling group and the presence of a partner who is a social parent to the existing children) in the stepfamily group although the blending of these families is imminent. The reasoning for this is because the child as yet unborn is likely to have minimal effect on the family functioning which according the theoretical perspective taken by this thesis explains the differences in child outcomes depending on if they live in a stepfamily with or without younger half siblings. Additionally there is the risk that the pregnancy may not lead to the birth of a live child. There are 41 families in which the mother reports being currently pregnant in the step parent but no younger half siblings group.

To determine who should form part of the subpopulation for this analysis and which of the two groups within the subpopulation they ought to be placed into the parental partnership trajectory variable and sibling group type variable were used. Neither the subpopulation nor the two groups within it overlap exactly with the single family complexity variable, in particular the reblended group. In the propensity score model the reblended group is split between excluded from the subpopulation, and both the groups within the subpopulation. Table 14 below shows how the subpopulation and the groups within it used in the propensity score analysis relates to the parental partnership trajectory, sibling group and family complexity variables. The two groups in the propensity score analysis are social parent only, and social parent and younger half sibling only and the key in Table 14 below explains how they relate to the parental partnership trajectory, sibling complexity and family complexity variables.

TABLE 14: MAPPING OF RELATIONSHIP BETWEEN PARENTAL PARTNERSHIP TRAJECTORY, SIBLING GROUP TYPE AND FAMILY COMPLEXITY TO PROPENSITY SCORE VARIABLES

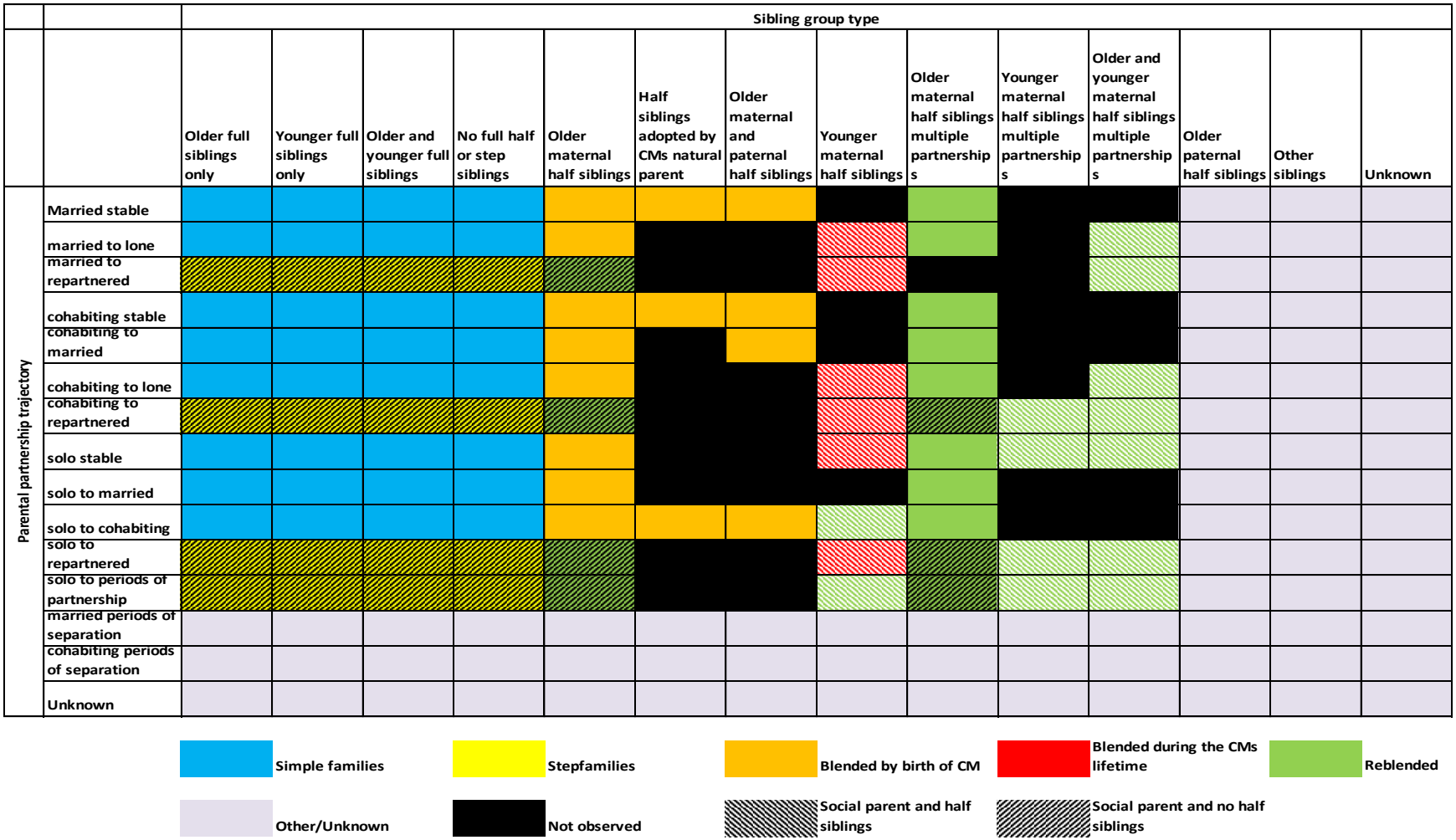


Table 14 demonstrates that only a minority of combinations of the three variables are included in the subpopulation for the propensity score analysis. Only three categories of the family complexity variable are part of the propensity score analysis subgroup, namely stepfamilies, blended during the Cohort Member's lifetime and the reblended group. It is the reblended group in which the difference in classification rules in the propensity score analysis relative to the family complexity variable are most apparent. Table 15 shows that the reblended category of family complexity is split approximately evenly between the two groups in the propensity score subpopulation. Comparing Table 13 with Table 15 it is clear that a number of children who are in the reblended group are not in the family complexity subpopulation.

TABLE 15: FAMILY COMPLEXITY FOR PROPENSITY SCORE SUBPOPULATION

	Social parent and no half siblings	Social parent and half siblings	Total
Stepfamily	501	0	501
Blended during the CM's lifetime	0	235	235
Reblended	129	116	245
Total	630	351	981

Note that Table 15 and Table 13 do not have the exact same numbers in the stepparent and blended in the Cohort Member's lifetime group because the subpopulation for the propensity score analysis is restricted only to those children who live with their biological mothers, whereas the family complexity variable is blind to which biological parent children live with.

6.3.6 Limitations of the single measure of family complexity

It is a limitation of the variable that a relatively large number of children are classified as other/unknown however this is a consequence of my methodology which prioritises accuracy of classification. As outlined above the main problem of the other/unknown group is that those children who have experienced family complexity and live with their biological father and apart from their biological mother are in this group. The small numbers who

have experienced this change and the qualitative differences between children who live with their mothers and those who live with their fathers suggest that a distinction is necessary and the sample size means a separate analysis is not possible.

6.4 The outcome variables

6.4.1 Introduction

The key outcome domains for this thesis are social and emotional well-being and cognitive development. In deciding how to operationalise these concepts the ways in which they has been operationalised in previous studies was considered. As none of the literature reviewed in section 4.5 related to British children none of these studies were informative of how to operationalise these domains. Some of the studies included section 4.3 which researched parental partnership used the MCS and used similar outcome domains. The Kiernan and Mensah (2010) study, Schoon et al (2011) and Fomby (2011) studies all used either the Strengths and Difficulties Questionnaire (SDQ) or subscales of the British Ability Scales (BAS). The MCS guide to psychometrics (Johnson, 2012) confirmed that the SDQ and the reading subscale of the BAS are the most useful way of representing children's social and emotional well-being and cognitive development using the MCS.

6.4.2 The Strengths and Difficulties Questionnaire

The Strengths and Difficulties Questionnaire is a widely used and well validated measure of children's well-being (see sdqinfo.com for validation evidence and examples of uses of the strengths and difficulties questionnaire). The main measure is intended to screen a general population sample aged between 4-17 for emotional and behavioural difficulties, (Goodman, 1997). The questionnaire is designed to be completed by parents, teachers or other care givers, and there is a version for older children for self-completion. The Millennium Cohort Study at wave 4 includes a version completed by the survey main respondent and a version completed by the child's teacher. The Strengths and Difficulties Questionnaire data is included in the data package as the answers given to each individual question, and then summed to give a score for each of the five subscales and a total difficulties score for each child. When the strengths and difficulties questionnaire is being used on a sample drawn from the general population it is broadly considered better to use the internalising and externalising scales rather than the individual sub scales or overall total difficulties score (Goodman et al, 2010). The internalising scale consists of the sum of the scores on the emotion symptoms and peer relationship subscales and the externalising scale consists of the sum of the scores on the hyperactivity and conduct subscales (Goodman et al, 2010). This is because the overall total difficulties score is too broad and

the individual sub scales too narrow to capture when a child's behaviour is problematic. The internalising and externalising scales have been validated in a clinical setting and found to be acceptable to specialists in the field of children's socio-emotional well-being (Goodman et al, 2010). In order to analyse children's socio-emotional well-being it needs to be determined whether socio-emotional well-being should be analysed as a continuous or categorical dependent variable. As the strengths and difficulties questionnaire is a score it is entirely possible to treat it as a continuous variable. I have chosen not to treat socio-emotional well-being as a continuous variable as I am not specifically interested in individual scores, but in identifying children who broadly have poor socio-emotional well-being. For analytical ease I will identify children in two groups, normal and problematic, as any more subtle categorisation would be harder to analyse and ultimately would create a bigger risk of small groups and as the independent variable is the focus of this thesis I would rather have a small n for the independent rather than the dependent variable. There are two possible approaches to transforming the scores to identify which children have poor socio-emotional well-being, firstly those children who have scores within a given range relative to the rest of the children, e.g. the bottom decile are considered to have problems; or alternatively a more theoretic approach could be taken and fortunately there is guidance provided about the Strengths and Difficulties Questionnaire and what score indicate poor well-being. In order to determine what scores are within normal ranges the guidance provided by the creators of the strengths and difficulties questionnaire have been consulted (sdqinfo.com, n.d.), this suggests two alternative scoring schemes, one of which breaks scores down into normal, borderline and abnormal and one which breaks scores down into near average, slightly above average, high and very high. The cut-off point between normal/near average and raised is the same in both schemes, therefore I have chosen to create two categories; one of normal and one of problematic based on the cut off between normal/around average and the rest. For the internalising scale the cut off score is 7 or above and for the externalising scale the cut off score is 9 or above (sdqinfo.com, n.d.).

The MCS contains information about the Strengths and Difficulties Questionnaire score provided by both the main respondent and the child's teacher, however the scores provided by the teachers are incomplete with less than half of the cohort having scores available, whereas the scores provided by the main interview respondent are far more complete. Table 16 shows the number of eligible children, i.e. those who live with at least

one of their biological parents, and the response rate of the main interview completed Strengths and Difficulties Questionnaire.

TABLE 16: COMPLETION OF STRENGTHS AND DIFFICULTIES QUESTIONNAIRE SUBSCALES

Completion of SDQ subscales	Frequency	Proportion
Both externalising and internalising complete	13334	96.84
Externalising only complete	51	0.37
Internalising only complete	48	0.35
Neither completed	337	2.45
Total	13770	100

Overall there is information on each scale for over 97% of the eligible sample. Imputing the outcomes for those cases in which there was missing information was considered, but those families in which neither scale was completed were not missing at random as there were 51 cases in which no main interview at all had been completed. It is possible that those who completed an interview but not a strengths and difficulties questionnaire have all actively refused to complete one for a particular reason, which may be associated with the strengths and difficulties questionnaire results. No information is provided about reasons for non-completion of instrument, if this is the choice of the interviewee or interviewer error. This means that imputation is not possible as the data is not missing at random.

The proportion of the children who fall into the normal and problematic categories is shown in Table 17 for and externalising behaviour and for internalising behaviour and these are both within the expected range of results for the Strengths and Difficulties Questionnaire when applied to a population sample.

TABLE 17: CHILDREN'S EXTERNALISING BEHAVIOUR SCORES

Externalising behaviour of the child	Frequency	Proportion
Normal	10435	77.96

Problematic	2950	22.04
Total	13385	100

TABLE 18: CHILDREN'S INTERNALISING BEHAVIOUR

Internalising behaviour of the child	Frequency	Proportion
Normal	11288	84.35
Problematic	2094	15.65
Total	13382	100

6.4.3 The British Ability Scales

There are many domains of cognitive development, and deciding which domain of cognitive development or if an index of various domains ought to be the appropriate outcome measure is necessary. There are theoretic and practical considerations to be made when deciding how children's cognitive development ought to be operationalised. The theoretic considerations will inform us which domains of cognitive development are important and can be accurately assessed using large scale survey data; the practical considerations relate to the data actually available in the Millennium Cohort Study waves 1-4. Whilst there is a difference between cognitive and educational development with cognitive development encompassing a broader range of processes and educational development focusing more heavily on the development of skills, it is far easier when collecting large scale data to focus on the acquisition of skills side of educational and cognitive development because this is easier to quantify reliably between children. Given the age of the children there are two key domains that they ought to have achieved measureable competence in, namely reading and counting. The Millennium Cohort Study includes pattern construction, word reading, and number skills assessments in wave 4, in addition to this the children's key stage 1 SAT results are available using the secure data service. The key stage 1 SAT results are not suitable to be used as a measure of children's

cognitive development because they do not apply to children in Scotland or Northern Ireland. All of these cognitive assessments administered to children as part of the MCS are individually well validated however they are not designed to be collapsed into a single index of overall cognitive development. This suggests that the best course of action is to use the outcomes individually as the dependent variable. In order to keep the analysis reasonably brief I intend to only use one representative outcome to represent the children's cognitive development, and I have chosen to use children's word reading outcome. This is because of the fundamental importance of reading ability for children's learning across a range of domains making it reasonable to argue that difficulties with reading will interrupt children's broader cognitive development and identifying poor readers identifies children who struggle with school more generally.

The variable I have chosen to use to represent children's reading ability is their score on the word recognition test. This test is an assessment from the British Ability Scales (BAS) word recognition test which is a well validated psychological assessment of children's cognitive ability (Hill, 2005), which can be easily administered without special training to a population sample. The word recognition test involves children been shown groups of words and asked to read them, they continue to read until they get less than 20% of a group of words correct. The tests are designed for use with children from 5 to 17 years old. This then produces a score which can be standardised with reference to the child's age and the expected performance provided by the authors of the tests. Standardised scores are not easily compared across waves, but as this is the first wave the word recognition test has been administered to the cohort children there is no opportunity to compare across waves but there are benefits of standardised scores to compare children to their age appropriate milestones.

The MCS BAS were completed by the children with the interviewer, so they are primary data from the child and are not subject to systematic reporting bias. Some children will find the word recognition test difficult for reasons which are not systematically reflective of their cognitive ability, for example children with dyslexia or other specific learning disabilities. There is no reason for believing that children who have a specific learning disability will be more concentrated in those families which have experienced family complexity and as this is the focus of this research the poor representation of their cognitive abilities by the word recognition test is not material.

To transform the scores on the word recognition test into a variable appropriate for analysis as a loose proxy for children's cognitive development I have taken the standardised scores for each child. There is no guidance available about what constitutes a poor performance on the word recognition test, and as such I have chosen to categorise those children with standardised scores in the bottom decile of the Millennium Cohort Study sample as having poor reading ability for age. Due to tied scores slightly more than 10% of the sample were in this poor performance group. Table 19 shows the frequency and proportion of children living with at least one biological parent who scored within age related expectations, poor for age, and did not complete the instrument.

TABLE 19: CHILDREN'S READING ABILITY FOR AGE

	Frequency	Proportion
Expected reading ability for age	12048	87.50
Poor reading ability for age	1414	10.27
Missing	307	2.23
Total	13770	100

Note that there are 46 children who have no externalising, internalising or reading scores available. Of these children 13 have no main interview data either.

6.5 The control variables

6.5.1 Introduction

The proposed control variables are informed by the existing literature about family complexity and children's well-being alongside an inspection of the literature about children's socio-emotional well-being and cognitive development to determine any possible confounding factors. This section reviews the literature for each of the key domains of control variables, before concluding if the variables were to be included in the final models, and where the domain is considered to be a relevant control variable for the examination of the association between family complexity and children's socio-emotional well-being or cognitive development the variable included is outlined.

6.5.2 Characteristics of the child

Children differ in the likelihood that they have poor outcomes, with the most obvious dimension on which children differ being the child's gender, with boys being at far greater risk of poor outcomes than girls (Mensah and Kiernan, 2010a). In the past there has been a finding that families of all boy children are less likely to divorce than families which have all girl children (Morgan et al, 1988) but despite a high degree of initial interest this finding has been largely discredited (Lyngstad and Jalovaara, 2010). The child's birth order is important with evidence of a firstborn advantage, and to a lesser extent evidence of a poorer outcomes for children with many siblings (Lawson and Mace, 2010; de la Rochebrochard and Joshi, 2013). These characteristics are related to children's experience of family complexity with mothers with more existing children being less likely to have children in any new relationship, and women who have many children within a partnership being less likely to experience the dissolution of that partnership (Thomson et al, 2014). When parents are more involved with children from previous partnerships they are less likely to have multiple children in any subsequent partnership (Hohmann-Marriott, 2015). When children reach school age there is an increase in the risk that their parents will dissolve their partnership (Steele et al, 2005). Children who are born prematurely (<37 weeks gestation) or at a low birth weight (<2.5kg) are at an elevated risk of poor socio-emotional and cognitive outcomes in childhood (Bhutta et al, 2002). Some of the risk factors for premature birth or low birth weight overlap with risk other risk factors for family complexity (Shah et al, 2011) (in terms of characteristics of the mother) dealt with below,

although there is no work which explicitly links the two. Children who come from an ethnic minority or do not speak English at home are also considered to be at a disadvantage in socio-emotional well-being and cognitive development due in part to an inherent bias in the test instruments which are normed on white British, English speaking children, and as such this is more a problem of the instrument which needs to be considered than anything else. There is limited evidence of any systematic developmental or well-being penalty associated with being from an ethnic minority (Goodman et al, 2008).

As a result of this consideration of the relevant literature the characteristics of the child that were deemed to be relevant and hence included as control variables where the child's gender, the child's ethnicity, if the child was a firstborn and the number of siblings the child was living with at the age of seven.

Table 20 shows the gender of all children.

TABLE 20: GENDER FOR ALL CHILDREN

Child's gender	Frequency	Proportion
Male	7072	51.36
Female	6698	48.64
Total	13770	100

The census six category ethnicity variable was chosen and is shown in Table 21.

TABLE 21: ETHNICITY FOR ALL CHILDREN

Child's ethnicity	Frequency	Proportion
White	11760	85.41
Mixed	450	3.27
Indian	267	1.94
Pakistani or Bangladeshi	651	4.73
Black	452	3.28
Other	189	1.37
Total	13769	100

Table 22 shows the number of children living in the cohort member's coresident sibling group. Note that the number of children with 1 child in the sibling group is smaller than the number with no full, half or step siblings in Table 10 because the sibling complexity variables count cohort children who have a twin or triplet but no further siblings as being part of the no full, half or step sibling group as this type of sibling relationship is different. The family size variable which represents the economic characteristics of the sibling group is different and the number of children rather than the relationship is important for this variable.

TABLE 22: NUMBER OF CHILDREN IN THE COHORT MEMBER'S CORESIDENT SIBLING GROUP (INCLUDING COHORT MEMBER(S)) FOR ALL CHILDREN

Number of children (Cohort member(s) and siblings) in the family			
	Freq.	Percent	Cum.
1	1,781	12.85	12.85
2	6,242	45.05	57.9
3	3,765	27.17	85.07
4	1,408	10.16	95.23
5 or more	661	4.77	100
Total	13,857	100	

Table 23 shows if a child is their mother's firstborn for those children reported as living continuously with their biological mother.

TABLE 23: CHILD FIRSTBORN FOR ALL CHILDREN LIVING CONTINUOUSLY WITH THEIR MOTHERS

If child is firstborn			
	Freq.	Percent	Cum.
No	7,862	57.57	57.57
Yes	5,794	42.43	100
Total	13,656	100	

6.5.3 Characteristics of the mother

Historically research into the outcomes of children has considered mothers actions and characteristics to be of important in explaining their children's outcomes (see Shonkoff and

Phillips, 2000). This reflects a number of theoretic and pragmatic considerations, firstly almost all infants and young children live with their mothers, secondly, for the majority of children their mothers are their main carers (although this is by no means all or even nearly all children) this means that for researchers mothers are almost always the gateway parent facilitating a child's participation in a study and as such can be incorporated into studies so relatively speaking a great deal is known about how mothers influence their children's development. Mother's age both when they had their first birth and when they had the focal child is associated with the child's current socio-emotional and cognitive development, although this could be because the deficits associated with young motherhood are actually representing broader disadvantage and it is this that is being transmitted to the child rather than the fact that the mother began childbearing at a young age (Hawkes and Joshi, 2012). Necessarily the children of mothers who begin their childbearing at a young age are exposed to a greater risk of sibling complexity, and there is some evidence that the partnerships of young mothers are more unstable than the partnerships of women who begin childbearing later (Lyngstad and Jalovaara, 2010; Thomson et al, 2014). The education of mothers is associated with their children's socio-emotional well-being and cognitive development, with children whose mothers have low levels of having poorer socio-emotional well-being and cognitive development (Blanden et al, 2012). The partnerships of better educated mothers are more stable than those of less well educated mothers, and they are less likely to have children with multiple partners, however some of this evidence does come from outside the UK where education may not hold the same value as in the UK (Lyngstad and Jalovaara, 2010; Thomson et al, 2014). Once again it has been argued that mother's education is actually more of a marker of a wide variety of social capital rather than necessarily having a facilitating effect of itself (Hawkes and Joshi, 2012), and this is why they have more stable partnerships.

I have chosen to include the mother's age at first birth and her highest education level achieved.

Mother's age at her first birth was derived using the household grid by matched the mother to her oldest child who had ever been recorded in the household with her, in some cases this child had moved out by wave 4 and was not included in the sibling measure. Her age at the birth of this child was then calculated. This meant that it was possible to know how old a child's mother was at their first birth when the child was not living with their mother but these children have been categorised separately as living apart from their mothers in this variable. Inevitably there will be a number of women who do not live with

their oldest child at any point during the focal child's life, and as such will be miscategorised as being older at their first birth than they ought to be, as their first birth is missing from the household schedule. This might be due to the death of a previous child, or a very large age gap between children – possibly as a result of the family complexity I am interested in.

Table 24 shows the age of the child's mother at the time of her first birth

TABLE 24: MOTHER'S AGE AT FIRST BIRTH FOR ALL CHILDREN

Age at first birth	Frequency	Proportion
<20	2652	19.26
20-24	3648	26.49
25-29	3928	28.53
30-34	2535	18.41
35-39	726	5.27
40+	73	0.53
Missing	208	1.51
Total	13770	100

Mothers are asked about their highest achieved educational qualification at each wave and in order to allow for those mothers who have achieved higher educational qualifications during their child's lifetime the most up to date qualifications information from wave 4 are used, around 12% of mothers had upgraded their qualifications from wave 1. Once again those children who are not currently living with their mother are separately classified.

Table 25 shows the highest qualification achieved by mothers by the time that their child is aged seven.

TABLE 25: MOTHER'S HIGHEST EDUCATIONAL ACHIEVEMENT FOR ALL CHILDREN

Mother's education	Frequency	Proportion
NVQ Level 1	1002	7.28
NVQ Level 2	3748	27.22
NVQ Level 3	2035	14.78
NVQ Level 4	3990	28.98
NVQ Level 5	825	5.99
None	1590	11.55
Overseas only	395	2.87
Unknown	184	1.34
Total	13771	100

6.3.4 Maternal mental and physical health

The physical and mental health of mothers has also been found to be associated with children's socio-emotional well-being and cognitive development. The association between maternal depression and poorer outcomes for children is well-established (Kiernan and Mensah, 2009), and seems to be more acute when mothers live on their own, either because some depressed mothers struggle to maintain relationships with anyone or because partners shield children from maternal depression to some extent (Smith, 2004; Fomby, 2016). The breakdown of a partnership increases mental stress before, during and for around two years after the end of a partnership (Blekesaune, 2008). Mothers who have a complex family report higher levels of depression (Fomby, 2016) The physical health of mothers seems to have a similar effect on children's well-being and development to their mental health, with poor health being associated with poorer outcomes for children (Mensah and Kiernan, 2010b). Once again there is little evidence about the likelihood of partnership breakdown as a result of maternal poor health, and unlike poor mental health there is less of an issue of disentangling the temporal order of events, which makes this lack of research surprising.

Children of parents with specific problems, such as alcohol and drug addiction and serious mental illness (although depression can be severe here this is referring to conditions with an element of psychosis) have established poorer well-being (Smith, 2004). There is evidence that parents with drug and alcohol problems are more likely to divorce, but it is

unclear if this is also true for cohabiting parents or those with relatively mild problems (Lyngstad and Jalovaara, 2010).

Maternal mental health is better established in relation to children's outcomes than maternal physical health (Mensah and Kiernan, 2010b). As a result of the limited evidence relating maternal mental health to children's socio-emotional well-being or cognitive development the decision has been made to exclude maternal physical health only as a control variable. When looking at maternal mental health the serious maternal mental health problems i.e. those with an element of psychosis are rare and consequently the MCS does not specifically include information on their occurrence, so maternal mental health will be evaluated solely by the use of a depression measure.

The measure of maternal mental health is a longitudinal measure covering the age three, age five and age seven wave. The variable does not cover the age nine months wave, this is because the focus at this point was specifically post-natal well-being and the instrument used to evaluate maternal mental health was not the same as the measure used in later waves and it is not appropriate to combine the two. The maternal mental health variable uses two sources of information to assess if a mother was depressed at each wave. The main and partner respondents completed a Kessler inventory which is a well validated psychological instrument for identifying depression (Kessler et al, 2002), and were also asked if they are currently receiving medical treatment for depression. The Kessler cut off of 13 was used to assess if the screening instrument indicated depression, in line with the developers guidance (Kessler, 2002) If the mother is shown on the screening test to be depressed or is receiving treatment for depression she is categorised at that wave as being depressed. As mothers are not always the main respondents this variable follows mothers rather than the main respondent, so in some cases uses the partner variable or the main variable or a combination of the two depending on which interview the mother completed at each wave. This variable records only for those children who have always lived with their biological mother.

Table 26 records the child's mother's depression status since the child was three.

TABLE 26: MATERNAL DEPRESSION FOR ALL CHILDREN

Mother's mental health	Frequency	Proportion
Never depressed	10309	74.87
Episodic depression (once)	1504	10.92
Recurrent depression (twice)	443	3.22
Persistent depression (at all three time points)	486	3.53
Unknown	1027	7.46
Total	13770	100

6.3.5 Paternal characteristics

The characteristics of children's fathers have received less attention from researchers and less is known about how fathers influence their children's well-being and development. This is in part because fathers are of less interest to many researchers as there is regrettably widespread assumption that characteristics of mothers alone represent the parents reasonably, ignoring the contribution of fathers (Wilson and Prior, 2011). More pragmatically fathers are more difficult to access, as it is common for children to live apart from their fathers and tracing them for the purpose of social research on the outcomes of their children is difficult and consequentially expensive. What research there is about the specific contributions of fathers, in particular non-resident fathers suggests that easily measurable indications of father involvement, namely financial contribution and frequency of contact are not associated with improved outcomes for their children (Adamsons and Johnson, 2013; Amato and Gilbreth, 1999).

I have not been able to include control variables which relate to fathers; this is because information about fathers is less complete, especially as regards non-resident fathers.

6.3.6 Quality of inter-parental relationship

In addition to the characteristics of the parents the quality of the parents relationship is also important, with evidence suggesting that children whose parents have high quality interactions have better outcomes and conversely highly fractious relationships suffering poorer outcomes (Goldberg and Carlson, 2014; Fomby and Osbourne, 2010). At the extreme those children whose parents' relationship is characterised by domestic violence

are at particular risk of poor emotional well-being and cognitive development (Wolfe et al, 2003). The evidence on relationship quality and partnership separation is suggests that poor quality relationships are associated with a higher likelihood of partnership breakdown, although second and higher order partnerships appear to have lower relationship quality than first partnerships (Amato and James, 2010; Rosand et al, 2014). There is little evidence about how relationship quality interacts with multipartnered fertility, although instinctively you would expect better quality relationships to be more likely to be fertile.

There is strong evidence about the heritability of divorce, with adults whose own parents divorced being more likely to form an unstable partnership themselves and to have a partner with a similar experience of parental partnership dissolution (Hognas and Thomas, 2016; Lyngstad and Jalovaara, 2010; Kiernan and Mueller, 1998) and this could suggest that there is a tendency within the family to form poor quality partnerships and to be tolerant of relationship breakdown. Whilst this in itself interesting, there is limited evidence linking grandparental divorce to children's outcomes (Amato and Cheadle, 2005) so it is unclear how grandparental divorce relates to children's well-being as distinct from its effects on parental partnership.

I have not included any control variables which relate to the quality of relationship between the parents. This is because parental relationship quality in the MCS is measured only at 9 months and 5 years using the Golombok Rust inventory of marital state.

6.5.7 Economic characteristics of the household

Household poverty and other socio-economic characteristics of households have received a lot of attention from researchers and as such there is pretty concrete evidence of associations between both the outcomes and parental partnership and economic disadvantage, however there is less evidence about multipartnered fertility and economic characteristics. Poverty is a significant risk factor for poor socio-emotional and cognitive outcomes. The duration of poverty is important for children's outcomes with children who are always poor being at a greater risk of poor outcomes than children who are poor for only part of their childhood (Brooks-Gunn and Duncan, 1997; Holmes and Kiernan, 2013; Hill et al, 2013). Observationally there is a greater incidence of partnership breakdown amongst couples who are poor (Lyngstad and Jalovaara, 2010) and there is a persuasive argument that the advantages of stable partnership are in fact the advantages of being not

poor (Crawford et al, 2013). Multipartnered fertility is more common amongst poor families, but this may be as either a cause, symptom or consequence of poverty. Family social class is often conflated with income poverty but in fact is quite different, particularly picking up differences amongst the non-poor and those families for which income is a poor marker of status (e.g. the retired, part time only workers). Social class is associated with children's socio-emotional and cognitive outcomes, with children whose parents are from higher SEC groups having fewer adverse outcomes than those from lower SEC backgrounds (Sullivan et al, 2013). Finally, there is a suggestion that household worklessness is associated with poorer outcomes for children (Ermisch et al, 2004) there is little apart from popular perception that associates worklessness with partnership instability and multipartnered fertility.

The economic characteristics of the household, in particular if the household is in poverty have widely been found to be highly predictive of the outcomes for household children (e.g. Bradshaw and Holmes, 2010). As such these are important control variables. As the relevant aspects of the economic characteristics of the household's economic characteristics extend beyond the income of the household four economic variables have been included in the model, namely the household longitudinal experience of poverty, the family social class, the tenure of the household and if anyone in the household is in work.

Longitudinal experience of poverty uses the derived variable provided at all four waves which records if the family's equivalised income is below the poverty line (below 60% of median income). Equivalised income is more useful to us as it takes account of the composition of the household. As current research in poverty (Brooks-Gunn and Duncan, 1997; Holmes and Kiernan, 2013; Hill et al, 2013) suggests it is not just the experience of poverty but its persistence across the lifetime which has negative impacts on children's well-being and development. Table 27 shows this lifetime experience of poverty.

TABLE 27: CHILD'S LIFETIME EXPERIENCE OF POVERTY FOR ALL CHILDREN

Longitudinal poverty	Frequency	Proportions
Never poor	6969	50.61
Episodic poverty	2013	14.62
Recurrent poverty	2492	18.1
Persistent poverty	2152	15.63
Unknown	145	1.05
Total	13771	100

Tenure of household

The household tenure was a simplified measure of that collected as part of the main instrument reducing the circumstances of nested households (living as part of a bigger household) into the circumstances of the entire household. Households who owned their houses outright or with the aid of a mortgage were not distinguished, neither were the social tenants of housing associations and local authorities. Table 28 shows how many children were living in each type of housing tenure at the age of seven.

TABLE 28: HOUSING TENURE FOR ALL CHILDREN

Household tenure	Frequency	Proportions
Owner occupied	8931	64.86
Social rented	3372	24.49
Private rented	1334	9.69
Unknown	134	0.97
Total	13771	100

Social class of the household

Occupation was collected from both the main and partner interviewee and the higher of these two social classes was used for the social class of the household. When an individual was not currently working social class was unknown. The social class of some households may be understated as nested households only provide the social class of the main and partner respondent and the overall social class of the household may be different depending on who else is in the household. The unknown group includes families in which

there was nobody working, and those families in which social class was not reported. Table 29 shows the household social class for all children.

TABLE 29: HOUSEHOLD SOCIAL CLASS FOR ALL CHILDREN

Social class	Frequency	Proportion
Managerial/Professional	3203	23.26
Intermediate	1374	9.98
Small employer/self employed	1702	12.36
Low supervisory/technical	1042	7.57
Semi-routine/routine	3542	25.72
Unknown	2908	21.12
Total	13771	100

If the household is workless

This variable records if nobody in the household was in work, information which is available in the household grid. Table 30 shows how many children lived in households were nobody was working.

TABLE 30: HOUSEHOLD WORK STATUS FOR ALL CHILDREN

Anyone in the household works	Frequency	Proportion
At least one person working	11438	83.07
Nobody working	2331	16.93
Total	13770	100

6.5.8 Neighbourhood/school characteristics

Ecological theories suggest that the characteristics of the child's environment can also have an association with children's well-being and cognitive development. As such an investigation into the existing literature linking neighbourhood and school characteristics and children's well-being and development is necessary, and how these characteristics are

linked to partnership stability and multipartnered fertility. Neighbourhood is closely related to poverty and ethnicity both of which may be responsible for the effects observed, and many researchers have been unable to disentangle the specific effects of neighbourhoods from the specific characteristics of households and schools (Midouhas et al, 2014). There are specific associations between child well-being and cognitive development and residential moves with children who are highly mobile having poorer outcomes (Jellyman and Spencer, 2008), and this is particularly relevant because residential moves are a common side effect of parental partnership change and multipartnered fertility (Feijten and van Ham, 2010). Household tenure is associated with poorer outcomes for children, in particular growing up in socially rented housing which is increasingly residualised in the contemporary UK (Lupton et al, 2009; Tunstall et al, 2011). Housing tenure is not necessarily associated with parental partnership stability or multipartnered fertility but these events can serve as a pathway into social housing for families (Feijten and van Ham, 2010).

As young children spend significant amounts of time in school, schools have a strong impact on their well-being and development (Ford, 2004), however it is unlikely that parental relationship choices will be systematically related to characteristics of their school. As the vast majority of British children attend UK state schools and admissions for these schools are broadly residence based. This suggests that as far as parental partnership and tendency towards multipartnered fertility is concerned schools do not have a significant role.

As a result of the evidence from these other studies (Ford et al, 2004; Feijten and van Ham, 2010; Jellyman and Spencer, 2008; Lupton et al, 2009; Tunstall et al, 2011) no neighbourhood or school characteristics have been included as control variables in the thesis.

6.5.9 Parenting behaviours

The parenting behaviour of parents has long been acknowledged as of vital importance in determining the developmental trajectories of children (specifically see Verhoeven, 2010 and Shonkoff and Phillips, 2000 for a review). Attention has focused on two distinct areas of parenting, namely the overall discipline and support strategy employed by parents, and the specific parenting behaviours engaged in by parents. As well as the environmental influence on children's behaviour the behaviour of the parents is also postulated to

influence the expression of the children's genetic inheritance through epigenetic changes. It is this interaction between environmental and genetic influences which is most important, but by its very nature difficult to disentangle (Collins et al, 2000). As the specific genetic legacy of parents to children is in most social science research difficult to measure (although recent cohort studies such as Born in Bradford have included biomarkers) it is more common to focus only on measureable environmental measures ignoring the good evidence that behaviour interacts strongly with the genetic inheritance of the child. There are undoubtedly systematic effects of parenting on children's well-being and development but it is important to remember that parenting will capture an unquantified inherent susceptibility to these environmental differences.

As mentioned above there are two key aspects of parenting, the parenting style and specific behaviours engaged in with the child. Parenting style broadly refers to the degree to which the parents set and enforce rules and the degree to which they accept feedback. This has led to the identification of four parenting styles with varying degrees of discipline and set boundaries, of which the gold standard is authoritative parenting which combines clear rules with firm but not harsh enforcement and interest in and support for in the child (Baumrind, 1966). Parenting style is difficult to measure independently of parenting behaviours (Darling and Steinberg, 1993) as the philosophy of parenting practised by parents is only effective in their actions, regardless of their abstract views. None the less there is an established consensus that authoritative parenting is the ideal type of parenting. The second aspect of parenting, namely the parenting behaviours engaged in by the parents although distinct from the parenting style overlaps with their abstract beliefs about parenting. Parents with an authoritative parenting style will engage in both supportive and disciplinary activities with children and hence can be identified by these activities, however actual parenting actions have an importance beyond indicating broader parenting styles with several distinct practices associated with positive and negative behavioural and developmental outcomes for children.

Specific parenting behaviours which have been shown to promote children's well-being and development include regular home routines (Kelly et al, 2013), systematic parental support for schoolwork (Desforges and Abouchaar, 2003) high quality parenting interactions (O'Connor and Scott, 2007; Gutman and Feinstein, 2010). There are established negative parental behaviours, such as the use of corporal punishment (Ferguson, 2013).

Parenting styles and behaviour are a possible pathway between complex family life and children's outcomes and well-being and there is evidence that links parenting styles and parental partnership style, but a dearth of evidence relating complex sibling groups to parenting. Mothers who experience a partnership change are more likely to engage in negative parenting behaviour and a decrease in positive parenting behaviour, but these differences were slight (Beck et al, 2010). These associations are strongly mediated by poverty with parenting and poverty seemingly linked (Kiernan and Mensah, 2011). Partnership transitions are strongly associated with changing the quality and or quantity of parenting received from the father (Tach et al, 2010; Cheadle et al, 2010). There is less evidence about fathers in the UK reflecting the relative lack of data but there is evidence that there is a high degree of variation in fathers contact after a relationship breakdown (Kiernan, 2006). Finally there is limited evidence about the role of stepparents and what factors make them more likely to adopt a parenting role in regard to a stepchild. Recent British evidence suggests that children suffer educationally as stepfathers make limited investments in their development and that for behavioural outcomes stepfathers parenting investment is immaterial to the child's outcomes (Emmott and Mace, 2014). A comprehensive US comparison of different family types found differences between stepfathers based on their marital status, with married stepfathers investing more in the child than biological fathers and cohabiting fathers investing minimally in the child, with the investment of mothers in parenting activities remaining fairly constant across family types (Carlson and Berger, 2013). It must be noted that the US context for marriage or cohabitation is different to the UK one (Kiernan et al, 2011) limiting the applicability of these findings.

Parenting has been included as a control variable and has been represented using an index of self-report positive and negative parenting behaviours engaged in with the child.

Positive parenting is included as an index based on a number of parenting behaviours which are broadly positive. This included only the parenting at age seven. All of the individual items are asked of the main respondent only and as long as they report the positive behaviour at least once a week they are recorded as engaging in it, and if they report the positive practice less than twice a month they are recorded as not engaging in that positive parenting behaviour. Once a score for each of the parenting behaviours has been established the scores are summed to form an index of positive parenting measure which is a count of the number of positive parenting behaviours that the main respondent reports engaging in with the focal child. The six positive parenting behaviours are if the

child is read with, if the child did art or creative activities at home, if the child played outdoor or indoor games at home, if the child had a regular bedtime, if the parent considered themselves to be affectionate towards the child, and finally if the parent considered themselves to be close to the child. Table 31 shows the number of children by number of positive parenting behaviours reported by the parent.

TABLE 31: POSITIVE PARENTING FOR ALL CHILDREN

Number of positive parenting behaviours engaged in	Frequency	Proportions
0	3	0.02
1	27	0.20
2	103	0.75
3	296	2.16
4	836	6.10
5	2594	18.93
6	9846	71.84
Total	13706	100

Negative parenting is an index constructed in an analogous fashion to the positive parenting index again only using data collected at the age seven survey. High scores were undesirable as this indicated a high degree of negative parenting interactions. Once again an item was coded as a yes if it occurred at least once a week, and no if it was recorded as never happening. For some of the items which have strong social disapproval around them, those parents who were 'unable to say' the frequency of which their children were exposed to these behaviours were coded as engaging in them as this was interpreted as an attempt to underreport a negative behaviour. The six items on the negative parenting scale were if the child was smacked, shouted at, bribed or ignored when naughty, if the parent was irritated by the child and if the parent considered themselves to be a poor parent. Table 32 shows the number of negative parenting behaviours reported by parents.

TABLE 32: NEGATIVE PARENTING FOR ALL CHILDREN

Number of negative parenting behaviours engaged in	Frequency	Proportions
0	7065	51.31
1	4234	30.75
2	1666	12.1
3	604	4.39
4	162	1.18
5	32	0.23
6	6	0.045
Total	13770	100

6.5.10 Variable types

The variables can be considered to form a number of different categories, those which are fixed by the time of the focal child's birth, those which are exogenous to the child's experience of family complexity and those which are endogenous to the experience of family complexity. The fixed variables are mother's age at first birth, the child's sex and ethnicity; the random variables are the mother's education, the family's social class, the tenure of the household, the work status of the household, maternal mental health, positive and negative parenting behaviour; and the endogenous variable is the poverty of the household. It can be argued that none of random variables are in fact independent of the child's experience of family complexity and all capture some latent dimensions of families undergoing change, however the endogenous variable goes further than this and because it is an equivalised measure it actually takes into account the household size which is necessarily related to family complexity. It might be considered more desirable to remove the household size element from the poverty measure but this risks making serious errors about which households are in poverty, and it is best practice to include poverty as an equivalised measure. These differences between the types of variable are important for how we interpret the findings and must be considered at this stage.

Chapter 7. Associations between parental partnership trajectory and children's outcomes

7.1 Introduction

This chapter examines the association between parental partnership trajectory and children's problematic externalising behaviour, problematic internalising behaviour and poor reading ability for age using weighted logistic regression models.

7.2 Externalising behaviour

TABLE 33: ASSOCIATION BETWEEN PARENTAL PARTNERSHIP TRAJECTORY AND PROBLEMATIC EXTERNALISING BEHAVIOUR

Outcome: Problematic externalising behaviour

Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
N	13385	13182
Constant	0.17***	0.21***
Parental partnership trajectory		
Married stable		
Married periods of separation	1.30	0.95
Married to lone	1.67***	1.11
Married to repartnered	2.03***	1.55*
Cohabiting stable	1.59***	1.24*
Cohabiting to married	1.50***	1.25
Cohabiting periods of separation	2.54***	1.49
Cohabiting to lone	2.38***	1.01
Cohabiting to repartnered	3.82***	2.36***
Unpartnered stable	2.83***	1.20
Unpartnered to married	2.09**	1.49
Unpartnered to cohabiting	3.30***	1.91***
Unpartnered to repartnered	3.48***	1.55*
Unpartnered to periods of partnership	3.11***	1.04
Unknown	2.34***	1.39**
Mother's age at first birth		
25-29		

Outcome: Problematic externalising behaviour

Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
<20		1.38**
20-24		1.34**
30-34		0.9112061
35-40		0.874612
40+		1.013821
Mother's highest educational qualification		
NVQ Level 1		
NVQ Level 2		0.79*
NVQ Level 3		0.83
NVQ Level 4		0.65***
NVQ Level 5		0.60**
None		1.17
Overseas only		0.92
Child's ethnicity		
White		
Mixed		0.91
Indian		1.18
Pakistani and Bangladeshi		0.87
Black or Black British		0.62**
Other		0.57*
Child's sex		
Male		
Female		0.52***
Household poverty		
Never poor		
Episodic poverty		1.20*
Recurrent poverty		1.42***
Persistent poverty		1.42**
Unknown		1.64
Household work status		
At least one adult working		
No adults working		1.40*
Household social class		
Managerial/professional		
Intermediate		1.16
small employer/self employed		1.04

Outcome: Problematic externalising behaviour

Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
low supervisory/technical		1.31*
semi-routine/routine		1.28**
Unknown		1.05
Maternal depression		
Never depressed		
Episodic depression		1.14
Recurrent depression		1.16
Persistent depression		1.32*
Unknown		0.96
Positive parenting index		0.89**
Negative parenting index		2.36***
Pearson χ^2 Goodness of Fit: F	0.000	1.44
Pearson χ^2 Goodness of Fit: Pr>F	1.000	0.1682

*=p<0.05; **=p<0.01; ***=p<0.001

The model reported in Table 33 is a logistic regression model which reports the level of significance for the odds reported for each category of the variables relative to the reference category indicated. Models have been fitted using backwards stepwise methods with a Wald test used to evaluate the significance of individual variables. This is outlined in more detail in section 5.3.4. The same technique is used for all the logistic regression models in Chapters 7-13. The goodness of fit statistic reported is a the significance level of the Pearson χ^2 Goodness of Fit, and this statistic should be rejected if this number is less than 0.05 and consequently the model rejected. This is outlined in more detail in section 5.3.4 and the same statistic is presented for all logistic regression models in Chapters 7-13.

Table 33 shows that in the unadjusted model there is a widespread relationship between parental partnership trajectory and problematic externalising behaviour, with nearly all groups showing increased odds of problematic externalising behaviour. Once the model is adjusted for the control variables there is a widespread reduction in the odds ratios of problematic externalising behaviour for all categories of parental partnership trajectory. In all groups where the child lives with a social parent have statistically significant increased odds of problematic externalising behaviour regardless of their parent's initial partnership

in the adjusted model. These odds are significantly reduced in comparison with the unadjusted model but are most reduced for the groups who had initially unpartnered mothers. Interestingly the greatest odds of problematic externalising behaviour are seen in the group which had parents who were initially cohabiting but had repartnered by the time the child was seven. The most interesting result in this analysis is the significant increase in the odds ratio of problematic externalising behaviour for children whose parents have been continuously cohabiting from their birth.

As outlined in section 5.3.4 when a Pearson χ^2 test for goodness of fit is performed on an unadjusted model, the F value is necessarily 0.000, and P>F is 1.000, because there cannot be any difference between the observed covariate pattern and that predicted by the model when there is only one variable in the model. As such the Pearson χ^2 test for the unadjusted model presented in Table 31 indicates that the model should not be rejected.

The Pearson χ^2 test for goodness of fit presented in the adjusted model in Table 33 is not significant, suggesting that the null hypothesis should not be rejected and we can consider that the model is an appropriate fit to the data.

7.3 Internalising behaviour

TABLE 34: ASSOCIATION BETWEEN PARENTAL PARTNERSHIP TRAJECTORY AND PROBLEMATIC INTERNALISING BEHAVIOUR

Outcome: Problematic internalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
N	13382	13133
Constant	0.13***	0.19***
Parental partnership trajectory		
Married stable		
Married periods of separation	1.69*	0.96
Married to lone	1.52**	0.92
Married to repartnered	1.25	0.88
Cohabiting stable	1.18	0.91
Cohabiting to married	1.28	1.05
Cohabiting periods of separation	2.32**	1.20
Cohabiting to lone	2.06***	0.93
Cohabiting to repartnered	2.22***	1.14
Unpartnered stable	2.74***	1.02
Unpartnered to married	1.53	0.86
Unpartnered to cohabiting	2.16***	1.09
Unpartnered to repartnered	2.62***	1.00
Unpartnered to periods of partnership	3.19***	1.05
Unknown	2.01***	1.04
Mother's age at first birth		
25-29		
<20		1.20
20-24		1.27**
30-34		0.81*
35-40		0.75
40+		1.25
Mother's highest educational qualification		
NVQ Level 1		
NVQ Level 2		0.6*
NVQ Level 3		0.70**
NVQ Level 4		0.67**
NVQ Level 5		0.79
None		1.06

Outcome: Problematic internalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
Overseas only		1.01
Child firstborn		
Not mother's firstborn		
Mother's firstborn		1.44***
Child's ethnicity		
White		
Mixed		1.37
Indian		1.45
Pakistani and Bangladeshi		1.56***
Black or Black British		0.99
Other		1.38
Child's sex		
Male		
Female		0.84**
Household poverty		
Never poor		
Episodic poverty		1.24*
Recurrent poverty		1.43**
Persistent poverty		1.42**
Unknown		0.93
Household tenure		
Owner occupied housing		
Social rented		1.32**
Private rented		0.97
Maternal depression		
Never depressed		
Episodic depression		1.98***
Recurrent depression		2.47***
Persistent depression		2.95***
Unknown		1.53**
Positive parenting index		0.86***
Negative parenting index		1.53***
Pearson χ^2 Goodness of Fit: F	0.000	1.39

Outcome: Problematic internalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
Pearson χ^2 Goodness of Fit: Pr>F	1.000	0.1921

*=p<0.05; **=p<0.01; ***=p<0.001

Table 34 shows that in the unadjusted model there is a widespread but by no means universal association between problematic internalising behaviour and parental partnership trajectory with 10 of the 14 parental partnership trajectories showing an increased odds ratio of problematic internalising behaviour. The odds for problematic internalising behaviour are highest for those children who were born to unpartnered parents but have experienced periods of partnership which may or may not be with the child's other biological parent.

In the model with controls parental partnership trajectory is no longer significant when judged by the Wald test and ought to be removed in the model fit process. Calculations not shown indicate that once the economic characteristics of the household are included as controls the parental partnership trajectory variable ceases to be statistically significant in the model, at the 10% level. This suggests that any association between problematic internalising behaviour and parental partnership trajectory is likely to be in a large part the result of the economic circumstances of the family.

In order to fully explore how economic characteristics attenuate the association between internalising behaviour and parental partnership trajectory the four variables which constitute economic characteristics are added individually and then in various combinations in order to see what dimensions of household economic characteristics reduce the association between parental partnership trajectory and problematic internalising behaviour into insignificance. The four variables are a longitudinal measure of poverty, housing tenure, if the household is workless and the social class of the household, note that in the formulation of models in which all economic characteristics are included the worklessness measure is insignificant and is hence not present in the internalising models which include economic characteristics collectively.

As outlined in section 5.3.4 when a Pearson χ2 test for goodness of fit is performed on an unadjusted model, the F value is necessarily 0.000, and P>F is 1.000, because there cannot be any difference between the observed covariate pattern and that predicted by the model

when there is only one variable in the model. As such the Pearson χ2 test for the unadjusted model presented in Table 34 indicates that the model should not be rejected.

The Pearson χ2 test for goodness of fit presented in the adjusted model in Table 32 is not significant, suggesting that the null hypothesis should not be rejected and we can consider that the model is an appropriate fit to the data.

TABLE 35: SIGNIFICANCE OF PARENTAL PARTNERSHIP TRAJECTORY IN MODELS PREDICTING PROBLEMATIC INTERNALISING BEHAVIOUR ONCE HOUSEHOLD ECONOMIC CHARACTERISTICS ARE INCLUDED

	Model									
	poverty only	tenure only	working only	class only	poverty and tenure	poverty and working	poverty and class	tenure and working	tenure and class	working and class
n = 13382 throughout										
Significance of trajectory variable					I/S	I/S	I/S		I/S	
	Significance level of each trajectory									
Parental Partnership Trajectory										
Married stable										
Married periods of separation										
Married to lone										
Married to repartnered										
Cohabiting stable										
Cohabiting to married										
Cohabiting periods of separation			*	*						*
Cohabiting to lone		*	**	**						**
Cohabiting to repartnered	*	*	**	**				*		**
Unpartnered stable	**	***	***	***				*		***
Unpartnered to married										
Unpartnered to cohabiting			***	**						**
Unpartnered to repartnered	*	**	***	***				**		***
Unpartnered periods of partnership	**	***	***	***				*		***
Unknown	***	***	***	***	**	**	**	***	**	***

*=p<0.05; **=p<0.01; ***=p<0.001

Table 35 shows that including only one of the economic variables does not individually make the association between parental partnership trajectory and problematic internalising behaviour insignificant, but there is a reduction in significance. The greatest

reduction in significance comes from the addition of the longitudinal poverty measure. When the four variables are added in the six pairwise blocks it is apparent that the three combinations which include the poverty variables and the tenure and class combination. Only one of the combinations which include worklessness reduce the association between parental partnership trajectory and problematic internalising behaviour into insignificance which suggests that worklessness is the weakest attenuation effect on the association. Otherwise the analysis suggests that it is experiencing economic adversity in one or more relevant dimension which reduces the association between parental partnership trajectory and problematic internalising behaviour into insignificance. Further interpretation of this finding will be made in the discussion section of this chapter.

As explored above the economic characteristics are responsible for attenuating parental partnership trajectory, and as a result in the models which include only economic characteristics and health or parenting, parental partnership trajectory is entirely attenuated. The same is true in the economic characteristics, health and parenting models as economic characteristics exercise their established effect on the association between parental partnership trajectory and problematic internalising behaviour. This leads to the conclusion that the association between problematic internalising behaviour and parental partnership trajectory is primarily the result of the economic circumstances of households, in particular their exposure to longer term poverty together with at least one other dimension of economic disadvantage.

7.4 Reading ability

TABLE 36: ASSOCIATION BETWEEN PARENTAL PARTNERSHIP TRAJECTORY AND POOR READING ABILITY FOR AGE

Outcome: Poor reading ability for age		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
N	13463	13216
Constant	0.06***	0.10***
Parental partnership trajectory		
Married stable		
Married periods of separation	1.73*	1.18
Married to lone	2.49***	1.37
Married to repartnered	2.75***	1.68
Cohabiting stable	1.74***	1.22
Cohabiting to married	1.73**	1.48*
Cohabiting periods of separation	4.24***	2.30**
Cohabiting to lone	3.88***	1.56*
Cohabiting to repartnered	3.02***	1.42
Unpartnered stable	3.98***	1.55*
Unpartnered to married	2.69**	1.47
Unpartnered to cohabiting	4.15***	1.67**
Unpartnered to repartnered	6.20***	2.60***
Unpartnered to periods of partnership	3.92***	1.22
Unknown	2.55***	1.23
Mother's age at first birth		
25-29		
<20		1.33*
20-24		1.28*
30-34		0.77
35-40		0.98
40+		0.37*
Mother's highest educational qualification		
NVQ Level 1		
NVQ Level 2		0.80
NVQ Level 3		0.84
NVQ Level 4		0.61**
NVQ Level 5		0.59*
None		1.52**

Outcome: Poor reading ability for age		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
Overseas only		1.38
Child firstborn		
Not mother's firstborn		
Mother's firstborn		0.69***
Child's ethnicity		
White		
Mixed		0.41**
Indian		0.33**
Pakistani and Bangladeshi		0.43***
Black or Black British		0.45**
Other		0.73
Child's sex		
Male		
Female		0.46***
Household poverty		
Never poor		
Episodic poverty		1.37*
Recurrent poverty		1.82***
Persistent poverty		1.93***
Unknown		1.64
Household social class		
Managerial/professional		
Intermediate		1.40*
small employer/self employed		1.41*
low supervisory/technical		1.53*
semi-routine/routine		1.56**
Unknown		2.00***
Household tenure		
Owner occupied housing		
Social rented		
Private rented		
Maternal depression		
Never depressed		
Episodic depression		1.44**
Recurrent depression		1.19

Outcome: Poor reading ability for age		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
Persistent depression		1.54**
Unknown		1.20
Positive parenting index		0.93
Negative parenting index		1.11**
Pearson χ^2 Goodness of Fit: F	0.000	2.84
Pearson χ^2 Goodness of Fit: Pr>F	1.000	0.0030

*=p<0.05; **=p<0.01; ***=p<0.001

Table 36 shows that in the unadjusted model there are universally increased odds of having poor reading ability for all groups relative to the children of the continuously married group. Children born to initially unpartnered parents who subsequently partner with someone other than the child's other natural parent have the greatest risk of poor reading performance. In the adjusted model the association between parental partnership and poor reading ability for age only remains significant for children of the initially cohabiting whose parents subsequently marry each other or separate and reunite or separate permanently; and those children born to unpartnered mothers who have not had a cohabiting partner, or who now cohabit with the child's father or have repartnered with another partner who is a step parent to the child. These results suggest that for children's propensity to be poor readers the parent's initial partnership status is more important than the changes in parental partnership that they experience during their lifetime.

As outlined in section 5.3.4 when a Pearson χ2 test for goodness of fit is performed on an unadjusted model, the F value is necessarily 0.000, and P>F is 1.000, because there cannot be any difference between the observed covariate pattern and that predicted by the model when there is only one variable in the model. As such the Pearson χ2 test for the unadjusted model presented in Table 36 indicates that the model should not be rejected.

The Pearson χ2 test for goodness of fit presented in the adjusted model in Table 36 is significant, suggesting that the null hypothesis should be rejected and we should not consider that the model is an appropriate fit to the data. As the model has a firm theoretic basis, the model will be retained, but the results from the model interpreted with caution and in context with the findings from other models.

Chapter 8. Associations between parental partnership transitions and children's outcomes

8.1 Introduction

This chapter examines the association between parental partnership transitions and children's problematic externalising behaviour, problematic internalising behaviour and poor reading ability for age using weighted logistic regression models.

8.2 Externalising behaviour

TABLE 37: ASSOCIATION BETWEEN PARENTAL PARTNERSHIP TRANSITIONS AND PROBLEMATIC EXTERNALISING BEHAVIOUR

Outcome: Problematic externalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
N	13385	13182
Constant	0.21***	0.21***
Parental partnership transitions		
No partnership transitions		
Interruption to continuing parental partnership	1.54**	1.11
Breakdown of parent's partnership	1.80***	1.15
Repartnering of resident parent	2.54***	1.37**
Unknown	1.91***	1.28**
Mother's age at first birth		
25-29		
<20		1.45***
20-24		1.38**
30-34		0.90
35-40		0.88
40+		0.99
Mother's highest educational qualification		
NVQ Level 1		
NVQ Level 2		0.78*
NVQ Level 3		0.82

Outcome: Problematic externalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
NVQ Level 4		0.64***
NVQ Level 5		0.58**
None		1.17
Overseas only		0.93
Child's ethnicity		
White		
Mixed		0.93
Indian		1.09
Pakistani and Bangladeshi		0.78
Black or Black British		0.64*
Other		0.55**
Child's sex		
Male		
Female		0.52***
Household poverty		
Never poor		
Episodic poverty		1.23**
Recurrent poverty		1.48***
Persistent poverty		1.52***
Unknown		1.60
Household social class		
Managerial/professional		
Intermediate		1.15
small employer/self employed		1.05
low supervisory/technical		1.35*
semi-routine/routine		1.29**
Unknown		1.29*
Maternal depression		
Never depressed		
Episodic depression		1.14
Recurrent depression		1.16
Persistent depression		1.33*
Unknown		0.96
Positive parenting index		0.90**
Negative parenting index		2.36***

Outcome: Problematic externalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
Pearson χ^2 Goodness of Fit: F	0.000	1.24
Pearson χ^2 Goodness of Fit: Pr>F	1.000	0.2692

*=p<0.05; **=p<0.01; ***=p<0.001

Table 37 shows that the unadjusted model has a strong association between all groups which experience a parental partnership transition relative to the group which experiences no parental partnership transitions with problematic externalising behaviour, the greatest odds of problematic externalising behaviour are associated with the repartnered transition group.

In the adjusted model the group who have experienced the repartnering of their biological parent are the only group to have significantly increased odds of problematic internalising behaviour compared to the group whose parents have not changed their partnership status.

As outlined in section 5.3.4 when a Pearson χ2 test for goodness of fit is performed on an unadjusted model, the F value is necessarily 0.000, and P>F is 1.000, because there cannot be any difference between the observed covariate pattern and that predicted by the model when there is only one variable in the model. As such the Pearson χ2 test for the unadjusted model presented in Table 37 indicates that the model should not be rejected.

The Pearson χ2 test for goodness of fit presented in the adjusted model in Table 37 is not significant, suggesting that the null hypothesis should not be rejected and we can consider that the model is an appropriate fit to the data.

8.3 Internalising behaviour

TABLE 38: ASSOCIATION BETWEEN PARENTAL PARTNERSHIP TRANSITIONS AND PROBLEMATIC INTERNALISING BEHAVIOUR

Outcome: Problematic internalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
N	13382	13133
Constant	0.14***	0.19***
Parental partnership transitions		
No partnership transitions		
Interruption to continuing parental partnership	1.74**	1.09
Breakdown of parent's partnership	1.58***	0.95
Repartnering of resident parent	2.08***	1.03
Unknown	1.74***	1.04
Mother's age at first birth		
25-29		
<20		1.21*
20-24		1.27**
30-34		0.81*
35-40		0.75
40+		1.25
Mother's highest educational qualification		
NVQ Level 1		
NVQ Level 2		0.76*
NVQ Level 3		0.71**
NVQ Level 4		0.67**
NVQ Level 5		0.79
None		1.06
Overseas only		1.02
Not mother's firstborn		
Mother's firstborn		1.45***
Child's ethnicity		
White		
Mixed		1.37
Indian		1.44
Pakistani and Bangladeshi		1.55***

Outcome: Problematic internalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
Black or Black British		1.00
Other		1.37
Child's sex		
Male		
Female		0.84**
Household poverty		
Never poor		
Episodic poverty		1.24*
Recurrent poverty		1.44***
Persistent poverty		1.43**
Unknown		0.92
Household tenure		
Owner occupied housing		
Social rented		1.33**
Private rented		0.96
Maternal depression		
Never depressed		
Episodic depression		1.98***
Recurrent depression		2.45***
Persistent depression		2.94***
Unknown		1.52**
Positive parenting index		0.86***
Negative parenting index		1.53***
Pearson χ^2 Goodness of Fit: F	0.000	0.85
Pearson χ^2 Goodness of Fit: Pr>F	1.000	0.5742

*=p<0.05; **=p<0.01; ***=p<0.001

Table 38 shows the association in the unadjusted model between parental partnership transitions and problematic internalising behaviour. It is apparent that there is a widespread association between parental partnership transitions and problematic internalising behaviour as all of the transitions are associated with significantly increased odds of problematic internalising behaviour. In common with the model relating problematic internalising behaviour and parental partnership trajectory (section 7.2) there is no significant association between problematic internalising behaviour and parental partnership transitions once the economic characteristics of the household have been included in the model (calculations not shown).

As outlined in section 5.3.4 when a Pearson $\chi 2$ test for goodness of fit is performed on an unadjusted model, the F value is necessarily 0.000, and P>F is 1.000, because there cannot be any difference between the observed covariate pattern and that predicted by the model when there is only one variable in the model. As such the Pearson $\chi 2$ test for the unadjusted model presented in Table 38 indicates that the model should not be rejected.

The Pearson $\chi 2$ test for goodness of fit presented in the adjusted model in Table 38 is not significant, suggesting that the null hypothesis should not be rejected and we can consider that the model is an appropriate fit to the data.

8.3 Reading ability

TABLE 39: ASSOCIATION BETWEEN PARENTAL PARTNERSHIP TRANSITIONS AND POOR READING ABILITY FOR AGE

Outcome: Poor reading ability for age		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
N	13463	13216
Constant	0.08***	0.11***
Parental partnership transitions		
No partnership transitions		
Interruption to continuing parental partnership	2.15***	1.49
Breakdown of parent's partnership	2.42***	1.27*
Repartnering of resident parent	2.99***	1.37*
Unknown	1.90***	1.04
Mother's age at first birth		
25-29		
<20		1.41**
20-24		1.3**
30-34		0.75*
35-40		0.95
40+		0.33*
Mother's highest educational qualification		
NVQ Level 1		
NVQ Level 2		0.79
NVQ Level 3		0.83
NVQ Level 4		0.61**
NVQ Level 5		0.58*
None		1.52**
Overseas only		1.39
Child firstborn		
Not mother's firstborn		
Mother's firstborn		0.74**
Child's ethnicity		
White		
Mixed		0.42**
Indian		0.30***
Pakistani and Bangladeshi		0.38***

Outcome: Poor reading ability for age		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
Black or Black British		0.47*
Other		0.68
Child's sex		
Male		
Female		0.46***
Household poverty		
Never poor		
Episodic poverty		1.42**
Recurrent poverty		1.94***
Persistent poverty		2.09***
Unknown		1.60
Household social class		
Managerial/professional		
Intermediate		1.40*
small employer/self employed		1.41*
low supervisory/technical		1.56*
semi-routine/routine		1.58**
Unknown		1.98***
Maternal depression		
Never depressed		
Episodic depression		1.43**
Recurrent depression		1.19
Persistent depression		1.55**
Unknown		1.18
Positive parenting index		0.92
Negative parenting index		1.11**
Pearson χ^2 Goodness of Fit: F	0.000	1.23
Pearson χ^2 Goodness of Fit: Pr>F	1.000	0.2734

*=p<0.05; **=p<0.01; ***=p<0.001

Table 39 shows that in the unadjusted model there is a strong association between parental partnership transitions and poor reading ability with all transition pathways showing a significant association with increased odds of poor reading ability relative to the

no transitions pathway, the highest odds ratios are associated with the repartnering transition. After the model has been adjusted by the inclusion of the control variables both the parental partnership breakdown transition and the repartnered transition have significantly higher odds ratios of poor reading ability for age than the no parental partnership transitions group.

As outlined in section 5.3.4 when a Pearson $\chi 2$ test for goodness of fit is performed on an unadjusted model, the F value is necessarily 0.000, and P>F is 1.000, because there cannot be any difference between the observed covariate pattern and that predicted by the model when there is only one variable in the model. As such the Pearson $\chi 2$ test for the unadjusted model presented in Table 39 indicates that the model should not be rejected.

The Pearson $\chi 2$ test for goodness of fit presented in the adjusted model in Table 39 is not significant, suggesting that the null hypothesis should not be rejected and we can consider that the model is an appropriate fit to the data.

Chapter 9. Associations between parental partnership status and children's outcomes

9.1 Introduction

This chapter examines the association between parental partnership status and children's problematic externalising behaviour, problematic internalising behaviour and poor reading ability for age using weighted logistic regression models.

9.2 Externalising behaviour

TABLE 40: ASSOCIATION BETWEEN PARENTAL PARTNERSHIP STATUS AND PROBLEMATIC EXTERNALISING BEHAVIOUR

Outcome: Problematic externalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
N	13385	13182
Constant	0.19***	0.23***
Parental partnership status		
Married		
Cohabiting	1.73***	1.24**
Lone	2.24***	1.02
Stepparent	2.92***	1.82***
Unknown	1.36***	0.75
Mother's age at first birth		
25-29		
<20		1.40**
20-24		1.36**
30-34		0.90
35-40		0.88
40+		0.98
Mother's highest educational qualification		
NVQ Level 1		
NVQ Level 2		0.79*
NVQ Level 3		0.82

Outcome: Problematic externalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
NVQ Level 4		0.65***
NVQ Level 5		0.59**
None		1.18
Overseas only		0.90
Child's ethnicity		
White		
Mixed		0.93
Indian		1.16
Pakistani and Bangladeshi		0.84
Black or Black British		0.65*
Other		0.59*
Child's sex		
Male		
Female		0.52***
Household poverty		
Never poor		
Episodic poverty		1.25**
Recurrent poverty		1.46***
Persistent poverty		1.48***
Unknown		1.67*
Household work status		
At least one adult working		
No adults working		1.50**
Household social class		
Managerial/professional		
Intermediate		1.18
small employer/self employed		1.03
low supervisory/technical		1.30*
semi-routine/routine		1.30**
Unknown		1.03
Positive parenting index		0.88**
Negative parenting index		2.38***
Pearson χ^2 Goodness of Fit: F	0.000	0.72
Pearson χ^2 Goodness of Fit: Pr>F	1.000	0.6941

Outcome: Problematic externalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)

*=p<0.05; **=p<0.01; ***=p<0.001

Table 40 indicates that when looking at the unadjusted model there is a widespread and highly significant association between parental partnership status and children's propensity to display problematic externalising behaviour. The three alternative family statuses explored in the model are all significantly associated with higher odds of problematic externalising behaviour, with the highest odds associated with having a stepparent. In the adjusted model there is a significantly increased propensity to display problematic externalising behaviour for those living with a biological parent who has repartnered and children whose biological parents are cohabiting when compared to children whose parents are married to each other. The continued significance observed for the cohabiting group is unambiguous even once the full set of controls are included.

As outlined in section 5.3.4 when a Pearson $\chi 2$ test for goodness of fit is performed on an unadjusted model, the F value is necessarily 0.000, and P>F is 1.000, because there cannot be any difference between the observed covariate pattern and that predicted by the model when there is only one variable in the model. As such the Pearson $\chi 2$ test for the unadjusted model presented in Table 40 indicates that the model should not be rejected.

The Pearson $\chi 2$ test for goodness of fit presented in the adjusted model in Table 40 is not significant, suggesting that the null hypothesis should not be rejected and we can consider that the model is an appropriate fit to the data.

9.3 Internalising behaviour

TABLE 41: ASSOCIATION BETWEEN PARENTAL PARTNERSHIP STATUS AND PROBLEMATIC INTERNALISING BEHAVIOUR

Outcome: Problematic internalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
N	13382	13133
Constant	0.14***	0.19***
Parental partnership status		
Married		
Cohabiting	1.44***	1.03
Lone	2.10***	0.98
Stepparent	1.95***	1.04
Unknown	1.51	0.87
Mother's age at first birth		
25-29		
<20		1.21*
20-24		1.27**
30-34		0.81*
35-40		0.75
40+		1.24
Mother's highest educational qualification		
NVQ Level 1		
NVQ Level 2		0.76*
NVQ Level 3		0.71**
NVQ Level 4		0.67**
NVQ Level 5		0.79
None		1.06
Overseas only		1.02
Child firstborn		
Not mother's firstborn		
Mother's firstborn		1.45***
Child's ethnicity		
White		
Mixed		1.39
Indian		1.45
Pakistani and Bangladeshi		1.56***

Outcome: Problematic internalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
Black or Black British		1.01
Other		1.38
Child's sex		
Male		
Female		0.84**
Household poverty		
Never poor		
Episodic poverty		1.24*
Recurrent poverty		1.45***
Persistent poverty		1.44**
Unknown		0.94
Household tenure		
Owner occupied housing		
Social rented		1.33**
Private rented		0.97
Maternal depression		
Never depressed		
Episodic depression		1.98***
Recurrent depression		2.43***
Persistent depression		2.95***
Unknown		1.54**
Positive parenting index		0.86***
Negative parenting index		1.54***
Pearson χ^2 Goodness of Fit: F	0.000	0.97
Pearson χ^2 Goodness of Fit: Pr>F	1.000	0.4629

*=p<0.05; **=p<0.01; ***=p<0.001

Table 41 shows that there is a statistically significant association between parental partnership status and problematic internalising behaviour in the unadjusted model. As is the case with other conceptions of parental partnership the inclusion of economic characteristics of the household results in parental partnership status no longer being significant enough to be included in the model.

As outlined in section 5.3.4 when a Pearson χ2 test for goodness of fit is performed on an unadjusted model, the F value is necessarily 0.000, and P>F is 1.000, because there cannot be any difference between the observed covariate pattern and that predicted by the model when there is only one variable in the model. As such the Pearson χ2 test for the unadjusted model presented in Table 41 indicates that the model should not be rejected.

The Pearson χ2 test for goodness of fit presented in the adjusted model in Table 41 is not significant, suggesting that the null hypothesis should not be rejected and we can consider that the model is an appropriate fit to the data.

9.4 Reading ability

TABLE 42: ASSOCIATION BETWEEN PARENTAL PARTNERSHIP STATUS AND POOR READING ABILITY

Outcome: Poor reading ability for age		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
N	13463	13216
Constant	0.07***	0.11***
Parental partnership status		
Married		
Cohabiting	2.16***	1.29*
Lone	3.03***	1.24
Stepparent	3.16***	1.54**
Unknown	2.86	1.60
Mother's age at first birth		
25-29		
<20		1.36*
20-24		1.29*
30-34		0.76
35-40		0.96
40+		0.34*
Mother's highest educational qualification		
NVQ Level 1		
NVQ Level 2		0.80
NVQ Level 3		0.83
NVQ Level 4		0.61**
NVQ Level 5		0.59*
None		1.53*
Overseas only		1.40
Child firstborn		
Not mother's firstborn		
Mother's firstborn		0.72***
Child's ethnicity		
White		
Mixed		0.42**
Indian		0.32**
Pakistani and Bangladeshi		0.42***
Black or Black British		0.48*

Outcome: Poor reading ability for age		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
Other		0.72
Child's sex		
Male		
Female		0.47***
Household poverty		
Never poor		
Episodic poverty		1.40**
Recurrent poverty		1.94***
Persistent poverty		2.05***
Unknown		1.70
Household social class		
Managerial/professional		
Intermediate		1.40*
small employer/self employed		1.40*
low supervisory/technical		1.53*
semi-routine/routine		1.57**
Unknown		1.97***
Maternal depression		
Never depressed		
Episodic depression		1.42**
Recurrent depression		1.21
Persistent depression		1.54**
Unknown		1.15
Positive parenting index		0.92
Negative parenting index		1.11**
Pearson χ^2 Goodness of Fit: F	0.000	1.26
Pearson χ^2 Goodness of Fit: Pr>F	1.000	0.2551

*=p<0.05; **=p<0.01; ***=p<0.001

In Table 42 the unadjusted model shows that there is a strong association between all of the parental partnership status groups and being a poor reader. When the control variables are introduced children who live with a repartnered parent and children whose parents are cohabiting with each other are once again seen to be at higher risk of displaying poor

reading ability for their age when compared to their peers with biological parents who are married to each other when the children are aged seven.

As outlined in section 5.3.4 when a Pearson $\chi 2$ test for goodness of fit is performed on an unadjusted model, the F value is necessarily 0.000, and P>F is 1.000, because there cannot be any difference between the observed covariate pattern and that predicted by the model when there is only one variable in the model. As such the Pearson $\chi 2$ test for the unadjusted model presented in Table 42 indicates that the model should not be rejected.

The Pearson $\chi 2$ test for goodness of fit presented in the adjusted model in Table 42 is not significant, suggesting that the null hypothesis should not be rejected and we can consider that the model is an appropriate fit to the data.

Chapter 10. What difference does how you measure parental partnership make to the association between parental partnership and children's outcomes?

10.1 Introduction

As outlined in the introduction to the thesis there is a difference in the way parental partnership is operationalised between the specialist literature which looks only at family structure and its relationship to children's outcomes (e.g. Kiernan and Mensah, 2010), and the more general policy or interventionist literature which recognises family structure as being important but includes parental partnership as incidental (e.g. Centre for Social Justice, 2014). The specialist literature uses a measure which captures change in the parent's partnership over time whereas non-specialist literature tends to only look at family structure as a simple measure of parental partnership status at one point in the child's life. This section is a brief examination of the differences between each of the three measures of parental partnership outlined in previous chapters, i.e. trajectory, transitions and status, to see if using a more complicated measure of parental partnership has benefits in terms of our understanding of parental partnership. The conclusions of this comparison has implications in terms of how parental partnership is measured across a range of different research questions.

10.2 Externalising behaviour

To refresh the readers memory, partial results tables for the regression models for problematic externalising behaviour for each of parental partnership trajectory Table 43 (section 7.2), parental partnership transitions Table 44 (section 8.2) and parental partnership status Table 45 (section 9.2) are shown below. The tables show only the odds ratios associated with each of the categories of the parental partnership and their significance levels in the adjusted model but they omit other variables. The models presented were fitted using the method outlined in Chapter 5, and the variables included in the final model are outlined in sections 7.2, 8.2 and 9.2 respectively.

TABLE 43: EXTRACT FROM TABLE 33

Variable	Adjusted model
Parental partnership trajectory	
Married stable	
Married periods of separation	0.95
Married to lone	1.11
Married to repartnered	1.55*
Cohabiting stable	1.24*
Cohabiting to married	1.25
Cohabiting periods of separation	1.49
Cohabiting to lone	1.01
Cohabiting to repartnered	2.36***
Unpartnered stable	1.20
Unpartnered to married	1.49
Unpartnered to cohabiting	1.91***
Unpartnered to repartnered	1.55*
Unpartnered to periods of partnership	1.04
Unknown	1.39**

*=p<0.05; **=p<0.01; ***=p<0.001

TABLE 44: EXTRACT FROM TABLE 37

Variable	Adjusted model
Parental partnership transitions	
No partnership transitions	
Interruption to continuing parental partnership	1.11
Breakdown of parent's partnership	1.15
Repartnering of resident parent	1.37**
Unknown	1.28**

*=p<0.05; **=p<0.01; ***=p<0.001

TABLE 45: EXTRACT FROM TABLE 40

Variable	Adjusted model
Parental partnership status	
Married	
Cohabiting	1.24**
Lone	1.02
Stepparent	1.82***
Unknown	0.75

*=p<0.05; **=p<0.01; ***=p<0.001

Comparing the trajectory model with the transition model it is apparent that there are differences between constituent parts of the reference group for the transition model with the cohabiting stable group significant in the trajectory model, and this trajectory forms part of the reference group in the transitions model. There is a significant association between breakdown of parental partnership and problematic externalising behaviour in the transition model, and this is driven predominately by the partnering of the initially unpartnered which is included in this transition from the trajectory model. This interpretation is backed up by the status model which indicates that lone parenthood per se is not associated with increased odds of problematic externalising behaviour. In all three models, trajectory, transition and status there is an association between having a step parent and increased odds of problematic externalising behaviour. This implies that however you formulate the inclusion of a step parent in a young child's family there are significant associations with problematic externalising behaviour. The magnitude of this association is tempered by the initial partnership of the child's biological parents with a protective effect of initial marriage, however having a step parent remains detrimental.

Looking at the trajectory and status models there are increased odds of problematic externalising behaviour for most of the trajectories which include either initial biological parental cohabitation and/or are currently cohabiting (the one exception being the cohabiting to lone parent trajectory). This finding is not present in the transition model as parental partnership type is not included in this model and is a weakness of this approach.

There is a case that any circumstances which lead to the addition of a step parent to the child's household are associated with increased odds of problematic behaviour, there is also good evidence that living with cohabiting parents at any point up to the age of seven is associated with a higher risk of problematic externalising behaviour. The association between cohabitation and problematic externalising behaviour is somewhat unexpected as the control variables included were intended to allow for the concentration of broader disadvantage in cohabiting families none the less there is a discernible cohabitation disadvantage. This acts to the disadvantage of the transition model which does not include the legal basis of parent's partnerships, and to a lesser extent the status model which does not capture erstwhile cohabitees, however there seems to be a less certain association for them.

The externalising example strongly suggests that the differences between parental partnership conceptions are that trajectory is information dense but requires a lot of information about a family; that the transitions approach misses out important information about initial partnership status; and the status approach again fails to capture information about the initial partnership of the parents. When problematic externalising behaviour is the relevant outcome this suggests that the best representation is trajectory; then there is little to choose between transitions and status, however transitions are probably preferable from a theoretical point of view. All three conceptions of parental partnership are unambiguous about step parents and their promotion of the odds of problematic externalising behaviour but differ in the interpretation of cohabitation.

10.3 Internalising behaviour

Again to refresh the readers memory, partial results tables for the regression models for problematic internalising behaviour for each of parental partnership trajectory Table 46 (section 7.3), parental partnership transitions Table 47 (section 8.3) and parental partnership status Table 48 (section 9.3) are shown below. The tables show only the odds ratios associated with each of the categories of the parental partnership and their significance levels in the adjusted model but they omit other variables. The models presented were fitted using the method outlined in Chapter 5, and the variables included in the final model are outlined in sections 7.3, 8.3 and 9.3 respectively.

TABLE 46: EXTRACT FROM TABLE 34

Variable	Adjusted model
Parental partnership trajectory	
Married stable	
Married periods of separation	0.96
Married to lone	0.92
Married to repartnered	0.88
Cohabiting stable	0.91
Cohabiting to married	1.05
Cohabiting periods of separation	1.20
Cohabiting to lone	0.93
Cohabiting to repartnered	1.14
Unpartnered stable	1.02
Unpartnered to married	0.86
Unpartnered to cohabiting	1.09
Unpartnered to repartnered	1.00
Unpartnered to periods of partnership	1.05
Unknown	1.04

*=p<0.05; **=p<0.01; ***=p<0.001

TABLE 47: EXTRACT FROM TABLE 38

Variable	Adjusted model
Parental partnership transitions	
No partnership transitions	
Interruption to continuing parental partnership	1.09
Breakdown of parent's partnership	0.95
Repartnering of resident parent	1.03
Unknown	1.04

*=p<0.05; **=p<0.01; ***=p<0.001

TABLE 48: EXTRACT FROM TABLE 41

Variable	Adjusted model
Parental partnership status	
Married	
Cohabiting	1.03
Lone	0.98
Stepparent	1.04
Unknown	0.87

*=p<0.05; **=p<0.01; ***=p<0.001

In the adjusted models there is no association between parental partnership and increased odds of problematic internalising behaviour as all three conceptions of parental partnership cease to be significant in the tests of model fit. As long as economic characteristics are included in the model all of the tested formulations of parental partnership cease to be significant in all of the intermediate models (those with permutations of the variable groups only). It can confidently be stated that parental partnership is not associated with problematic internalising behaviour regardless of how it is formulated once economic characteristics of the household have been included as controls.

10.4 Reading ability

The partial results tables for the regression models for poor reading ability for age for each of parental partnership trajectory Table 49 (section 7.4), parental partnership transitions Table 50 (section 8.4) and parental partnership status Table 51 (section 9.4) are shown below. The tables show only the odds ratios associated with each of the categories of the parental partnership and their significance levels in the adjusted model but they omit other variables. The models presented were fitted using the method outlined in Chapter 5, and the variables included in the final model are outlined in sections 7.3, 8.3 and 9.3 respectively.

TABLE 49: EXTRACT FROM TABLE 36

Variable	Adjusted model
Parental partnership trajectory	
Married stable	
Married periods of separation	1.18
Married to lone	1.37
Married to repartnered	1.68
Cohabiting stable	1.22
Cohabiting to married	1.48*
Cohabiting periods of separation	2.30**
Cohabiting to lone	1.56*
Cohabiting to repartnered	1.42
Unpartnered stable	1.55*
Unpartnered to married	1.47
Unpartnered to cohabiting	1.67**
Unpartnered to repartnered	2.60***
Unpartnered to periods of partnership	1.22
Unknown	1.23

*=p<0.05; **=p<0.01; ***=p<0.001

TABLE 50: EXTRACT FROM TABLE 39

Variable	Adjusted model
Parental partnership transitions	
No partnership transitions	
Interruption to continuing parental partnership	1.49
Breakdown of parent's partnership	1.27*
Repartnering of resident parent	1.37*
Unknown	1.04

*=p<0.05; **=p<0.01; ***=p<0.001

TABLE 51: EXTRACT FROM TABLE 42

Variable	Adjusted model
Parental partnership status	
Married	
Cohabiting	1.29*
Lone	1.24
Stepparent	1.54**
Unknown	1.60

*=p<0.05; **=p<0.01; ***=p<0.001

The trajectory model highlights the unexpected finding that poor reading ability for age is more associated with parents initial partnership status than current partnership status, with children whose parents were initially cohabiting being at higher risk of poor reading ability for age than those who have experienced significant disruption. As the transitions model of parental partnership only takes account of change and not status this suggests that conceptualising parental partnership using a transitions approach is not recommended when it comes to examining children's reading ability for age because it treats initial partnership as exogenous. The status model also does not reflect the emergent findings from the parental partnership trajectory that initial partnership is important for children's reading ability. As status does not attempt to be a lifetime measure of parental partnership this shortcoming is within the expectations for the variable.

Chapter 11. Associations between sibling group type and children's outcomes

11.1 Introduction

This chapter examines the association between sibling group type and children's problematic externalising behaviour, problematic internalising behaviour and poor reading ability for age using weighted logistic regression models.

11.2 Externalising behaviour

TABLE 52: ASSOCIATION BETWEEN SIBLING GROUP AND PROBLEMATIC EXTERNALISING BEHAVIOUR

Outcome: Problematic externalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
N	13385	13182
Constant	0.30***	0.27***
Sibling group type		
No siblings		
Older full siblings only	0.71***	1.45
Younger full siblings only	0.77**	1.34
Older and younger full siblings only	0.98	1.71
Older maternal half siblings	1.27*	1.87
Younger maternal half siblings	2.65***	2.53*
Maternal half siblings with multiple non-shared parents	2.71***	2.59*
Other (various paternal half siblings and step siblings with no shared siblings)	1.32	2.69*
Unknown	1.59**	2.11
Mother's age at first birth		
25-29		
<20		1.42***
20-24		1.37**
30-34		0.90
35-40		0.85
40+		0.94
Mother's highest educational qualification		
NVQ Level 1		

Outcome: Problematic externalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
NVQ Level 2		0.77*
NVQ Level 3		0.81
NVQ Level 4		0.64***
NVQ Level 5		0.58**
None		1.18
Overseas only		0.91
Number of children in the sibling group		
One child		
Two children		0.60
Three children		0.51
Four children		0.50
Five or more children		0.44*
Child's ethnicity		
White		
Mixed		0.91
Indian		1.12
Pakistani and Bangladeshi		0.82
Black or Black British		0.65*
Other		0.59*
Child's sex		
Male		
Female		0.52***
Household poverty		
Never poor		
Episodic poverty		1.28**
Recurrent poverty		1.50***
Persistent poverty		1.57***
Unknown		1.70*
Household social class		
Managerial/professional		
Intermediate		1.15
small employer/self employed		1.05
low supervisory/technical		1.34**
semi-routine/routine		1.30**
Unknown		1.34**
Positive parenting index		0.89**

Outcome: Problematic externalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
Negative parenting index		2.38***
Pearson χ^2 Goodness of Fit: F	0.000	1.09
Pearson χ^2 Goodness of Fit: Pr>F	1.000	0.3661

*=p<0.05; **=p<0.01; ***=p<0.001

Using Table 52 to look at the unadjusted model for externalising behaviour it is immediately apparent that the reference group selected is in fact in the middle of the distribution for likelihood of problematic externalising behaviour, with a number of sibling groups being significantly associated with a decreased likelihood of problematic externalising behaviour and a number of groups being significantly associated with an increased likelihood of problematic externalising behaviour. There are two groups with a significantly lower odds of problematic externalising behaviour relative to the no full, half or step sibling group, namely the older full siblings only group and the younger full siblings only group. There are significantly higher odds ratios of problematic externalising behaviour for maternal half siblings from multiple partnerships, the younger maternal half siblings group and the older maternal half siblings group.

In the adjusted model which includes the number of children in the family, there are only increased odds of problematic externalising behaviour for children with maternal half siblings from multiple partnerships, younger maternal half siblings and those children in the heterogeneous other siblings group.

As outlined in section 5.3.4 when a Pearson χ2 test for goodness of fit is performed on an unadjusted model, the F value is necessarily 0.000, and P>F is 1.000, because there cannot be any difference between the observed covariate pattern and that predicted by the model when there is only one variable in the model. As such the Pearson χ2 test for the unadjusted model presented in Table 52 indicates that the model should not be rejected.

The Pearson χ2 test for goodness of fit presented in the adjusted model in Table 52 is not significant, suggesting that the null hypothesis should not be rejected and we can consider that the model is an appropriate fit to the data.

11.3 Internalising behaviour

TABLE 53: ASSOCIATION BETWEEN SIBLING GROUP AND PROBLEMATIC INTERNALISING BEHAVIOUR

Outcome: Problematic internalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
N	13382	13133
Constant	0.24***	0.31***
Sibling group type		
No siblings		
Older full siblings only	0.51***	0.55***
Younger full siblings only	0.77**	0.83*
Older and younger full siblings only	0.83	0.68**
Older maternal half siblings	0.82	0.59***
Younger maternal half siblings	1.76***	0.93
Maternal half siblings with multiple non-shared parents	2.49***	1.18
Other (various paternal half siblings and step siblings with no shared siblings)	0.50*	0.52
Unknown	1.19	0.81
Mother's age at first birth		
25-29		
<20		1.15
20-24		1.24**
30-34		0.81*
35-40		0.73
40+		1.17
Mother's highest educational qualification		
NVQ Level 1		
NVQ Level 2		0.76*
NVQ Level 3		0.70**
NVQ Level 4		0.67**
NVQ Level 5		0.79
None		1.04
Overseas only		1.01
Child's ethnicity		
White		
Mixed		1.36
Indian		1.50

Outcome: Problematic internalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
Pakistani and Bangladeshi		1.60***
Black or Black British		0.99
Other		1.42
Child's sex		
Male		
Female		0.84**
Household poverty		
Never poor		
Episodic poverty		1.22
Recurrent poverty		1.39**
Persistent poverty		1.39**
Unknown		0.92
Household tenure		
Owner occupied housing		
Social rented		1.31**
Private rented		0.95
Maternal depression		
Never depressed		
Episodic depression		1.96***
Recurrent depression		2.40***
Persistent depression		2.85***
Unknown		1.56**
Positive parenting index		0.86***
Negative parenting index		1.53***
Pearson χ^2 Goodness of Fit: F	0.000	0.74
Pearson χ^2 Goodness of Fit: Pr>F	1.000	0.6731

*=p<0.05; **=p<0.01; ***=p<0.001

As shown in Table 53 the unadjusted model for problematic internalising behaviour once again suggests that the chosen reference group, no full, half or step siblings is in the middle of the distribution. There are reduced odds of problematic internalising behaviour for the children with older full siblings only, younger full siblings only and the other siblings group.

Turning to the groups which have increased odds of problematic internalising behaviour relative to the no full, half or step siblings group the greatest odds in the unadjusted model are associated with the maternal half siblings with multiple non shared parents (OR 2.49 $p<0.001$) followed by the younger maternal half siblings group (OR 1.76 $p<0.001$).

In the adjusted model, none of the sibling groups have significantly increased odds of problematic externalising behaviour relative to the reference group of children with no full, half or step siblings. Four sibling categories have significantly reduced odds of problematic internalising behaviour relative to the reference group, namely older full siblings only, younger full siblings only, older and younger full siblings only, older and younger full siblings only, and older maternal half siblings.

As outlined in section 5.3.4 when a Pearson $\chi 2$ test for goodness of fit is performed on an unadjusted model, the F value is necessarily 0.000, and P>F is 1.000, because there cannot be any difference between the observed covariate pattern and that predicted by the model when there is only one variable in the model. As such the Pearson $\chi 2$ test for the unadjusted model presented in Table 53 indicates that the model should not be rejected.

The Pearson $\chi 2$ test for goodness of fit presented in the adjusted model in Table 53 is not significant, suggesting that the null hypothesis should not be rejected and we can consider that the model is an appropriate fit to the data.

11.4 Reading ability

TABLE 54: ASSOCIATION BETWEEN SIBLING GROUP AND POOR READING ABILITY

Outcome: Poor reading ability for age		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
N	13463	13216
Constant	0.11***	0.10***
Sibling group type		
No siblings		
Older full siblings only	0.87	1.07
Younger full siblings only	0.66**	0.79
Older and younger full siblings only	1.26	1.15
Older maternal half siblings	2.16***	1.48**
Younger maternal half siblings	2.14***	1.01
Maternal half siblings with multiple non-shared parents	3.38***	1.33
Other (various paternal half siblings and step siblings with no shared siblings)	0.96	0.91
Unknown	2.00**	1.16
Mother's age at first birth		
25-29		
<20		1.40**
20-24		1.31**
30-34		0.75*
35-40		0.91
40+		0.29*
Mother's highest educational qualification		
NVQ Level 1		
NVQ Level 2		0.79
NVQ Level 3		0.82
NVQ Level 4		0.61**
NVQ Level 5		0.59*
None		1.49**
Overseas only		1.38
Child's ethnicity		
White		
Mixed		0.42**
Indian		0.31***

Outcome: Poor reading ability for age		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
Pakistani and Bangladeshi		0.39***
Black or Black British		0.48*
Other		0.70
Child's sex		
Male		
Female		0.46***
Household poverty		
Never poor		
Episodic poverty		1.46**
Recurrent poverty		2.02***
Persistent poverty		2.17***
Unknown		1.82
Household social class		
Managerial/professional		
Intermediate		1.41*
small employer/self employed		1.41*
low supervisory/technical		1.55*
semi-routine/routine		1.59***
Unknown		2.01***
Maternal depression		
Never depressed		
Episodic depression		1.44**
Recurrent depression		1.23
Persistent depression		1.53**
Unknown		1.14
Positive parenting index		0.92
Negative parenting index		1.12**
Pearson χ^2 Goodness of Fit: F	0.000	1.36
Pearson χ^2 Goodness of Fit: Pr>F	1.000	0.2050

*=p<0.05; **=p<0.01; ***=p<0.001

The final analysis shown in Table 54 evaluates the extent to which complex sibling groups are associated with the odds of being in the bottom 10% for reading ability for age. In the

unadjusted model there is one group with significantly reduced odds of poor reading ability for age the younger full siblings only group; there are four groups associated with increased odds of poor reading ability for age namely maternal half siblings with multiple non shared parents, older maternal half siblings, and younger maternal half siblings.

In the adjusted model there is only one group which has a significant association with increased odds of poor reading ability which is the older maternal half siblings only group. For all other groups the economic characteristics of the household are more important than sibling groups for explaining children's likelihood to be poor readers.

As outlined in section 5.3.4 when a Pearson $\chi 2$ test for goodness of fit is performed on an unadjusted model, the F value is necessarily 0.000, and P>F is 1.000, because there cannot be any difference between the observed covariate pattern and that predicted by the model when there is only one variable in the model. As such the Pearson $\chi 2$ test for the unadjusted model presented in Table 54 indicates that the model should not be rejected.

The Pearson $\chi 2$ test for goodness of fit presented in the adjusted model in Table 54 is not significant, suggesting that the null hypothesis should not be rejected and we can consider that the model is an appropriate fit to the data.

Chapter 12. Modelling the interaction between parental partnership and sibling groups and their association with children's outcomes

12.1 Introduction

This chapter discusses logistic regression models which include an interaction between parental partnership and children's sibling groups.

12.2 Results of jointly controlled and interacting models

The first possible approach to examining family complexity was to use parental partnership and sibling group as covariates both independently of one another and as jointly interacting variables in a single model.

The sibling group type variable used in these models was the same as that used in the single variable analysis presented in Chapter 11. Chapters 7, 8 and 9 presented the different results obtained by considering parental partnership in the form of trajectory, transitions and status and the comparison of the three formulations shown in Chapter 10 indicated there are likely to be different results from models depending on which of the parental partnership variables are used, so when jointly controlling for parental partnership and sibling group results are likely to differ depending on which measure of parental partnership is employed. The status variable has been discounted as not being suitably representative of the effects of parental partnership on children's well-being and development, the trajectory and transitions variables are both potentially appropriate for use jointly measuring family complexity. Original expectations about the parental partnership suggested that it was likely that once control variables were included the trajectory of children's parental partnership would be largely irrelevant and that transitions were key (see Crawford et al, 2013 for evidence on this point), however the comparison of trajectory and transitions approached to measuring parental partnership suggest that trajectory is a better measure of experience than transitions. I therefore initially chose to fit the jointly controlled models of parental partnership and sibling group complexity using the parental partnership trajectory, however it quickly became apparent that this was unwieldy and I chose to use the more compact transitions measure. This is still an appropriate way to measure parental partnership change over the life of a child and is easier to use.

All children in the MCS at wave 4 who were living with at least one biological parent and for whom appropriate outcome data was available were used in this analysis.

The first stage in assessing the use of a model which jointly controls for parental partnership and sibling group to assess the effects of family complexity on children's well-being and development is to examine if any meaningful results can be obtained from these models. Table 55 below highlights the significance levels of the family complexity variables using Wald tests for significance in the jointly controlled and interacting models, for each of the outcomes and for the adjusted and unadjusted models.

TABLE 55: SIGNIFICANCE LEVELS OF PARENTAL PARTNERSHIP AND SIBLING GROUP WHEN MODELLED USING JOINTLY CONTROLLED OR INTERACTING MODELS FOR EACH OF THE THREE OUTCOMES

Outcome	Unadjusted or adjusted	Significance levels within the model for the variables reported using Wald tests		
		Parental partnership transitions	Sibling group complexity	Interaction term
Externalising behaviour	Unadjusted	0.0000	0.0000	
Externalising behaviour	Adjusted	0.1869	0.0050	
Externalising behaviour	Unadjusted	0.0430	0.0000	0.3330
Externalising behaviour	Adjusted	0.9850	0.0166	0.1472
Internalising behaviour	Unadjusted	0.0000	0.0000	
Internalising behaviour	Adjusted	0.9035	0.0000	
Internalising behaviour	Unadjusted	0.1124	0.0000	0.3544
Internalising behaviour	Adjusted	0.2951	0.0041	0.4504
Reading ability	Unadjusted	0.0000	0.0000	
Reading ability	Adjusted	0.0406	0.0022	
Reading ability	Unadjusted	0.2964	0.0000	0.0073
Reading ability	Adjusted	0.1784	0.1485	0.2276

Table 55 indicates that there is little justification when data is modelled like this for an association between parental partnership and any of the outcomes which varies on the basis of sibling group type. The variable significance levels observed suggest that with one small exception, parental partnership is not significantly associated with the model outcome when modelled alongside sibling group once the models have been adjusted.

The evidence of these jointly controlled and interacting models suggests that in this particular model design there is no association between family complexity and children's problematic externalising, problematic internalising and poor reading ability for age. This interpretation does not fit in with the literature reviewed in section 4.2 (e.g. Halpern Meekin and Tach, 2008). The most obvious explanation is that it is the jointly controlled model approach that is not appropriate to the research design and is failed to adequately capture the most important aspects of family complexity for children's well-being and development. A jointly controlled approach was not taken by any of the literature reviewed in section 4.2 and 4.5.

These findings suggest that the role of family complexity is not adequately captured by interacting existing measures of the components of family complexity, but needs to be addressed by a variable which prioritises those elements of family complexity which are most important for children's well-being and development. These considerations have been made in section 6.3 and will inform the creation and use of a single measure of family complexity which reduces family complexity to its most relevant aspects.

Chapter 13. A single measure of family complexity

13.1 Introduction

This chapter examines the association between a single measure of family complexity and children's problematic externalising behaviour, problematic internalising behaviour and poor reading ability for age using weighted logistic regression models.

13.2 Externalising behaviour

TABLE 56: ASSOCIATION BETWEEN FAMILY COMPLEXITY AND PROBLEMATIC EXTERNALISING BEHAVIOUR

Outcome: Problematic externalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
N	13385	13182
Constant	0.22***	0.22***
Family complexity		
Simple family		
Stepfamily	1.76***	1.08
Blended by the birth of focal child	1.61***	1.24*
Blended in the focal child's lifetime	3.31***	1.60**
Reblended	3.54***	1.64**
Unknown	1.77***	1.25**
Mother's age at first birth		
25-29		
<20		1.42***
20-24		1.36**
30-34		0.91
35-40		0.88
40+		1.01
Mother's highest educational qualification		
NVQ Level 1		
NVQ Level 2		0.78*
NVQ Level 3		0.82
NVQ Level 4		0.64***

Outcome: Problematic externalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
NVQ Level 5		0.58**
None		1.15
Overseas only		0.91
Child's ethnicity		
White		
Mixed		0.90
Indian		1.11
Pakistani and Bangladeshi		0.79
Black or Black British		0.63**
Other		0.56**
Child's sex		
Male		
Female		0.52***
Household poverty		
Never poor		
Episodic poverty		1.27**
Recurrent poverty		1.48***
Persistent poverty		1.50***
Unknown		1.58
Household social class		
Managerial/professional		
Intermediate		1.17
small employer/self employed		1.05
low supervisory/technical		1.36*
semi-routine/routine		1.32**
Unknown		1.09
Household work status		
At least one adult working		
No adults working		1.31
Positive parenting index		0.90**
Negative parenting index		2.38***
Pearson χ^2 Goodness of Fit: F	0.000	0.95
Pearson χ^2 Goodness of Fit: Pr>F	1.000	0.4795

*=p<0.05; **=p<0.01; ***=p<0.001

As shown in Table 56 the unadjusted model shows an association between complex family structure and problematic externalising behaviour which extends to all the children who have any type of complexity in their family.

In the adjusted model those living with a step parent but no half siblings is no longer significantly associated with increased odds of problematic externalising behaviour, however all groups with half siblings are associated with increased odds externalising behaviour relative to children living in simple families. The highest odds of problematic externalising behaviour is to be found amongst those children who live in a family which has been reblended, followed by those children whose families have become blended during their lifetime. This indicates that that there is an association between family complexity and the likelihood that problematic externalising behaviour for some children which is robust to the inclusion of standard controls.

As outlined in section 5.3.4 when a Pearson $\chi 2$ test for goodness of fit is performed on an unadjusted model, the F value is necessarily 0.000, and P>F is 1.000, because there cannot be any difference between the observed covariate pattern and that predicted by the model when there is only one variable in the model. As such the Pearson $\chi 2$ test for the unadjusted model presented in Table 56 indicates that the model should not be rejected.

The Pearson $\chi 2$ test for goodness of fit presented in the adjusted model in Table 56 is not significant, suggesting that the null hypothesis should not be rejected and we can consider that the model is an appropriate fit to the data.

13.3 Internalising behaviour

TABLE 57: ASSOCIATION BETWEEN FAMILY COMPLEXITY AND PROBLEMATIC INTERNALISING BEHAVIOUR

Outcome: Problematic internalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
N	13382	13133
Constant	0.15***	0.23***
Family complexity		
Simple family		
Stepfamily	1.64***	0.88
Blended by the birth of CM	1.22	1.03
Blended in the CM lifetime	2.44***	1.12
Reblended	3.13***	1.50*
Unknown	1.61***	1.06
Mother's age at first birth		
25-29		
<20		1.20
20-24		1.26**
30-34		0.81*
35-40		0.72*
40+		1.14
Mother's highest educational qualification		
NVQ Level 1		
NVQ Level 2		0.75*
NVQ Level 3		0.70**
NVQ Level 4		0.66**
NVQ Level 5		0.78
None		1.06
Overseas only		1.00
Child firstborn		
Not mother's firstborn		
Mother's firstborn		1.38***
Number of children in the sibling group		
One child		
Two children		0.77**
Three children		0.80*
Four children		0.78

Outcome: Problematic internalising behaviour		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
Five or more children		0.70*
Child's ethnicity		
White		
Mixed		1.36
Indian		1.46
Pakistani and Bangladeshi		1.61***
Black or Black British		1.02
Other		1.41
Child's sex		
Male		
Female		0.84**
Household poverty		
Never poor		
Episodic poverty		1.23
Recurrent poverty		1.41**
Persistent poverty		1.40**
Unknown		0.92
Household tenure		
Owner occupied housing		
Social rented		1.31**
Private rented		0.95
Maternal depression		
Never depressed		
Episodic depression		1.95***
Recurrent depression		2.41***
Persistent depression		2.90***
Unknown		1.55**
Positive parenting index		0.86***
Negative parenting index		1.54***
Pearson χ^2 Goodness of Fit: F	0.000	0.70
Pearson χ^2 Goodness of Fit: Pr>F	1.000	0.7050

*=p<0.05; **=p<0.01; ***=p<0.001

Looking at the unadjusted model in Table 57 it is apparent that there is an association between all of the complex family groups apart from living in a family characterised by blending by the birth of the focal child and increased odds of problematic internalising behaviour.

Once the model is adjusted by the inclusion of the control variables, only the most complex reblended families have significantly increased odds of problematic internalising behaviour, in comparison to children growing up in simple families.

As outlined in section 5.3.4 when a Pearson $\chi 2$ test for goodness of fit is performed on an unadjusted model, the F value is necessarily 0.000, and P>F is 1.000, because there cannot be any difference between the observed covariate pattern and that predicted by the model when there is only one variable in the model. As such the Pearson $\chi 2$ test for the unadjusted model presented in Table 57 indicates that the model should not be rejected.

The Pearson $\chi 2$ test for goodness of fit presented in the adjusted model in Table 57 is not significant, suggesting that the null hypothesis should not be rejected and we can consider that the model is an appropriate fit to the data.

13.4 Reading ability

TABLE 58: ASSOCIATION BETWEEN FAMILY COMPLEXITY AND POOR READING ABILITY FOR AGE

Outcome: Poor reading ability for age		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
N	13463	13216
Constant	0.08***	0.11***
Family complexity		
Simple family		
Stepfamily	2.05***	1.19
Blended by the birth of CM	2.62***	1.45**
Blended in the CM lifetime	2.95***	1.28
Reblended	5.15***	1.74**
Unknown	1.90***	1.13
Mother's age at first birth		
25-29		
<20		1.36*
20-24		1.28*
30-34		0.75*
35-40		0.95
40+		0.33*
Mother's highest educational qualification		
NVQ Level 1		
NVQ Level 2		0.79
NVQ Level 3		0.83
NVQ Level 4		0.61**
NVQ Level 5		0.58*
None		1.48**
Overseas only		1.39
Child firstborn		
Not mother's firstborn		
Mother's firstborn		0.78*
Child's ethnicity		
White		

Outcome: Poor reading ability for age		
Variable	Unadjusted model (odds ratios)	Adjusted model (odds ratios)
Mixed		0.42**
Indian		0.31***
Pakistani and Bangladeshi		0.40***
Black or Black British		0.48**
Other		0.71
Child's sex		
Male		
Female		0.46***
Household poverty		
Never poor		
Episodic poverty		1.46**
Recurrent poverty		2.00***
Persistent poverty		2.16***
Unknown		1.74
Household social class		
Managerial/professional		
Intermediate		1.43*
small employer/self employed		1.41*
low supervisory/technical		1.55*
semi-routine/routine		1.60***
Unknown		1.99***
Maternal depression		
Never depressed		
Episodic depression		1.41**
Recurrent depression		1.21
Persistent depression		1.51*
Unknown		1.15
Positive parenting index		0.92
Negative parenting index		1.11**
Pearson χ^2 Goodness of Fit: F	0.000	1.19
Pearson χ^2 Goodness of Fit: Pr>F	1.000	0.2969

*=p<0.05; **=p<0.01; ***=p<0.001

As shown in Table 58 in the unadjusted model there is an association between the experience of family complexity and increased odds of poor reading ability for age, which extends to all categories of family complexity at the 0.001 significance level.

In the adjusted model an interesting finding appears, children who have step parents only or have younger half siblings only are not at an increased risk of poor reading ability for age compared to children growing up in simple families. Children who have older half siblings only – and have never experienced their mother partnering with anyone other than their own biological parent have increased odds of having poor reading ability for age than their peers in simple families. Children who have the most complex families are also at an increased risk of poor reading ability for age.

As outlined in section 5.3.4 when a Pearson $\chi 2$ test for goodness of fit is performed on an unadjusted model, the F value is necessarily 0.000, and P>F is 1.000, because there cannot be any difference between the observed covariate pattern and that predicted by the model when there is only one variable in the model. As such the Pearson $\chi 2$ test for the unadjusted model presented in Table 58 indicates that the model should not be rejected.

The Pearson $\chi 2$ test for goodness of fit presented in the adjusted model in Table 58 is not significant, suggesting that the null hypothesis should not be rejected and we can consider that the model is an appropriate fit to the data.

Chapter 14: Exploratory propensity score matching analysis to investigate the difference between step and blended families

14.1 Introduction

In Chapter 7-10 one of the emerging conclusions was that children who have a stepparent have poorer outcomes than children with any other form of parental partnership history, regardless of the starting point of their parent's initial partnership. In Chapter 11 it emerged that children with younger half siblings and the most complicated sibling groups (i.e. those which include half siblings with multiple non shared parents) were at increased risk of some poorer outcomes compared to their peers with simple sibling groups. Chapter 12 and Chapter 13 sought to understand how these two aspects of family complexity combine in relation to children's outcomes. Both of these chapters compared various forms of family complexity to no family complexity. The analysis of Chapter 13 suggested that it is the presence of half siblings rather than stepparents that drive the poorer outcomes observed for children who live in the most complex families.

The purpose of this Chapter is to analyse a slightly different conception of family complexity to that presented in Chapter 13, in that it looks only at dimensions of family complexity amongst families who have all had some experience of family complexity. This is in order to understand more about which dimensions of family complexity are more important in relation to children's outcomes. This Chapter only considers family complexity which has occurred in the child's lifetime and as such takes a similar approach to the parental partnership change literature, which only considers the child's lifetime experience. The selected dimensions used are informed by the findings of Chapter 7 and Chapter 10 and ultimately the parental partnership change literature with the consistent finding of poor outcomes for children in stepfamilies (e.g. Kiernan and Mensah, 2010; Fomby, 2011, Osbourne and McLanahan, 2007). The propensity score analysis focuses on the difference between families in which there is a stepparent and no half siblings, and those families in which there is a stepparent and a half sibling. As outlined in section 6.3.5 the model testing family complexity is not directly comparable with the analysis undertaken in Chapter 13. This analysis uses a subpopulation which does not map onto the categorisations of family complexity used in Chapter 13, and the groups within this subpopulation are not directly comparable with the categories in the family complexity measure.

As a result the analysis presented in this Chapter should not be considered as directly comparable to that presented in Chapter 13, and instead be interpreted as complementary. This analysis is a development of the conclusions of Chapter 7 and Chapter 11 and should be considered in those terms.

This chapter uses the technique of propensity score matching. The idea of propensity score matching is that families who have differential exposure to the key variable of interest, here fertility within a stepparent partnership are matched on the basis of prior characteristics in order to attempt to control for unobserved heterogeneity. If used properly conclusions can be drawn about the causal relationship between the variable of interest and the outcome. This technique is of interest as there is a high level of awareness in the family complexity field that outcomes for children associated with family complexity are to some extent the result of characteristics of families who experience family complexity rather than the result of family complexity itself (e.g. Crawford et al, 2013). The controlled regression models frequently used in analysing family complexity account for the possible selection of families into family complexity using their observed characteristics as far as possible, however this still leaves bias from unobserved characteristics a possibility. The promise of propensity score matching is that a properly specified propensity score will account for the unobserved variation between individuals by comparing similar individuals to each other. As such propensity score matching can be used to provide a richer way of understanding the selection of families into family complexity.

The propensity score analysis is best described as exploratory in this study of the association between family complexity and children's outcomes. There are three main reasons for considering the propensity score matching analysis as exploratory. Firstly, propensity score matching assumes that the propensity for the event of interest to occur does not vary over time. Secondly, this propensity score matching analysis conceptualises the birth of a half sibling as an event, which indeed it is, but this is not necessarily consistent with the theoretical perspective of this thesis which is to consider that the effects upon children of a half sibling being added to their sibling group are as a result of a process of stress building on the family structure. Finally, there are limitations to the generalisability of the analysis as the sample weights are not used, and the identification of the subpopulation and distinguishing the group who have experienced the birth of a half sibling has some limitations.

Propensity score methods assume that the propensity for an event are constant, and although the period in which there is an opportunity for family complexity to occur is relatively short it is none the less possible for the propensity for a biological mother to have another child with her new partner to vary over time, and not necessarily in ways in which we can easily observe. In particular in relation to future expectations across a whole range of systems that families interact with, which are not quantified and vary over relatively short periods of time. As the timing of the transition from a stepfamily with no half siblings to a stepfamily with half siblings varies between families this is relevant, as a family which has an identical mapped propensity at MCS wave 4, when the analysis takes place may have had different propensity at MCS wave 3 when the half sibling was actually born.

Propensity score matching assumes that the event of interest is a discrete event which is then instrumental variable for the outcome of interest. In conceptualising the difference between the children with stepparents as the birth of the half sibling, using propensity score analysis makes this event key. The theoretical perspective of this thesis outlined in Section 2.4 conceptualises family complexity as a process. Using the birth of a half sibling in this way may not represent this process as this necessarily takes time to unfold and the differences of timing in the event to the child's key outcome are not accounted for in propensity score matching. The propensity score matching analysis presented in this chapter attempts to use the possibilities of family complexity as a method to control for unobserved variation, however this analysis can only be described as exploratory due to the uncertainty about how well this method reflects the theoretical perspective of the thesis.

Finally the analysis is best described as exploratory because the attractions of propensity score matching as a way of controlling for unobserved variance have to be balanced against the available data, and the technical limitations of the method. In brief the first limitation is that the identification of the subpopulation outlined in 6.3.5 is not entirely consistent with regard to mothers in no co-residential relationships, and that for the identification of the two groups there is uncertainty about the appropriate identification of families in which mothers are currently pregnant with a first half sibling for the cohort member. The second limitation is that the findings of the analysis are not applicable to the general population because the weights which account for the original MCS sampling frame and the differential attrition of groups from the first wave cannot be integrated into propensity score analysis. This is explained in more detail in section 14.2.2.

14.2 Propensity score matching in a weighted survey

14.2.1 The test condition

Propensity matching works by matching subjects who have differ with respect to their status on the key variable of interest to isolate the effect of the key variable of interest. All subjects must be at risk of the event represented by the key variable of interest but this does not have to be the same risk. When the event takes place at different time, it is assumed that the propensity for the event to occur is broadly similar at all times. In this analysis I am interested in examining the effect on children of the birth of a younger half sibling, relative to those who have not had the experience of the birth of a half sibling for the subpopulation of children who are at risk of this event, here conceptualised to be those children with a social parent. In propensity score analysis the key variable of interest is known as the test condition, and the two groups in the subpopulation have been formed on the basis of this test condition, as outlined in detail in section 6.3.5.

To briefly recap the variable construction the subpopulation for the propensity score analysis is the group of children who currently (or have in the past) live(d) with their biological mother and a step parent. The two groups within the subpopulation are constructed on the basis of if their mother has had a child with this new partner who is a half sibling to the cohort member.

14.2.2 Weighting

All the previous logistic regression analysis has included weighting of the data to ensure as far as possible that it was representative of the population of British children born around 2000-1 and to counter the differential attrition of groups within the survey (Plewis, 2007). It is technically difficult to include weights when doing propensity matching because the execution of propensity weighting requires the generation of weights. Stata 13 defaults to a failure message if weights are included in the command for propensity score matching, and the user written commands that are used for fitting the propensity score model also default to error messages if weights are included. It can be argued that weights ought to be included, especially those which relate to sample attrition which is high amongst the step and blended families (see Table 3, section 6.1.1); DuGoff et al (2014), explain the bias introduced by ignoring sample weights. The technical difficulties of introducing the survey

weights to the analysis are such that this analysis is presented without survey weights. When interpreting the results from this analysis there are the following limitations:

- The results are only applicable to the families who were eligible and chose to participate in the Millennium Cohort Study
- The results only relate to those families who participated in every wave of the survey, i.e. 1, 2, 3 and 4 so the new families in wave 2 are specifically excluded
- The results are biased by the original sampling frame of the MCS which deliberately oversampled wards of high deprivation across England, Scotland, Wales and Northern Ireland and oversampled wards with a high density ethnic minority population in England only

14.3 Fitting a propensity score model

14.3.1 The process of fitting the propensity model

Propensity score models are a new feature in Stata 13 as in previous versions of Stata propensity score matching had to be done using user written commands, which although in many ways superior to the Stata commands did not produce standard errors in line with the best theoretical understanding of standard error for propensity matching (University of Wisconsin, 2013). I therefore chose to use Stata 13 for the propensity score analysis rather than Stata 12 which the rest of this thesis has been undertaken in. Stata 13 is backwards compatible so my data sets and analysis prepared in Stata 12 can be used in Stata 13.

In order for a propensity model to be valid it has to have both balance and overlap (Guo and Fraser, 2014). Balance is that the distribution of covariates is similar in both the test and control groups, and overlap is that the distributions of covariates overlap (University of California, San Francisco, 2013). Balance refers to the mean of the variables, whereas overlap refers to the range of values of the variables. Unobserved variables ought to be balanced and overlapping, but there is no way of ensuring this, and this is a limitation of this analytical method, however it applies to a greater or lesser extent to all statistical methods, and to all forms of investigation using the scientific method.

From Garrido et al, 2014 the stages in fitting a propensity score model are:

1. The selection of variables to include in the propensity score
2. Balancing the propensity score across the treatment and control groups
3. Balancing within blocks of the propensity score
4. Selecting the matching strategy for propensity scores
5. Balance of covariates after matching by propensity score

Only after these stages have been completed can the propensity score matching take place and a conclusion drawn about the differences between treatment and control groups. Once the propensity score model has been executed a test for overlap needs to be made so that the fit of the model for the actual outcomes can be checked.

14.3.2 The choice of variables to include in the propensity score

In the past when constructing the propensity score it has been suggested that all pre-treatment variables ought to be included in the model (Guo and Fraser, 2014) however this approach can introduce bias by over specifying the model (Garrido et al, 2014). Candidate variables ought to be associated with the outcomes of the propensity score models and may or may not be associated with the treatment condition however they ought not be associated with the treatment condition only (Garrido et al, 2014). For those variables which are associated with both the outcomes and the treatment condition the association ought to be in the same direction (Clarke et al, 2011) to reduce the possibility of bias being introduced. Logistic regression is used to check for these associations.

Theoretically all variables used to construct the propensity score should be independent of the treatment and to ensure this it is better to get a difference in time between the variables included in the propensity score and the treatment. This is difficult to manage as the treatment here is an event which for some of the families will be recent and for some may have happened in the infancy of the focal child, however consideration has been given to ensuring that the variables are independent from the transition from step to blended family.

14.3.3 Balancing the propensity score across the treatment and control groups

The propensity scores need to be similar across the treatment and control groups so matching on the basis of the propensity scores is actually possible, this is called common support. Splitting the propensity scores into quintiles enables this to be examined. The most straightforward way to examine this overlap is graphically and the psmatch2 suite of user written commands includes a command psgraph which produces a histogram of propensity scores for the treated and untreated groups which can then be examined.

14.3.4 Balancing within blocks of the propensity score

As well as the overall propensity score being balanced the individual covariates need to be balanced across the treatment and control groups. As with so much there is no one universally accepted method for doing this (Garrido et al, 2014), however the most widely used method currently uses minimisation of standardised differences (which are computed using means and variances) between

the treatment and control groups when the sample is split into smaller groups (depending on the characteristics of the sample). This can be done using the user written pscore command.

14.3.5 Selecting the matching strategy

There are a number of variations on matching strategy with the key decisions being if you wish to use nearest neighbour matching, and if so how many neighbours to match to, if to match with or without replacement, and if you wish to restrict matches by including a calliper. Aside from nearest neighbour matching there are probability based matching strategies such as kernel matching but these are not supported by the native Stata commands and as such the final propensity score model does not have robust standard errors which outweighs the benefits of the matching strategy. Selecting a weighting strategy requires the researcher to make a judgement about the characteristics of their data and fit it by a process of trial and error. Once again the user driven commands give a much greater scope for this process than the Stata native commands. To select which matching strategy is best one should select the one which minimises the standardised differences in mean and median.

14.3.6 Balance of covariates after matching by propensity score

The covariates can be assessed for balance after the propensity scores have been matched and one is looking for reductions in mean and median bias in the matched model relative to the unmatched model. The detailed reductions in bias in each covariate used to construct the propensity score can also be inspected to give another check.

14.3.7 Checking for overlap

Once the propensity score has been estimated the overlap can be examined using postestimation commands included as part of the suite of commands in Stata 13. This is simply the post estimation command teffects overlap which produces a graph which can be examined to visually check for overlap.

14.3.8 Results of the model

After the model has passed all of the balance and overlap checks the results can then be interpreted. The treatment effect can be reported as either the average treatment effect on the treated (ATT) or as the average treatment effect (ATE). Average treatment effect on the treated (ATT) is to be preferred in most circumstances because statistically it requires less strong assumptions about the data and in terms of the interpretation the treatment only happens to the treated group and the ATT is more intuitive to interpret.

14.4 Model fitting

The model fitting process for the propensity score is independent of the outcome, because the propensity score relates to the propensity for a stepfamily to have a subsequent birth. The variables included to specify the propensity score should not be associated with the test condition only, and if they are associated with the test condition they must be associated with the outcome before they can be included in the propensity score model. The same propensity score will be used for the three outcomes of interest, so the process of deriving the propensity score outlined once.

14.4.1 Variable choice

There is no clear rule about what variables ought to be considered as candidates for inclusion in the propensity score model. The variables need to meet the conditions outlined in section 14.3.2, in that if the variable is associated with the treatment it must also be associated with the outcome variables, beyond this there is little general guidance. As the propensity score represents the unobserved propensity to display a particular outcome, variables which are used to derive the propensity score should represent a factor which could be reasonably assumed to correlate with this propensity. This suggests that these variables should be clearly independent of the birth of a new child to the parents in a stepfamily.

This highlights the difficulty in appropriately selecting variables to include in a propensity score model for a complex, time varying process such as fertility in higher order partnerships and underscores the need to regard this analysis as exploratory.

The selection of the variables to construct the test condition with rests upon the literature for the outcomes and the predictors of fertility in a higher order partnership. The selection of these variables is conceptually difficult and to an extent subjective. Once the variables have been chosen, they can be tested for correlation with the key independent variable and the outcome variables, but there are no rigorous rules for the choice of variables to take forward.

Variables which represent time invariant characteristics of families are possible candidates for inclusion in the model, together with a range of variables which reflect maternal mental health and social networks which are important for this transition.

Importantly the decision not to consider the economic characteristics of the household was taken. This was because the economic characteristics of the household are adjusted for household size and so are not independent of the presence of any half sibling. Using the economic characteristics of the household at entry into the cohort to predict the propensity of children's biological mothers to have further children with the child's stepparent is questionable as in many cases the economic characteristics of the household when the child is aged 9 months will reflect the characteristics of the child's biological father, i.e. the mother's previous partner.

Table 59 below shows the candidate variables for inclusion in the propensity score and if they are associated with the test condition and the outcome variables and finally if they were included in the final propensity score. The association was tested using logistic regression and a Wald test at 10% sensitivity level.

Variables are included when they are associated with at least two of the three outcome variables. For the cases in which the variable is associated with only one of the outcomes there a case by case decision is made as to if the variable ought to be included. This approach takes into account if there is any association between the variable and the treatment condition along with the theoretic importance of the variable.

TABLE 59: VARIABLES CONSIDERED FOR INCLUSION IN THE PROPENSITY SCORE MODEL

Variable	Associated with treatment	Associated with externalising	Associated with internalising	Associated with reading	Included in the model
Maternal age at first birth (same at all waves)	Yes	Yes	Yes	Yes	**Yes**
Maternal education (wave 1)	No	Yes	Yes	Yes	**Yes**
Child's ethnicity (same at all waves)	No	No	Yes	No	Yes
Child's sex (same at all waves)	No	Yes	Yes	Yes	**Yes**
Longitudinal measure of maternal depression (data from all waves)	No	Yes	Yes	Yes	**Yes**
Positive parenting index (wave 4)	No	Yes	Yes	Yes	**Yes**
Negative parenting index (wave 4)	Yes	Yes	Yes	Yes	**Yes**

Variable	Associated with treatment	Associated with externalising	Associated with internalising	Associated with reading	Included in the model
Current maternal age (wave 4)	Yes	Yes	No	No	Yes
If the partnership is the same as the last wave (wave 3 – 4)	Yes	No	Yes	No	No
If the child is firstborn (same at all waves)	Yes	No	No	Yes	No
Maternal neuroticism (wave 4 – from OCEAN neuroticism subscale)	No	Yes	Yes	Yes	**Yes**
Changed school in past year (wave 4)	No	No	Yes	No	Yes
Moved house in the past year (wave 4)	Yes	No	No	No	**No**
Resident parents	Yes	No	No	No	**No**

Variable	Associated with treatment	Associated with externalising	Associated with internalising	Associated with reading	Included in the model
married (wave 4)					
Low birthweight (same at all waves)	Yes	No	No	Yes	No
Child born prematurely (same at all waves)	Yes	No	No	Yes	No
Child in poor health (wave 4)	No	Yes	Yes	Yes	**Yes**
Family bilingual (same at all waves)	No	No	No	No	**No**
If the family has social support locally (wave 4)	No	Yes	Yes	Yes	**Yes**

Using this approach has led to the exclusion of the same partnership variable, the firstborn variable, the low birth weight variable and the prematurity variable because they are all significantly associated with the treatment condition and as such including them in the propensity score runs the risk of introducing bias to the model.

The child's ethnicity variable and the changed school in the past year variable were included because they were not associated with the treatment condition. Child's ethnicity is time invariant variable which is set before the child become eligible for the treatment or control groups. Because of the

distribution of the children's ethnicity it was necessary to include to child's ethnicity as a binary white/non-white variable none the less this is a possible predictor of this association. There is no widespread mechanism by which having a younger half sibling would lead to a child changing school, as evidenced by the lack of association between the two variables thus suggesting that including this variable will work to increase the accuracy of the model without introducing significant bias.

The model used to generate the propensity score is shown in Table 60 below with the coefficients for each of the included variables.

TABLE 60: MODEL USED TO GENERATE THE PROPENSITY SCORE

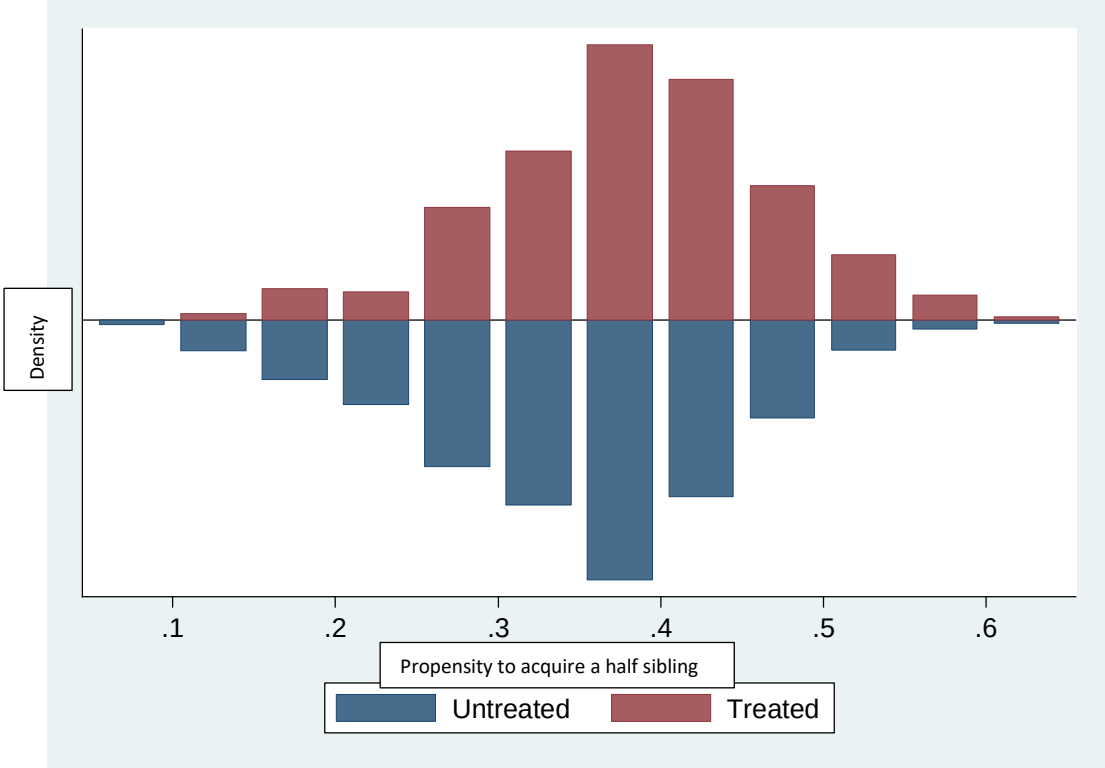
Outcome: Propensity to have a half siblings		
Variable	Coefficient	Standard Error
Age at first birth		
25-29		
<20	0.425	0.215
20-24	0.332	0.214
30-34	-0.597	0.381
35-39	-1.099	1.085
40+	0.091	0.252
Mother's education		
NVQ Level 1		
NVQ Level 2	-0.104	0.287
NVQ Level 3	-0.126	0.284
NVQ Level 4	-0.084	0.436

Outcome: Propensity to have a half siblings		
Variable	Coefficient	Standard Error
NVQ Level 5	0.047	0.289
None/overseas/unknown	0.369	0.467
Child's gender		
Male		
Female	-0.199	0.138
Maternal Depression		
Never depressed		
Episodic depression (once)	0.232	0.176
Recurrent depression (twice)	0.075	0.262
Persistent depression (at all three time points)	-0.092	0.297
Maternal neuroticism		
No evidence of neuroticism		
Borderline neurotic	-0.145	0.198
Mother neurotic	-0.438	0.331
If Child is in poor health		
No		
Yes	-0.416	0.365

Outcome: Propensity to have a half siblings		
Variable	Coefficient	Standard Error
If family has social support		
Yes		
No	0.105	0.260
Change of school		
No		
Yes	0.207	0.180
Simplified ethnicity		
White		
Non-white	-0.490	0.268
Positive parenting	-0.058	0.084
Negative parenting	0.113	0.065
Constant	-0.526	0.558

Having selected the variables to be included in the propensity score it now remained to be seen if this led to a balanced propensity score, this was tested using the psgraph and pscore command as detailed above. The graph of the overall balance of the propensity score between control and treatment groups is shown in Figure 6: Balance of propensity score between treated and untreated groups.

FIGURE 6: BALANCE OF PROPENSITY SCORE BETWEEN TREATED AND UNTREATED GROUPS



There are some differences between the treatment and control groups at the tail ends of the distribution of propensity scores. The differences at the tail end of the distribution is broadly reasonable because the low frequencies of these propensity scores, however given the good balance elsewhere the propensity score can be said to be balanced enough for my purposes.

Using the pscore command the overall balance of the propensity scores was checked and after a number of iterations the propensity scores were found to be balanced (n.b. the graph above refers to the final balanced propensity score although the overall balance is checked before the balance of the individual covariates this was done via an iterative process so the graph refers to the formulation of the propensity score which was balanced on an individual covariate level). By simplifying and reassessing the variables which went into the propensity scores balance was achieved.

14.4.2 Selecting the matching strategy

A number of matching strategies were considered, but the choice was finally reduced to that of variations of nearest neighbour matching with a calliper, this was because of the difficulties in producing standard errors when other matching strategies were employed. The calliper was used

because of the theoretic importance of ensuring that the matches were near to each other, although it has made a limited difference to the model fit (calculations not shown). The calliper was formulated as 0.2 of the standard error in the logit of the propensity score. The initial evaluation of the effectiveness of the matching strategy is made by comparing the mean and median standardised difference in errors across a range of matching strategies and it is this which is shown in Table 61. When checking for the mean and median of standardised differences in errors the outcome used is largely immaterial however in order to maximise the robustness of the results all three outcomes have been used in order to check that results are similar across all outcomes.

TABLE 61: MATCHING STRATEGIES CONSIDERED

	Matching strategy	Sample size	Treated	Control	Mean of standardised differences in errors	Median of standardised differences in errors
Externalising	Unmatched	959	345	614	8.5	7.0
	Calliper 1:1 w/r	954	345	609	5.1	3.3
	Calliper 1:3 w/r	954	345	609	3.3	3.4
Internalising	Unmatched	956	344	607	8.5	7.0
	Calliper 1:1 w/r	951	344	607	4.9	3.5
	Calliper 1:3 w/r	951	344	607	3.2	3.2
Reading	Unmatched	945	337	608	8.5	7.0
	Calliper 1:1 w/r	935	336	599	5.1	4.2
	Calliper 1:3 w/r	935	336	599	3.0	2.5

This suggests that the best strategy for minimising the standardised differences in errors is to use nearest neighbour matching with a calliper and three nearest neighbours. In order to examine that the matching strategy reduces bias in each of the covariates the detailed differences will be examined for the externalising outcome with the selected matching strategy compared to the unmatched sample. This ought to be sufficiently representative for all the outcomes under examination here.

TABLE 62: REDUCTION IN BIAS BEFORE AND AFTER MATCHING ON THE BASIS OF THE PROPENSITY SCORE IN THE SAMPLE ASSOCIATED WITH EACH CONTROL VARIABLE

		Unmatched	Mean		
Variable		Matched	Treated	Control	%bias
Age at first birth					
	<20	U	0.462	0.370	18.7
		M	0.455	0.451	0.8
	20-24	U	0.376	0.357	3.9
		M	0.383	0.393	-2.2
	30-34	U	0.031	0.079	-21.1
		M	0.032	0.029	1.3
	35-39	U	0.003	0.013	-11.2
		M	0.003	0.003	0
	40+	U	0.000	0.005	-9.8
		M	0.000	0.000	0
Mother's education					
	NVQ 2	U	0.376	0.327	10.3
		M	0.371	0.390	-4
	NVQ 3	U	0.148	0.165	-4.7
		M	0.151	0.162	-3.2
	NVQ 4	U	0.168	0.221	-13.3
		M	0.171	0.179	-2
	NVQ 5	U	0.031	0.041	-5.3
		M	0.032	0.021	5.7
	None	U	0.145	0.133	3.5
		M	0.145	0.145	0
	Overseas	U	0.034	0.022	7.2
		M	0.035	0.025	5.8
Child's sex					
	Female	U	0.450	0.497	-9.3
		M	0.449	0.432	3.5

		Unmatched	Mean		
Variable		Matched	Treated	Control	%bias
Lifetime experience of maternal depression					
	Episodic depression	U	0.231	0.183	11.9
		M	0.229	0.233	-1
	Recurrent depression	U	0.083	0.076	2.4
		M	0.084	0.071	5
	Always depressed	U	0.063	0.070	-2.9
		M	0.064	0.058	2.3
Maternal neuroticism					
	Mother borderline neurotic	U	0.182	0.173	2.4
		M	0.186	0.158	7.1
	Mother neurotic	U	0.048	0.073	-10.3
		M	0.032	0.035	-1.2
Child's own health					
	Child in poor health	U	0.034	0.045	-5.3
		M	0.035	0.029	3
Family's social support					
	Family lacks social support	U	0.080	0.070	3.7
		M	0.078	0.072	2.2
Child changed school					
	New school in last 12 months	U	0.197	0.159	9.9
		M	0.197	0.177	5.3
Child's ethnicity					
	Child non white	U	0.063	0.108	-16.2
		M	0.058	0.060	-0.7

		Unmatched	Mean		
Variable		Matched	Treated	Control	%bias
Positive parenting index					
		U	5.484	5.531	-5.4
		M	5.504	5.528	-2.7
Negative parenting index					
		U	1.063	0.886	15.6
		M	1.064	1.037	2.4

Whilst Table 62 indicates that the reduction in bias is far from universally significant it is significant and universal at least for the variables I have previously identified as being important.

14.5 Externalising behaviour

The table below gives the results of the propensity score model specified above for the externalising behaviour outcome. This model has been run using the Stata13 command in order to get robust standard errors.

TABLE 63: AVERAGE TREATMENT EFFECT ON THE TREATED FOR PROBLEMATIC EXTERNALISING BEHAVIOUR

Externalising binary	Coef.	Log odds	AI Robust Std. Err.	z	P>z	[95% Conf.	Interval]
ATET							
d_t							
(1 vs 0)	0.132	1.141	0.033	4.040	0.000	0.068	0.196

N = 956

Matches 3 - 10

Table 63 shows that there is a significant increase at the p<0.001 level in the odds of displaying problematic externalising behaviour as a result of the treatment in this model and that this is due to the transformation of a stepfamily into a blended family. The increase in the odds ratios is not huge but represents the increase in log odds of externalising behaviour arising from a child moving from a stepfamily into a blended family as a result of the birth of a half sibling in the new partnership. These results are consistent with the earlier logistic regression model results in which I consistently found an association between having half siblings and problematic externalising behaviour. When I earlier attempted to combine the stepfamily and half sibling aspects of family complexity using a logistic regression model, I found some suggestion that the sibling effect dominated the step parent effect and these results show that children who have half siblings as well as step parents display significantly more problematic externalising behaviour than children who have step parents only. It is worth remembering that these results apply only for children who live with their biological mother and have a step parent. Whilst my earlier models suggest that children who live with step parents are not significantly different in their propensity to display problematic externalising behaviour from children who do not live with half siblings or a step parent this does not mean that the result would be the same if these children were the reference group.

Postestimation overlap for externalising behaviour

FIGURE 7: COMMON SUPPORT FOR PROPENSITY TO ACQUIRE A HALF SIBLING FOR PROBLEMATIC EXTERNALISING BEHAVIOUR

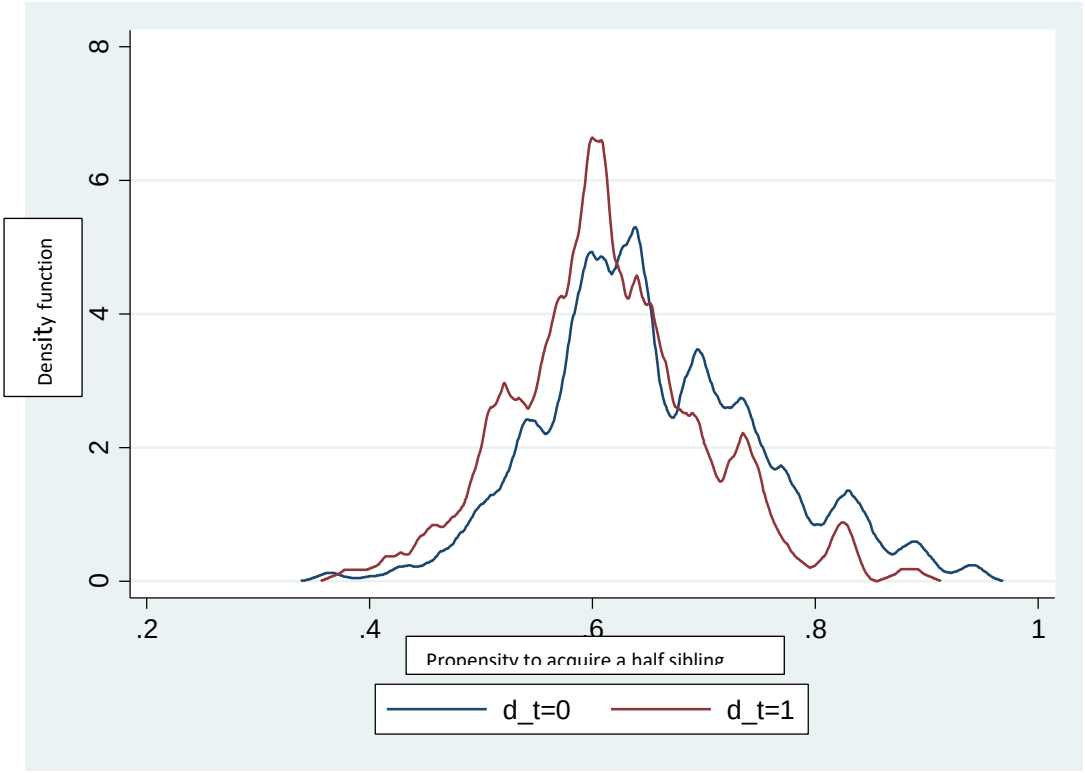


Figure 7 shows the overlap of the treated and control groups in the externalising model as ran

Overall there is a satisfactory degree of overlap between the treated and control groups, suggesting there is no reason to reject the results of the propensity score model on the basis of lack of overlap of the propensity scores.

14.6 Internalising behaviour

The table below shows the results of the propensity score model which has internalising as an outcome.

TABLE 64: AVERAGE TREATMENT EFFECT ON THE TREATED FOR PROBLEMATIC INTERNALISING BEHAVIOUR

Internalising binary	Coef.	Log odds AI Robust Std. Err.	z	P>z	[95% Conf.	Interval]
ATET						
d_t						
(1 vs 0)	0.074	1.077 0.030	2.450	0.014	0.015	0.134

N = 956

Matches 3 – 10

Table 64 shows that there is a significant there is a significant association between increased log odds of problematic internalising behaviour and having a younger half sibling and a step parent compared to the reference case of having a step parent only. This increase is more modest than that observed for the problematic externalising behaviour and is significant at the $p<0.05$ level, this is none the less significant enough to report. This result is in contrast to my earlier results in which there was no association between family complexity and problematic internalising behaviour once the economic circumstances of the family had been taken into account, however due to problems of endogeneity to the treatment condition the economic characteristics of the household were not included in this model. This reinforces the importance of economic characteristics for children's propensity to display problematic internalising behaviour. When interpreting this result and comparing it with others from the logistic regression the importance of the economic condition of the family is best borne in mind, and how this relates to the presence of and even decision to have half siblings to the focal child.

Postestimation overlap for internalising behaviour

The graph below shows the overlap between treated and control variables in the internalising model as ran

FIGURE 8: COMMON SUPPORT FOR PROPENSITY TO ACQUIRE A HALF SIBLING FOR PROBLEMATIC INTERNALISING BEHAVIOUR

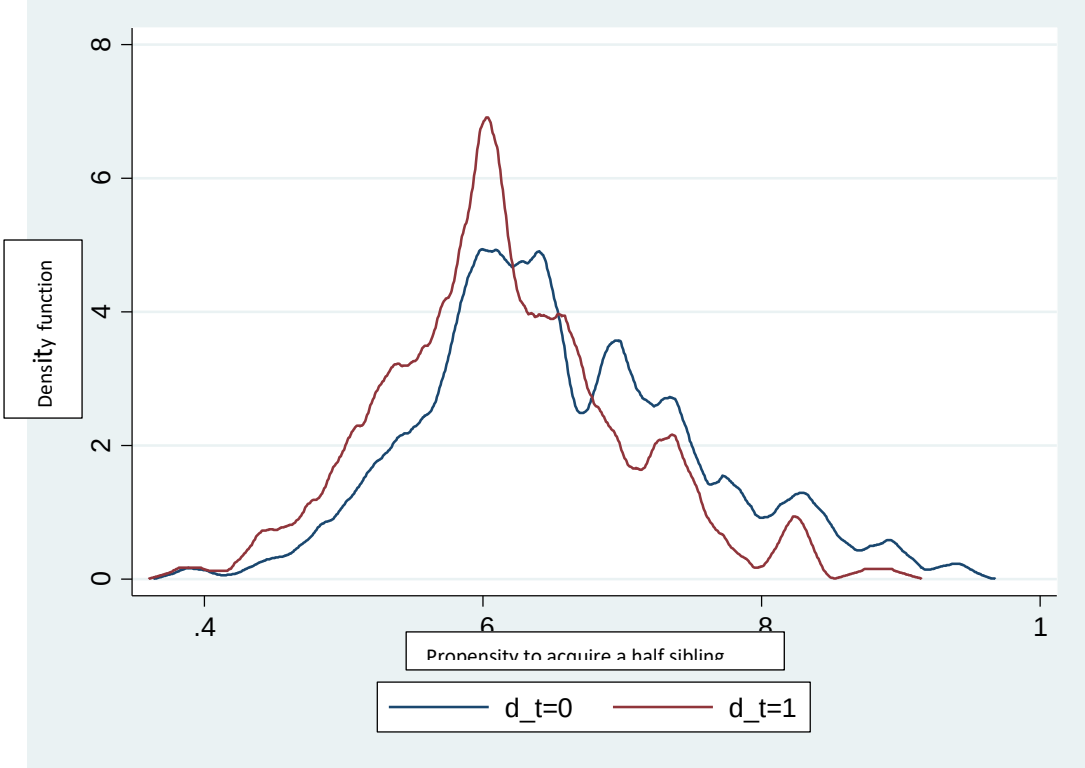


Figure 8 indicates that overall there is a satisfactory degree of overlap between the treated and control groups, suggesting there is no reason to reject the results of the propensity score model on the basis of lack of overlap of the propensity scores.

14.7 Reading ability

The table below shows the reading results from the propensity score model

TABLE 65: AVERAGE TREATMENT EFFECT ON THE TREATED FOR POOR READING ABILITY FOR AGE

Reading binary	Coef.	Log odds AI Robust Std. Err.	z	P>z	[95% Conf.	Interval]
ATET						
d_t						
(1 vs 0)	-0.007	0.993 0.033	-0.220	0.825	-0.072	0.057

N = 940

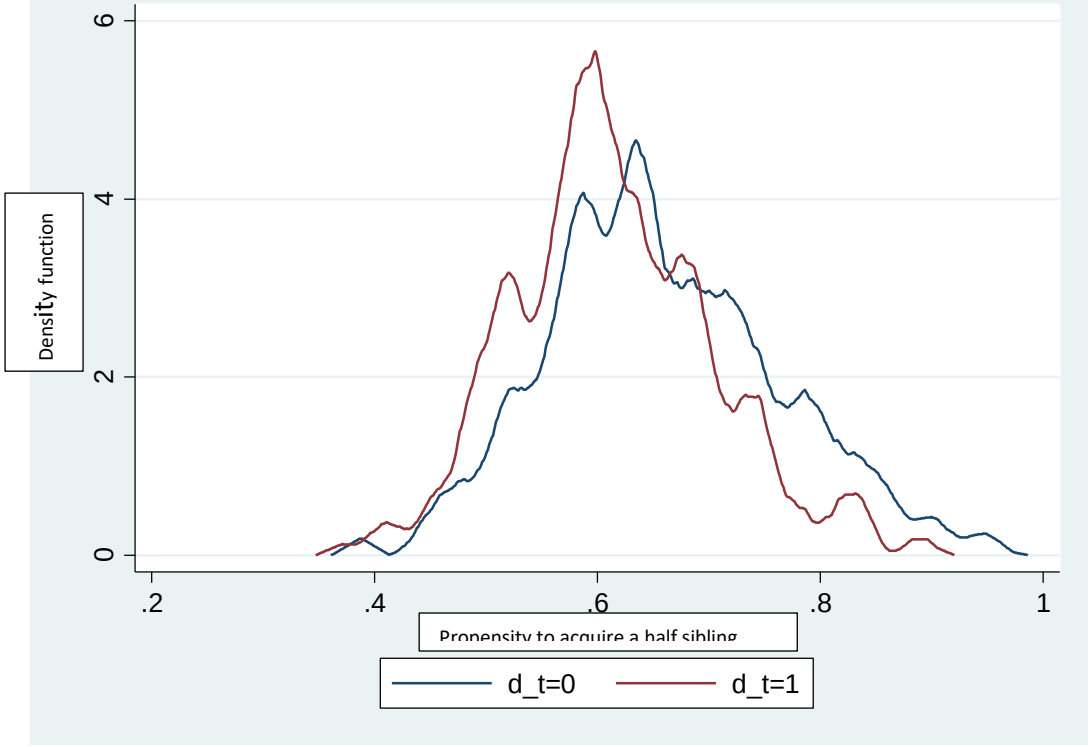
Matches 3 – 8

Table 65 indicates that there is no significant association between children who have a step parent only and those children who have a step parent and half siblings and the child being a poor reader for their age. This result is in line with my results for controlled logistic regression.

Postestimation overlap for reading ability

Figure 9 shows the overlap between treated and control variables in the reading model as ran.

FIGURE 9: COMMON SUPPORT FOR PROPENSITY TO ACQUIRE A HALF SIBLING FOR POOR READING ABILITY FOR AGE



Overall there is a satisfactory degree of overlap between the treated and control groups, suggesting there is no reason to reject the results of the propensity score model on the basis of lack of overlap of the propensity scores.

Chapter 15. Key findings

15.1 Parental partnership trajectory

There are poorer outcomes for children with the most complicated parental partnership trajectories for the externalising behaviour and reading outcomes. The children of erstwhile cohabitees appear to have the poorest outcomes. There is some evidence that children of initially cohabiting parents have poorer outcomes than their peers with initially married or unpartnered parents.

There is no association between parental partnership trajectory and internalising behaviour once the economic characteristics of the household have been taken into account.

The key policy variables included emphasise the importance of poverty and household economic characteristics in shaping the association between parental partnership trajectory and children's well-being. Parenting appears to be more important for the externalising behaviour outcome, and depression appears to be more important for the reading outcome.

15.2 Parental partnership transitions

The lone parent transition group are no longer disadvantaged in terms of their propensity to display problematic externalising behaviour or poorer reading ability once the economic characteristics of the household are included in the model. There are poorer outcomes for those children who have experienced the repartnering of their parent.

The association between poverty and internalising behaviour remains the same as the trajectory model, as does the relative importance of the different control variables.

15.3 Parental partnership status

For the externalising behaviour outcome children whose parents are cohabiting and those children who live with a social parent have a greater likelihood of displaying problematic behaviour. For the reading outcome there is an association between having cohabiting parents, or a lone parent or a social parent and increased likelihood of poor reading ability.

In common with the other measures of parental partnership, there was no association with internalising behaviour once economic characteristics were included and the relative importance of parenting and maternal mental health was maintained.

15.4 Comparing parental partnership trajectory, transitions and status measures

For the externalising and internalising outcomes the results were broadly the same whichever measure of parental partnership was used. Namely, living with a social parent increased the odds that a child would display problematic externalising behaviour; and there was no association with increased odds of problematic internalising behaviour once the economic characteristics of the household had been accounted for. When looking at the reading outcome the results for the trajectory and transitions measure were broadly similar, however the results for the status model were different to the results of the other formulations of parental partnership. In the status model all children who did not live with married biological parents were at higher risk of being a poor reader, something which was simply not supported by the evidence from the other articulations of parental partnership.

15.5 Sibling group type

There is no overarching narrative of sibling groups having consistent associations with children's propensity to show poor outcomes for each of the outcomes. Whilst the children with the most complex sibling groups, those with half siblings with multiple non shared parents, are consistently at increased risk of problematic externalising and poor reading ability; the evidence about internalising behaviour is harder to interpret because of the reference group selected. For externalising behaviour, I find that children who have younger maternal half siblings are at an increased risk of problematic externalising behaviour, which because of the lack of significance ascribed to the younger full siblings only group suggests that this is connected to the fact these are half siblings not just because they are younger siblings. For the reading outcome a more unexpected finding emerges, namely that it is children with older half siblings who are at increased risk of poor reading ability. There is no such association for children with younger half siblings.

As with parental partnership variables, I found that parenting is more important in adjusting the association between sibling group type and externalising behaviour, and maternal depression is more important for poor reading ability. Overall however, the economic characteristics of the household are most important.

15.6 Family complexity

This thesis uses a number of different analytical methods to examine the relationship between family complexity and children's socio-emotional well-being and cognitive development. The three analytical methods used were interactions models, an analysis of a single measure of family change and a propensity score analysis of the difference between simple stepfamilies and blended families. The interactions model proved not to have any meaningful results, so these are not discussed here. There is consistently no association across the analysis between family complexity and problematic internalising behaviour once the economic characteristics of the household have been accounted for.

For externalising behaviour the single measure of family complexity indicates that children in the most complex reblended families have the greatest likelihood of displaying problematic behaviour. Children who live in a family blended in their lifetime are more at risk than their peers in simple families. Children who live in a stepfamily or in a family which was blended by their birth are at no greater risk of displaying problematic externalising behaviour than their peers in simple families. The propensity score matching analysis indicates that the difference between step and blended families is directly the presence of half siblings in the latter family type.

The results for reading ability again suggest that children in the most complicated reblended families are at the greatest risk for being poor readers. Children in families blended by their own birth are at the next highest risk of being poor readers. The group with families blended in their own lifetime have only a borderline higher risk of being a poor reader relative to simple families. Once again there is no difference between stepfamilies and simple families for this outcome. Comparing step and blended families there is no significant difference in the child's propensity to be a poor reader between the two. This suggests that the family's history is important for reading ability.

Chapter 16. Discussion

16.1 Parental partnership trajectory

16.1.1 Externalising behaviour

In the adjusted model of association between parental partnership trajectory and problematic externalising behaviour, the three trajectories which feature the repartnering of the child's resident biological parent with a step parent are associated with increased odds of problematic externalising behaviour. The association between repartnering and increased odds of problematic externalising behaviour is in line with previous similar research (Crawford et al, 2013; Kiernan, 2006; Kiernan and Mensah, 2010).

Suggestions from the literature as to why children are more likely to display problematic externalising behaviour when their parent is repartnered include the idea that stepfathers are not good substitutes for biological fathers (Emmott and Mace, 2014) and that biological fathers are less willing to invest in non-resident children when they acquire a resident stepparent (Amato and Sobolewski, 2004; Cheadle et al, 2010; Tach et al, 2010). Mother's parenting has found to change when they repartner, which could reflect the orientation of the women towards child focused or adult focused relationships (Beck et al, 2010).

Significantly associated with increased odds of problematic externalising behaviour are the initially unpartnered then subsequently cohabiting with the child's biological parent and the trajectory which included children who had lived with their continuously cohabiting parents since birth. The association between continuous cohabitation and an increased propensity to display problematic externalising behaviour is discussed across the literature with Kiernan and Mensah, 2010 finding that children of cohabiting parents did display an increased propensity for problematic externalising behaviour and Crawford et al, 2013; 2011 finding that there was no association between cohabiting parents and children's propensity to display problematic externalising behaviour – both of these studies, like this one, using Millennium Cohort data. The difference between the findings of the Crawford et al studies and the Kiernan and Mensah study and this one reflect different conceptualisations of the change in the parental partnership observed over the child's lifetime. This study and the related Kiernan and Mensah study use a measure of lifetime parental partnership

which allows subtle distinctions to be drawn based on partnership history so the continuously cohabiting groups in the two analyses are differently constituted, giving rise to the observed difference in results observed between the two studies.

Why cohabitation should give rise to increased odds of problematic externalising behaviour relative to married peers even once a range of control variables such as maternal characteristics and household economic circumstances have been included is not intuitive. One possible reason is that families in which parents are continuing to cohabit and have not married by the time the focal child is seven have a relatively poor quality of relationship. Quality of parental relationship is widely found to be related to children's outcomes, see Early Intervention Foundation, 2016 for a review; and it is plausible that couples who continue to cohabit when the focal child is aged seven have poorer quality relationships than their peers who married at some point, but not so poor that the couple chose to split, which would remove the poor quality relationship from the child's developmental environment. The MCS only has questions about parental relationship quality at the nine months and five years survey.

16.1.2 Internalising behaviour

The association in the unadjusted model between parental partnership trajectory and problematic internalising behaviour is entirely driven by the concentration of economic adversity amongst a number of trajectories. Models which do not include economic characteristics show an association between parental partnership trajectory and problematic internalising behaviour, and those which include household economic characteristics do not. Any pairwise combination of longitudinal poverty, social class and tenure appears to have this effect. The lack of association between the odds of problematic internalising behaviour is found in similar studies (Fomby 2011; Kiernan and Mensah, 2010). This result is also been found in large scale reviews (Brooks-Gunn and Duncan, 1997) and other studies, (e.g. McCulloch et al, 2000). As such this conclusion can be considered as reinforcing the conclusion that a child's experience of parental partnership change is independent of their propensity to display problematic internalising behaviour.

16.1.3 Reading ability

Children's propensity to be in the bottom decile of reading ability seems to be more closely related to the initial partnership of their parents than their current partnership status, and within this the

changes in their parents partnership have differential effects. There does not appear to be an increase in likelihood of being a poor reader associated with having a parent who is repartnered relative to the control group. Note – the odds ratios of poor reading ability associated with having a repartnered parent are close to being statistically significant e.g. p= 0.06.

If we look at the children who lived with their initially unpartnered mothers; children whose mothers repartnered, began cohabiting with the child's biological father or remained single all of these children were at an increased risk of poor reading ability relative to their peers whose mothers were continuously married to their biological fathers. These findings are in line with some existing literature using the MCS, i.e. Holmes and Kiernan, 2010; Fomby 2011; and where these findings differ this is because a different conceptual basis has been used, i.e. Schoon et al, 2011.

There is good evidence from the US that for children of initially unpartnered mothers increasing numbers of parental partnership transitions are associated with lower cognitive testing scores is largely supported by this analysis (Craigie et al, 2012; Cooper et al, 2011, Waldfogel et al, 2010).

Of the children who began life with cohabiting parents, those whose parents subsequently married, had periods of temporary separation, or permanently separated are all at increased risk of poor reading ability relative to their continuously married peers. This conclusion does not seem to have been widely found in the research literature and there is no obvious explanation for this finding. This cautions against making large claims for the implications of this findings for policy or practice.

16.2 Parental partnership transitions

As much of the literature does not distinguish between a trajectory and transitions approach much of the background literature into which I wish to locate my findings overlaps and as such this discussion is relatively brief to avoid repetition.

16.2.1 Externalising behaviour

Problematic externalising behaviour is significantly more likely amongst children who have experienced their parent repartnering with a social parent. This relates well to the existing literature on the role of parental partnership transitions in the ecology of children's development (Fomby and Cherlin, 2007; Ermisch et al, 2012; Fomby 2011; Osborne and McLanahan, 2007) and as such can be said to confirm the view that a higher number of parental partnership transitions in early childhood are associated with a higher risk of problematic externalising behaviour.

16.2.2 Internalising behaviour

Looking at problematic internalising behaviour there is no association between it and parental partnership transitions once the economic characteristics of the household have been accounted for, thus indicating that any perceived association between problematic internalising behaviour and parental partnership transitions is the result of economic disadvantage being concentrated in those groups with a number of parental partnership transitions.

16.2.3 Reading ability

Children whose parents are or have been lone parents and those whose parents have repartnered with a step parent have significantly higher odds of poor reading ability than their peers whose parents have never changed their partnership status, whatever that may be. This finding is not entirely consistent with the existing literature, with a number of studies (Fomby, 2011; Steele et al, 2009) making the finding that educational ability is associated with parental partnership transitions and a number of studies finding that it is not (Ermisch et al, 2012; Schoon et al, 2011). This is likely to be because of the wide range of possible measures of educational attainment or cognitive development that could be used to measure this domain of interest.

For the two outcomes for which there is a robust significant association between parental partnership transitions and poor outcomes (namely externalising behaviour and reading ability) there is a consistency in the largest association being with the repartnering transition, there is some evidence that the breakdown of the parents relationship (which also includes partnering of biological parents when they were apart at the child's birth) also has a negative effect on children's development but this effect is not so widespread or as big as the repartnering effect.

16.3 Parental partnership status

Overall there is a no unambiguous association between children's well-being and children's parental partnership status at the age of seven. There is evidence of an association between problematic externalising behaviour and having both a step parent and living with parents who are cohabiting, however any association between having a lone parent and increased odds of problematic externalising behaviour is attenuated by the inclusion of the economic characteristics of the household in the model. There is no association between parental partnership status and problematic internalising behaviour once the economic characteristics of the household have been included. The association between parental partnership status and poor reading ability is more complex, and there is an association between living with a step parent or a cohabiting parent and having increased odds of poor reading ability.

This relates well to the conclusions of earlier research, see Amato and Keith (2001) for a review. The finding of poorer outcomes for the children of cohabitees and stepfamilies is well supported, but the lack of significantly poorer well-being for the children of lone parents is in contrast to some earlier findings and reflects better understanding of the importance of economic conditions for mediating this association. British lone parents are economically better off than ever before, and that supporting the children of lone parents is an accepted policy goal (Joyce, 2014).

16.4 Parental partnership trajectory, transitions or status

In both the adjusted problematic externalising behaviour and poor reading ability models where parental partnership was significantly associated with increasing the odds of the outcomes the trajectory measure was most informative. For both the problematic externalising behaviour outcome and the poor reading ability the trajectory model highlighted differences in children's propensity to have poor outcomes conditional on the initial partnership status of their parents. For the externalising outcome, this appeared to be predominately a matter of degree with initial partnership for the children whose parents were repartnered conditioning the size of the increase in odds ratio. For the poor reading ability outcome there is an even more obvious conditioning on the basis of initial parental partnership for results, however most of the groups with significantly increased odds of increased parental partnership include some degree of change in parental partnership.

The transition model is deliberately blind to the parental partnership status of the parents, only including change in parental partnership status rather than what these changes are. Whilst this captures many of the salient features of parental partnership change for children's well-being and development, the trajectory approach misses the difference between the groups by pathway highlighted by the trajectory model.

The status model includes only the parent's partnership status at the age of seven, so it does not include any reference to the initial partnership of the parents. The suggestion from the trajectory model that the association between problematic externalising behaviour and poor reading ability and parental partnership is contingent on both initial parental partnership and the changes in parental partnership cannot be observed in the status concept of parental partnership. Comparing parental partnership status to parental partnership transitions, the problematic externalising behaviour outcome status and transitions have similar results, with both models suggesting that children with a stepparent are more likely to display problematic externalising behaviour than the reference category. The status model also suggests that children with cohabiting parents are more likely to have problematic externalising behaviour than the reference category, which was a finding of the trajectory model, but not of the transitions model. For the poor reading ability model, the status model and the transitions model both agreed that the children of parents who had repartnered had an increased likelihood of poorer outcomes relative to the reference category; however the status model also extended this to finding that children who had lone parents had

higher odds of poor reading ability than their reference peers, for the transitions model, it was those children whose parents were cohabiting that had higher odds of poor reading ability.

Comparing the three versions of parental partnership indicates that for the association with problematic internalising behaviour it does not matter which of the three parental partnership variables are used as parental partnership no longer shows any association with parental partnership once the economic characteristics of the household are introduced as control variables. When the association between parental partnership and problematic externalising behaviour is considered, the trajectory approach is the most informative. For the association between parental partnership and poor reading ability again the parental partnership trajectory is the most informative measure of parental partnership. Both the parental partnership transitions variable and the parental partnership status variable do not produce directly equivalent associations between parental partnership and problematic externalising behaviour and poor reading ability as the trajectory measure. Relying on either parental partnership transitions or status would therefore give a misleading view of the association between child well-being and development and parental partnership in the early years. Given how much simpler parental partnership status is to derive than transitions, there is not a good case for considering parental partnership as a transition, the simplicity of its derivation suggests that status is a reasonable indicator when data is limited.

16.5 Potential explanations of the association between parental partnership and children's outcomes which could not be investigated using the data available

These results and the existing work in the field (reviewed in Chapter 4) emphasise the consistent difficulties children have in adjusting to repeated change, however there are a number of possible explanations for the results observed which are not practical to be included in the analysis which should be highlighted. Firstly, although parenting is included in the model it should be noted that of the twelve items which constitute the two indices all but two were asked only of the main respondent (in most cases the mother), so if for example the partner respondent had a punitive discipline regime for the child which the main respondent did not participate in, this would not be captured by the parenting variable used here. This problem is further complicated by the structural difficulties faced by the survey in capturing information about the day to day parenting participation of non-resident parents. As most of the children in the breakdown and repartnering pathways will have lived with both of their biological parents at some point the lack of information about the continuation of this relationship is a limitation. There is limited research identified about parenting by non-resident parents and how it manifests itself in children's outcomes, because it is a difficult relationship to access, however this is a candidate for further exploration (see Poole et al, 2013; Tach et al, 2010, Cheadle, 2010; Kiernan, 2006; Adamsons and Johnson, 2013 for what is known about non-resident parents parenting).

The broader disruption to children's daily lives of their parents partnership failing is not accounted for well in the analysis in Chapters 7-14, but it may be that parental partnership transitions are important because they substitute for a range of material changes which occur alongside a parental partnership transitions, for example dislocation from a child's social network by changing house or school (Gillespie, 2014; Crosnoe et al, 2013). There also may be an extent to which parental partnership transitions actually reflect the time elapsed since the first transition, and therefore the age at which the child experienced this transition, as it is reasonable to assume that parents who have repartnered will on average have dissolved their partnership with the child's other parent longer ago than those parents who have only dissolved their initial partnership and not repartnered (Sweeny, 2010). Dissolved partnerships were of lower quality than intact partnerships (Fomby and Osbourne, 2010) and a lingering effect of poor quality partnerships may be behind the significance of the breakdown transition. Additionally there is evidence that couples in higher order partnerships

have lower quality partnerships (Waldfolgel et al, 2010; Coleman and Glen, 2010; Ferri and Smith, 1998) possibly because of the complex circumstances of their lives or possibly as a result of their own partnership capabilities (Reynolds et al, 2014; Dunn et al, 2000).

16.6 Sibling group

16.6.1 Externalising behaviour

There is evidence of an association between sibling group type and problematic externalising behaviour and that this association is greatest amongst those children who have younger maternal half siblings, the significance of the reduction in odds ratios amongst those children who have younger full siblings indicates that this is not the result of having younger siblings per se, but it is specific to having younger maternal half siblings. There are significant increases in the odds of problematic externalising behaviour for those children who have maternal half siblings with multiple non shared parents and those who have other siblings. The other siblings group is difficult to interpret due to the heterogeneity of sibling groups found within this group however all these children have complicated sibling groups. The maternal half siblings with multiple half non shared parents have in the main experienced the growth of their sibling group in a non-traditional way within their lifetime. This suggests that the experience of sibling group expansion in a non-traditional way is associated with increased odds of problematic externalising behaviour amongst seven year olds.

The literature review in section 4.4 highlighted how little is understood about complex sibling groups in isolation from parental partnerships. The findings are broadly in agreement with the most similar research (Bronte-Tinknew et al, 2009), although this looked at paternal half siblings which as outlined in section 6.2.5 are distinct from maternal half siblings.

16.6.2 Internalising behaviour

The evidence of association between sibling group type and problematic internalising behaviour is difficult to interpret, this is because the selected reference group used across all of the models presented here, no full, half or step siblings, is for this particular outcome a poor reference category. It appears that the no full, half or step siblings group is itself strongly associated with increased odds of problematic internalising behaviour relative to all of the full siblings only groups, as evidenced by the significantly lower odds of problematic internalising behaviour observed.

As shown in section 4.4. there is no locatable research evidence looking at links between internalising behaviour and complex sibling groups.

16.6.3 Reading ability

Children with older maternal half siblings are at an increased risk of poor reading ability, and there are no significant associations for any other type of sibling group. This suggests that children's reading ability is compromised when they are the children of a higher order partnership, rather than being of lower birth order. This is not a current partnership effect as many of the children with older maternal half siblings are living with both of their biological parents, see Table 10 in section 6.3.3. This suggests that for reading development there are legacy issues from the previous partnerships of the mother and where she has had children in previous partnerships there is a residual effect on children from subsequent partnerships – an effect which does not appear to have any traction on the children who have experienced the birth of younger half siblings.

As with internalising behaviour there is no relevant research as far as I can ascertain, relating structural characteristics of the child's sibling group to their cognitive development, and consequently it is not possible to locate this research within the literature.

16.6.4 Limitations of the sibling group analyses

There are some general points which apply to all three analyses, and which are limitations of the analysis. Firstly, there is no universally accepted way to select a reference group for sibling group type given my focus on the relationship between the siblings. A simplified analytical structure which had those children with full siblings only as the reference group was selected as the most appropriate but this does not easily engage with the fact that there may be birth order (Lawson and Mace, 2010) as well as sibling group effects on children's well-being, and one of the key questions was if the relative age of half siblings was important.

Secondly, sibling groups interact with parental, mainly maternal, partnership histories. Most children who have younger half siblings will have experienced living with a step-parent, whereas only a small minority of children with full siblings only will have done so; see Table 10 in section 6.3.3. Therefore there will be an extent to which the younger maternal half siblings in particular capture the effects of step parents. The majority of children with younger maternal half siblings have established step parents (53%), but the majority of children with step parents do not have younger maternal half siblings (only 30% do). The degree to which siblings act as a proxy for parental partnership is limited given the numbers involved.

Finally, control variables were introduced for number of children in the family, and whether the child was firstborn, drawing on the existing literature which tends to look for an association between sibling group and children's outcomes in these terms e.g. Yucel and Yuan, 2015; De La Rochebrochard and Joshi, 2013. During the model fitting process that when sibling relatedness was included in the model in neither the internalising behaviour outcome, table 51, nor the reading outcome, table 52, whether the child was firstborn or the size of the child's family met the Wald test for significance for inclusion. In all of these models a process was followed and the sibling composition of the group was significant in all iterations of the model fit. The insignificance of the size of the child's sibling group and if the child was firstborn or not in the internalising and reading outcome models may have been a result of confounding, and that whilst the variables were qualitatively different, they were all in practice confounded on an unobserved latent concept and sibling relatedness happened to have the best fit of the three variables. The alternative explanation is that when researchers look at birth order and sibling group size and find that they are significantly associated with poor reading ability and problematic internalising behaviour, they are actually representing the (in these models) latent concept of relatedness of siblings which actually underlies the observed association. By contrast, for the problematic externalising behaviour outcome sibling group size and sibling group relatedness are both significant in the adjusted model, Table 50, suggesting that at least as far as externalising behaviour sibling group size and sibling group relatedness represent distinctive concepts.

16.7 Interaction between parental partnership and sibling group

16.7.1 Interaction effects

Analysing interaction models requires an alternative model which includes the variables when jointly controlled as well as the model which includes both variables and the interaction effect. Neither the jointly controlled nor the interactions models yielded any substantive results. The most interesting aspect of the interaction effects models was in fact the significance levels of the parental partnership transitions variable and the sibling variable when they were jointly controlled. For all of the outcomes a significant association between both parental partnership and sibling complexity and the outcome in the unadjusted model is observed, but in all of the adjusted models parental partnership ceases to be significant for all three outcomes, even if using the least stringent significance level of 10%.

There are two possible explanations for the lack of results from the interactions models. Firstly be because parental partnership is actually deriving its significance as a substitute for the control variables in the unadjusted models and once the controls have been introduced parental partnership is no longer significant for this reason. Because of the continued significance of sibling group type, this could imply that parental partnership in the parental partnership only models (Chapters 7, 8 and 9) is actually substituting for sibling group structure and its significance in these models actually derives from this. This implies that sibling group is the most important aspect of family complexity. Alternatively the lack of significance observed of parental partnership in the adjusted models is that parental partnership and sibling group are too similar to each other to both retain significance once control variables are introduced to the model and are confounding each other. There is some degree to which parental partnership has causal effects on sibling group, but this is not a necessary or sufficient causal relationship as is apparent from the joint distribution of the variables explored in Table 10, section 6.3.3. None the less, those cases in which parental partnership and sibling group type are confounding each other may be important.

16.8 Single measure of family complexity

16.8.1 Externalising behaviour

The results for externalising behaviour show that in the adjusted model, table 54, there is no significant difference between children in stepfamilies with no half siblings and children in simple families. Regardless of the type of blended family they are part of, children in blended families have poorer outcomes than their peers in simple families. These negative outcomes are graded by the type of complexity, with children who live with their older half siblings and either both of their biological parents or their shared lone biological parent less severely impacted than children who live with their younger half sibling and a biological and step parent or their lone shared biological parent, who have similar propensities to display problematic externalising behaviour as children who have experienced the most complicated parental transitions. The finding that having a half sibling rather than a stepparent is responsible for the association between having a stepparent and poorer behaviour broadly accords with the findings of Halpern-Meekin and Tach (2008), Hofferth (2006), Strow and Strow (2008) and Tillman (2008) but is in contrast to the findings of Evenhouse and Reilly (2004). Due to the different research designs and structures used the similarities of the findings across a range of different contexts adds to the evidence identifying family complexity as difficult for children.

16.8.2 Internalising behaviour

In the internalising behaviour analysis in Table 55 once the model is adjusted family complexity ceases to be significantly associated with the child's odds of problematic internalising behaviour. There is a significant increase in the odds of displaying problematic internalising behaviour for children growing up in reblended families relative to those in simple families apparent, but because of the insignificance of the family complexity variable in the process of model fitting this result should not be considered substantive. The insignificance of the family complexity variable is a result of the inclusion of the parents' partnership characteristics because sibling group type alone retains an association with problematic internalising behaviour once adjusted, whereas the results of the partnership model indicate that economic characteristics reduce into insignificance the association between problematic internalising behaviour and parent's partnership.

16.8.3 Reading ability

The results for reading ability in Table 56 show that once the economic characteristics of the household are included there is no difference between children who live with a biological and a social parent but have no half siblings in their propensity to be poor readers. There is no significant association between having a family which has become blended in the lifetime of the focal child and a propensity to be a poor reader. In contrast children in the most complex reblended families and children who have older half siblings, and live with their own biological parents or their shared biological parent as a lone parent are significantly associated with increased odds of poor reading ability. Existing research is mainly from the US and looks in the main at much older children using Grade Point Average as an outcome, which is different to a British child being a poor reader at the age of seven. None the less the finding that children's poorer outcomes can be explained better by the presence of half siblings than step parents is found by Gennetian (2005), Halpern-Meekin and Tach (2008), and Tillman (2008) Strow and Strow (2008). Where these researchers look at the relationship between the children and the head of the household in a comparable way to this analysis they find that children who live with only their biological parents and their half siblings have poorer academic achievement than their peers without half siblings. The finding of association between poorer academic outcomes and family complexity is consistent with Evenhouse and Reilly (2004) and Hofferth (2006). The evidence of this thesis suggests that there is an association between children having poor academic achievement and their experience of family complexity, and that this may be strong for children for whom the complexity predates their own birth.

16.9 Exploratory propensity score matching of stepfamilies with and without children born to the second partnership

The purpose of the propensity score matching exercise was to explore further if amongst families who experienced family complexity during the life of the child there was a clear difference in outcomes by the degree of complexity they experienced. The analysis is distinct from the analysis using the single variable measure of family complexity as it focused only on those children who had experienced family complexity in their lifetime. Propensity score matching was chosen as in principle it controls for observed and unobserved differences in likelihood to experience the particular event, here acquiring a younger half sibling, amongst the relevant population. Notwithstanding the exploratory nature of the analysis, outlined in 14.1 and 14.4, the results are suggestive that having a younger half sibling results in an increased propensity to problematic externalising behaviour. In addition there is an increased propensity to problematic internalising behaviour although this is not as significant and is of a smaller magnitude. There are no significant differences between children in step families who have acquired a half sibling and those who have not in terms of the likelihood that they are poor readers for age.

This result further adds to the emerging conclusions of Chapter 7, 11 and 13 that children's outcomes are more sensitive to the presence of half siblings than the presence of step parents. Chapter 14 only examines the subpopulation who have a stepparent, which is less than 10% of the overall Millennium Cohort Study population. The findings of this Chapter only relate to this subpopulation and should not be used to imply that children with stepfamilies are not an increased risk of poorer outcomes relative to children in simple families. The analysis in Chapter 14 complements that in Chapter 13, but only with regard to children in the most complex families. The intention of doing propensity matching between stepfamilies without joint children and those with joint children was to establish if the differences between stepfamilies and blended families originated in selection which propensity matching controls for well in principle. Propensity score matching has not been used before in this way, although other techniques to control for selection have been used to specifically compare the outcomes of children who grow up in stepfamilies with and without younger half siblings, e.g. sibling fixed effect models (see Case, 2001). There is no research identified in Chapter 4 asking similar questions in the context of British middle childhood, but it is possible to relate these findings to studies with similar aims in the US and Swedish work outlined in Chapter 4.

Not all of the family complexity literature is relevant for the approach of comparing stepchildren in stepfamilies and stepchildren in blended families, but this study is not the first to try and establish if there is any impact on the socio-emotional well-being and academic outcome of children in such families. The most similar study is Gennetian (2005) which looks at children in middle childhood, although this study examines only cognitive development and finds that once having a half sibling or not had been introduced there was no longer a negative effect of having a stepparent, and that children who had stepparents and half siblings had poorer cognitive development than children in simple families and children who had stepparents only were not different to children in simple families. This is at odds with my finding that there is no difference between children in step and blended in the Cohort member's lifetime families when it comes to cognitive development. This is possible a result of the different control strategies or may indicate a genuine difference between children who took part in the NLSY and the MCS. Gennetian (2005) does not look at children's socio-emotional well-being as an outcome. Cognitive development outcomes, admittedly for older children, are also examined by Halpern-Meekin and Tach (2008), Ginther and Pollack (2004) and Sundstrom (2013) and all of these studies find that children in blended families have poorer educational outcomes than children in stepfamilies, and that this does differ depending on where the child relates to the partnership and birth history. This is a contrast to my findings, where I find no cognitive disadvantage to growing up with in a blended family relative to growing up in a stepfamily, but there are a number of important differences, not the least of which is the way I have compared and step and blended families. Additionally I am looking at young children and all of the outcomes examined in the previous research relate to children at the end of their statutory educational careers.

Halpern-Meekin and Tach (2008) and Tillman (2008) both use a socio-emotional well-being outcome in teenagers, and find that once the presence of half siblings are taken into account the association between poorer well-being and stepfamilies is significantly attenuated. The Tillman study has a residual effect of a cohabiting stepparent, but given the difference between the context of cohabitation in the US and UK (Kiernan et al, 2011), this is probably irrelevant. The results of Halpern-Meekin and Tach (2008) and Tillman (2008) accord well with the findings of this research in that there is a difference in the socio-emotional well-being outcomes between children who live in stepfamilies and those who live blended families, with more negative effects for those children who have additional half siblings. Comparing my findings with those in the established literature indicates that despite using different analytical techniques my findings accord well with the existing

literature looking at socio-emotional well-being and complex families. There is less support for my finding that there is no difference between children in step and blended families in relation to their reading ability. Given the differences in samples and outcomes between my work and the work referenced here it is not unlikely that there is a fundamental difference in response to family complexity between the two samples (Kiernan, 2011), and it may be that early family complexity in the UK does not systematically result in poorer reading development in children in blended families relative to those in stepfamilies.

16.10 What can be concluded about family complexity?

This section on family complexity has included interactions, single measure and propensity score matching approaches. Having reported on each of these approaches separately it now remains to report the overall findings of these diverse approaches and create an overall narrative about the importance of family complexity in children's lives. The results have some consistent themes but are not unanimous, the single measure of family complexity and the propensity score analysis address different questions.

Consistently children are most sensitive to family complexity when it comes to the likelihood that they display problematic externalising behaviour, with significant associations observed when children in complex families are compared to those in simple families, as well as when we compare children in stepfamilies and blended families.

The evidence for internalising behaviour is at first sight inconsistent. Both the interactions approach and the single measure approach to family complexity had no relationship with internalising behaviour, finding internalising behaviour to be excluded during the model fit process once the control variables were included. In contrast the propensity score model suggests that there is a significant increase in the propensity of children to display problematic internalising behaviour when their mother and stepfather have biological children in comparison to when they do not. This result should be treated with caution as there is no opportunity for family complexity to 'drop out' of the propensity score model as here it is configured as a test condition rather than as a variable as it is in the interactions and single variable model. For this reason I do not think that the conclusion that there is a substantive association between family complexity and problematic internalising behaviour can be supported.

For reading ability there are is no substantive results from the interactions model, however there are substantive results in the single measure of family complexity model. There is no difference between children who are in stepfamilies and children in simple families, however all types of blended families have a significant association with poorer reading ability in comparison with children in simple families, with reblended families showing the highest levels of poor reading, followed by those families with older half siblings. When children's reading ability is examined using the propensity score model to account for latent variation in propensity to form a blended family, the association with poor reading ability disappears. This indicates that children's reading ability is not

affected by having younger half siblings, that rather it is the characteristics of the family that are important. It is worth noting that in the model of family complexity, the younger half siblings group was the least significant of the blended groups and the propensity score analysis only compares stepfamilies with and without biological children to the mother and the stepparent. It is therefore possible that there remains some association between family complexity and children's reading ability, but not when comparing all children with stepparents on the basis of if they have younger half siblings or not.

I can therefore conclude that having a younger half sibling leads to a higher propensity to display problematic externalising behaviour, however any increases in propensity to be a poor reader arise from selection of stepfamilies into blended families. As well as having younger half siblings, there is good evidence that having any type of half sibling is associated with more externalising behaviour, and poorer reading, with the most complex families, termed reblended, most severely affected. There is little evidence of any association between family complexity and problematic internalising behaviour.

16.11 How these findings relate to the literature

In Chapters 1, 2, 3 and 4 of this thesis outlined a number of ways in which this thesis could add to the existing literature. This was in terms of the literature on family complexity, parental partnership and sibling complexity. This section evaluates the contribution of this thesis to the field.

One of the problems identified in the existing literature was that much of it used US data, with a small but significant number using Swedish data. This gap was particularly acute for family complexity and sibling group structure in Britain; with more known about parental partnership history. Little research was identified that looked at young children, although once again parental partnership was better served than other aspects of family complexity. By design this research has addressed both of these shortcomings in the literature. My findings are intended to be representative of the experience of British children born in the early part of the century up to the age of seven and where my findings are limited (i.e. those using propensity score methods) this is indicated. There are a number of shortcomings in the coverage however, with the characteristics of families who chose not to participate in the initial survey being entirely unknown, and in particular the large number of children who ended up in the unknown group as there was missing information about their lifetime experiences who were possibly not missing at random both with respect to outcomes and family complexity, as shown in Table 3, in section 6.1.1. As such the research is as representative of British children as possible but is not completely representative. Despite these reservations the sample is the best available for studying family complexity in contemporary British children.

The literature review identified a general lack of evidence for both the association between family complexity and children's well-being and children's complex sibling groups and children's well-being. This research has looked at both these aspects of children's well-being and has added to the field. This analysis agrees with the majority of existing research in concluding that children are more affected by having half siblings than by having a stepparent and that the perceived stepparent effect is in fact the result of having half siblings. The research has differed from other research in the family complexity field by finding an effect only in certain specifications of models for cognitive outcomes. This may be a function of the age of the children or the type of family complexity this thesis has focused on.

The parental partnership field is better served in general with more research available and more of it relevant to a specifically British investigation. The thesis therefore proposed to extend this work and to add to debates about the most appropriate way to formulate parental partnership for researchers. This work indicated that levels of detail were important, but fundamentally the most important aspects of parental partnership were parental partnership at birth and if there was evidence of subsequent repartnering in the child's lifetime.

Chapter 17. How does this thesis relate to theory and policy?

17.1 Locating the thesis in theory

In Chapter 2 the theoretical position of this thesis with regard as to how family complexity was related to children's socio-emotional well-being and cognitive development were outlined. To briefly restate this thesis is based on family stress theory with family complexity being conceived of as a both a stressor of the family and a source of weakness, meaning that the family unit was less resilient to stresses than simple families. It was uncertain the extent to which these weaknesses were the results of the incomplete institutionalisation of complex families in how they relate to broader society; or to what extent families who experience family complexity were more vulnerable to poorer outcomes for their children as a result of the same characteristics which led them into family complexity. It could be a combination of the two which led to the poorer outcomes for children in complex families.

The structure of the analysis presented in this thesis does not allow conclusions about the processes which link family complexity to children's outcomes as it is uses data at a population outcome level rather than examining the processes within families. The analysis presented in this thesis does allow some general comments about the processes in families to be made, but the evidence is at a general observational level rather than an in depth evaluation of these processes in individual family.

Broadly this thesis supports using emotional, economic and parenting stress and incomplete institutionalism of the family type to jointly describe the process linking incomplete institutionalisation and family stress. Incomplete institutionalisation is a significant cause of parenting and emotional stress for the parents which in turn limits their ability to promote the child's well-being and development.

There is evidence of selection of families into complexity, which undoubtedly drives some of the association between family complexity and children's well-being and development. The evidence is strongest for the economic circumstances of the family, with a strong suggestion that families facing economic adversity are most vulnerable to complexity, if this is a reaction to poverty, with poorest families having most to gain from partnership; or a function of low skills and low labour force attachment and a higher cultural value placed on partnership and parenthood is not known.

Next, turning to whether economic, emotional and parenting stress and incomplete institutionalisation as well as selection can explain my findings. In some respects the two explanations are competing, however it is possible to interpret my findings with regard to both explanations as long as the limits of the explanation are well defined. There is good evidence for selection on the basis of economic characteristics, it is well-established that economic adversity has negative impacts on children's well-being and development (Sullivan et al, 2013; Hill et al, 2013), and it appears that complex families are poor before and after they become complex (Schoon, 2011; Thomson and McLanahan, 2012). Quite why there is this link is unknown, but it looks as if the poverty came first. This ties into the lack of evidence found about economic stress, as becoming a complex family will change a family's economic resources but there does not seem to be a unique or even an overrepresented mechanism which translates this into a form of stress unique to complex families. The evidence is greater for emotional and parenting stress and incomplete institutionalisation is a mechanism which explains why this is particularly acute amongst complex families, and why some simple families have poorer outcomes than others on the basis of the biological parents' legal marital status. The incomplete institutionalisation of complex families means that relationships are negotiated not deemed, which makes an equilibrium amongst family members hard to find, and easily disrupted when circumstances change. Overall the association between family complexity and children's well-being and development can be explained by a combination of selection, emotional and parenting stress and incomplete institutionalisation.

Looking across the parental partnership variables, the sibling group variable and the family complexity models it is apparent that the control variables have strong effects. This is most apparent in the case of problematic internalising behaviour which appears to have a limited association with any of the focal variables once the economic characteristics of the household have been accounted for. For both the problematic externalising behaviour and poor reading ability outcome there is evidence that including control variables, i.e. selection, explains a substantial proportion of the observed association between the various dimensions of family complexity and children's well-being and development. In the propensity score model, there remains an association between having younger half siblings and a higher propensity to display problematic behaviour but this result only applies to children living with a biological and social parent. Overall, there is evidence which suggests that children are not equally likely to experience family complexity, and that some of the factors on which they are selected into family complexity are also influential over their well-being and development outcomes. None the less there is a suggestion that it is the structures and functioning

of complex families which seems to be a better candidate for explaining the observed association rather than selection of families into complexity on the basis of their propensity to foster poor well-being and development in their children.

The second explanation of how the family's resources are systematically associated with poorer outcomes for children focuses on the exposure to and ability to cope with emotional, economic and parenting stress both in daily life and of the events which lead to family complexity. It is difficult to distinguish these types of stress from the control variables included to account for selection of families, none the less stress represents something different to these control variables. Stress suggests that individuals are unable to complete a task as well as they could do due to pressure upon them, and as such is circumstantial. Selection suggests that a characteristic is predetermined, and an individual's ability to complete a task is conditioned upon it, and as such is exogenous to circumstance. How to distinguish between a characteristic and a response to a stressful situation is difficult, especially given that stress can be long lasting and reinforcing, and sensitivity to stressful situations is a characteristic of selection. As stress is a subjective reaction to circumstance it is not appropriate to use a possible cause of stress as a proxy for stress felt (Malia, 2006; Melson, 1983), for example initially economic stress seems to be well represented by the poverty line, however the stress originating in living in poverty varies with regard to, for example, housing tenure with outright owner occupiers below the income poverty line, less likely to be stressed than families with the same income who are private sector tenants in high rent areas (Lupton, 2009). Whilst some of these structurally varying factors can be measured it is more difficult to measure things like ability to manage money, for example if the household has good enough credit to pay for utilities by direct debit rather than an expensive pre-payment meter. Any family which habitually struggles to contain their expenditure within the bounds of their income is likely to be under economic stress regardless of what that income is. Economic stress is more likely under conditions of economic strain, but is not guaranteed by it, nor is stress exclusively the preserve of those under strain (McCubbin and Paterson, 1983). Parenting stress would be evidenced by negative, inconsistent or uninvolved parenting, but not all instances of negative, inconsistent and uninvolved parenting result from the stress of the parent, and some just reflect the parent's choice of parenting strategy (Baumrind, 1966; Bowlby, 1981). Some stressed parents do not display negative, inconsistent or uninvolved parenting, and instead may be overly controlling of their children or unnecessarily anxious (Fomby, 2016). Parenting stress can take many forms and the range of forms that it takes are not uniquely the consequence of parenting stress. This means that using an appropriate instrument specifically to

identify parenting stress is necessary, and there is not one included in the MCS. Separately there may be stress in the inter-parental relationships, but stress in the inter-parental relationship is only measured at nine months and five years.

Although I am unable to conclusively state if emotional, economic or parenting stress adequately describe the family's resources there is some evidence that some of the possible features of economic, parental and emotional stress are present in complex families and that these are associated with poorer well-being and development for children. I will continue to consider emotional, economic and parenting stress as candidates for determining family resources. Families characterised by adverse economic circumstances, headed by a depressed mother and with dysfunctional parenting have poorer outcomes, and when these variables are jointly modelled with each of the family complexity variables they significantly attenuate the association which could suggest that family complexity isn't necessarily the problem, rather the effects of stress on the family's resources, which is incompletely captured by these measures of family complexity. The problem of interpreting these variables in this fashion is that it implies that these variables represent both selection and manifest pathways between latent stress and children's outcomes, and this dual role of the same variables seems incompatible. As individuals and consequently families vary significantly in their stress reaction, with some stress prone and some highly stress resistant and there is no data available about parenting stress or stress in the inter-parental relationship at this point in the MCS the analysis is necessarily lacking on this point.

17.2 Policy considerations

The evidence presented in this thesis suggests that there is an association between living in a complex family and children having poorer well-being and development outcomes. Explaining these findings in the context of theory suggests that there are some difficulties which are a necessary consequence of being a complex family; and some which affect only some complex families. The policy considerations arising from this thesis will be different when focusing on policy areas which affect all complex families and those which are felt only by some complex families. The distinctions developed when the results were placed within the theoretical framework will be maintained, with three explanations for the distinctive outcomes of complex families outlined; selection into family complexity, emotional, economic and parenting stress and the incomplete institutionalisation of complex families.

There is some degree to which the disadvantage of complex families is driven by the concentration of families with other characteristics which disadvantage their children into complexity i.e. selection. When reviewing the evidence in the context of the theory it appeared that the economic characteristics of the household was a selection characteristic. This suggests that the effects of family complexity on children can be attenuated by policies which address the mechanism linking poverty to poorer well-being for all children as poverty seems to act as a selection factor when it comes to this association. From a policy perspective this adds weight to the already significant evidence for the importance of household economic characteristics in determining young children's outcomes (e.g. Bradshaw and Holmes, 2010). Policy which reduces the association between household economic disadvantage and negative outcomes for children will benefit children in complex families because so many of these children live in households which are economically disadvantaged.

The distinctiveness of complex families was theoretically linked with the emotional, economic and parenting stress to which complex families are exposed. The evidence tends towards interpreting the economic characteristics of the household as a selection characteristic rather than a specific cause of stress for the family, so this section focuses on emotional and parenting stress. Although emotional and parenting stress are likely to be consequences of family complexity, it is not clear if they exist prior to the process of family complexity, or that family's propensity to suffer from emotional and parenting stress covaries with their propensity to be or become complex. As there were no appropriate parenting or relationship stress variables available this analysis has not

included any variables to represent these concepts and as such their importance cannot be evaluated. The analysis includes a proxy for parenting behaviour and a measure of maternal mental health whilst neither of them are proxies for emotional and parenting stress they are relevant in explaining some of the association between family complexity and children's socio-emotional well-being and cognitive development. Maternal depression and negative parenting may be associated not only with stress but with mother's perceptions of themselves as being part of a complex family which is incompletely institutionalised by society. This suggests that in order to alleviate the effect of maternal depression and parenting practices on children, policy could either intervene in the link between depression and parenting and children's outcomes (Kiernan and Mensah, 2009) or attempt to reduce the incidence of maternal depression and negative parenting practices. There is an ethical argument for intervening to prevent negative parenting through improved parenting education, however when it comes to maternal depression it is less straightforward, as some mothers are likely to be always be depressed. This suggests policy ought to address how family complexity can contribute to maternal depression amongst some vulnerable mothers, as well as recognising that there is no simple association between the two (Fomby, 2016). Doing so ought to reduce the impact of maternal depression as a contributor to the effects of family complexity upon children.

Incomplete institutionalisation is different to selection and emotional and parenting stress in that it should affect all complex families. To reduce the disadvantage of all children growing up in complex families, incomplete institutionalisation is an appropriate policy area to focus on. In the first section of the thesis family complexity in the policy environment was explored using a policy process model to explore how family complexity was located in the policy environment. The results of this exercise suggested that family complexity was primarily addressed in terms of its consequences. The survey of policy highlighted gaps in institutional support for complex families. In the light of my findings the significance of these gaps for providing a context children's well-being and development in complex families is increased.

There is role for public policy in providing a space in which relationships in complex families can be negotiated and promoting norms in these relationships by defining or explicitly not defining obligations between members of complex families. There are some areas in which policy already exists but is frequently not used, for example stepparents can have parental responsibility in addition to the biological parents with the permission of both the biological parents (when relevant), creating a legal relationship between the step parent and the child but without reducing the

relationship with the non-resident biological parent. This may help to define the responsibilities and obligations of the child's various parents.

A large part of the difference between married and cohabiting families is the deemed nature of relationships and obligations between married families which have to be negotiated by cohabiting families. Providing structural opportunities for cohabitees to make agreements when they have children may clarify the relationship between cohabiting partners and between cohabiting parents and their children. Chapter 7 indicated that there is an advantage to the children of erstwhile married parents, which may relate to the actual process of getting divorced because their parents have agreed about the residence and contact and financial provisions for them. Separating cohabitees are not required to formally end their relationship and agreeing about their child's maintenance and residence with an independent agreement analogous to the process of getting divorced. Many complex families include some cohabitation in their history as shown in Table 10, section 6.3.3, whether in the current or previous partnership and this could be a source of the distinctiveness of complex families. When there are no norms there is a constant renegotiation of relationships and this is not just at the time of partnership dissolution or formation, but the birth of new children can also lead to the renegotiation of the relationships between children and their non-resident biological parents and between the biological parents. This may be because there are fewer resources in terms of time, parenting etc. as well as economic resources available to the existing child, or because a non-resident parent fears dilution of their resources from their own biological child to the child of their former partner and their current partner (Carlson and Berger, 2013). The more people who are involved in this calculation the more complex it gets. Policy has a role in creating a space in which the obligations of the extended family members can be negotiated in response to changing circumstance and if necessary enforced. At the moment there is no formal setting for this type of necessary negotiation and thus relies heavily on the good will of the parties which may not be forthcoming. The financial obligations of parents to children may be enforced by the Child Maintenance Agency, but they will only get involved if parents fail to agree amongst themselves. However there is no formal curated space which parents can easily access in order to make this agreement outside of a legal divorce. Where couples were never married and cannot therefore divorce providing such a space may ease the difficulties of complex families and help to mitigate many of the negative consequences for children of growing up in such a family.

The policy considerations arising from this work highlight some general points which apply only to complex families and some evidence for family complexity interacting with and reinforcing already

acknowledged sources of disadvantage for children. This suggests that there are two distinct ways that policy interventions could address the poorer outcomes for children in complex families. Firstly, policy could address some of the aspects of children's environment which have acknowledged negative associations with children's socio-emotional well-being and cognitive development and which appear to be particularly concentrated (whether before or as a result of family complexity) in complex families – these are the socio-demographic characteristics, maternal mental health and parenting variables included as controls in Chapters 7-13. Secondly, policy could address the incomplete institutionalisation and consequent ecological pressure felt by complex families – this is the proposed explanation of the residual association observed in the models. That is the presence of younger, half siblings, rather than the presence of stepparents being of such importance for increasing the child's propensity to display problematic externalising behaviour. Also the importance of having older half siblings regardless of the stability of the parents' partnership for the child's propensity to be a poor reader suggests that policy needs to focus on relationships within the family over time. In order to promote children's outcomes policy needs to provide opportunities for agreements to be made between members of complex families who are uncertain of their own obligations and responsibilities towards each other as a result of the incomplete institutionalisation of these families as addressing more general causes of disadvantage which are particularly common amongst complex families.

Chapter 18. Limitations of the thesis and directions for future research

18.1 Limitations of the thesis

There are a number of limitations of the thesis. There are limitations in the propensity score analysis, which is why the propensity score matching exercise should only be considered as exploratory. These limitations are outlined in Chapter 14 and section 16.9, and as such the results of the exploratory propensity score analysis should be interpreted with caution. Other limitations to the findings of the thesis can justifiably form the basis of future research, and have been excluded from the current study by time constraints. Other limitations are the result of difficulties in accessing appropriate data for research and may be less suitable for future research. Finally, there are some interesting results which were not anticipated and warrant further investigation. The conclusions from the propensity score analysis should considered as complementing the conclusions of the logistic regression models presented in Chapter 7, 11 and 13 and viewed in relation to these findings. This is because the analysis is only relevant to a specific subpopulation of the sample, and may not be representative of this subpopulation because the sample weights were not used. Additionally, there are problems in correctly developing a propensity score because of the conceptualisation of family complexity as a process and because the propensity for a stepfamily to expand to include half siblings varies over time in ways which are not necessarily easy to capture. As such the propensity score analysis presents a different way to control for the latent differences between stepfamilies which influence both the likelihood that they will expand with a half sibling to the new partnership and outcomes for the existing child of the family. Further conceptual development is required before propensity score matching can be used to investigate family complexity, and whilst the technique has promise as a way to explore variation between families this thesis uses it in an exploratory way.

Whilst most results in this thesis are well explored, there are two results which have been neglected. The first result is the consistent finding that the children of cohabiting parents have significantly poorer outcomes in terms of problematic externalising behaviour and tendency to be a poor reader relative to their peers who live with married parents. This result holds when a wide range of background variables are accounted for and holds most surprisingly for cohabiting parents who marry in their child's early years. This result is at odds with much of the literature in the field

(Crawford, 2013) and although it is the same result as was found using the same data at age five (Kiernan and Mensah, 2010). I have not attempted to further analyse this result, but its persistence is noteworthy. Given the importance of half siblings in the final analysis the relative frequency of half siblings in the stable married families and the stable initially cohabiting families may prove informative. Roughly, older maternal half siblings are 3.5 times more common in continuously cohabiting families than in continuously married families, and around 4.3 times more common in initially cohabiting and later married families than in continuously married families. This is not an explanation of the difference, further research may find this to be informative in accounting for the distinctiveness of cohabiting families.

The second aspect that could be investigated further is the poorer outcome for children with older maternal half siblings, which applied even for children who had continuously lived with their biological parents. When I initially began the project I did not anticipate the size and persistence of this result, and focused on children with step parents as my original interest was in explaining the exceptionalism of stepfamilies. On reflection the unexpected poorer outcomes for the biological children in stepfamilies was not anticipated and the difficulties faced by these children are underappreciated, and this finding is perhaps amongst the most important of this thesis. The existing literature on family complexity identifies that children with half siblings even when they live with their own biological parents have poorer outcomes (Gennetian, 2005; Strow and Strow, 2008). The findings of this thesis are not unsupported and a future research question investigate the why having older half siblings is associated with poorer reading ability. The number of children living with older half siblings is large enough for nuanced comparisons to be made including marital status of the parents which may possibly have explained the exceptionalism of cohabitation outlined above.

Stepsiblings have not been examined in this thesis. This is because stepsiblings are relatively rare in the Millennium Cohort Study, with less than 100 families including them. The rarity of stepsiblings is because it is far more common for children to live with their biological mothers, meaning that stepsiblings are frequently spread across households. If stepsiblings are used as a defining aspect of sibling group in constructing the sibling variable as well as the presence of half siblings some of the resulting groups are very small. This in turn makes these groups underpowered for a statistical analysis. In practice the stepsibling groups would have to be analysed as part of a heterogeneous other group eliminating the explanatory value of including stepsiblings in the analysis to begin with.

The use of the household as the unit of analysis means that little is known about non-resident fathers and non-resident half siblings. As the MCS children at this wave are aged 7 the vast majority of children are living with their mothers, meaning that nearly all half siblings observed are maternal half siblings. The conclusions about family complexity drawn as a result of the analysis presented in this thesis are only applicable to families in which family complexity arises as a result of the presence of co-resident maternal half siblings. Any dataset which looks only at the characteristics and resources of a child's co-resident family, such as the MCS, lacks full information about how economic and parental resources are shared across households to the benefit of the child. The majority of children, even in the most complex families spread across multiple households will have contact with their non-resident parent (Adamsons and Johnson, 2013; Kiernan, 2006). It is possible that the quality and quantity of this contact makes a significant difference to these children's outcomes (Wilson and Prior, 2011) and that this contact varies with the complexity of the resident family (Dunn et al, 2000; Craigie, 2012). It is rare for large datasets to have the resources to be able to collect data on non-resident family members so this limitation is widespread and found in most of the previous studies of family complexity identified in the literature review (e.g. Gennetian, 2005; see section 4.2 for further). In future research if children with non-resident half siblings can be compared with children with resident half siblings an exploration of the way in which sharing resources across households between half siblings can be made to better understand the mechanisms which drive the distinctiveness of children living with their half siblings. This would allow a distinction to be drawn between family complexity and the inter and intra household distribution of parenting resources.

The final limitation of the thesis relates to timing. Firstly, whilst the idea that family complexity is a process rather than an event and that life events which happened in the life of the parents of the focal child long before the focal child was born are captured by the data, it has not been possible to give exposure times to family complexity, and to capture the extent to which a child is still living through the process of family change and the extent to which family change was some time ago (bearing in mind the children are only seven). This data would have allowed consideration of the timing effects of family complexity, such as an examination of the time taken to adjust to family complexity, or whether family complexity in the early years is substantively different to family complexity in the first school years. The second limitation relating to timing is that the outcomes measured here are all measured cross-sectionally at the age of seven, how the growth curve of

children's well-being in particular is affected by their exposure to family complexity is unaddressed by this thesis but is potentially a relevant aspect of family complexity and children's lives to consider.

18.2 Future directions for research

This thesis has examined the role of family complexity in the well-being and development of contemporary young British children. Further work to ascertain the degree to which these findings are replicated in comparable children will add to the strength of the findings. Future research needs to specifically focus on children who are the biological children in stepfamilies, i.e. those with older half siblings as this is an important area I have not explored. The role of fathers, especially non-resident fathers, and paternal half siblings is unexplored in this thesis and as my interpretation of results relies heavily on the importance of and variability of the contribution of biological fathers this is an aspect of family complexity which needs to be explored.

The interpretation of findings offered here is not uncontroversial. It may be argued that I have relied upon, rather than tested the theory of incomplete institutionalisation. This is also a weakness of other studies in the literature which invoke the theory of incomplete institutionalisation without making attempts to test the theory against the data. There are full parental partnership histories available for all the children (and if not this is indicated) and these would enable us to see if there were significant differences between families formed in higher order partnerships dependent on the marital status of not just the current partnership but prior fertile partnerships. The reason this approach may be better served by future research rather than this thesis is two-fold. Firstly when the child in the MCS has older half siblings, as the majority of children with half siblings do, there is no information about the relationship into which the older half sibling was born. Looking at half siblings born in the focal child's lifetime, it is apparent that if there are differences contingent on relationship status in the previous partnership and more data is required.

Further research is needed into the structural differences in child rearing environment contingent on being formerly married, formerly cohabiting or never in a coresident partnership. This will enable us to structure the study of legacy effects from previous partnerships more accurately.

Further research on fathers may make the distinction for children's outcomes on the basis of the partnerships to which their half siblings and they were born redundant, as marital status is possibly a proxy for the quality and consistency of parenting input made by the various biological fathers to the children in the household. Marital status makes more sense if it is interpreted as a signal, particularly about fathers, rather than intrinsically valuable for children's outcomes. None the less I am aware of

the need for further research linking children's outcomes, sibling group complexity and the marital status of each of the mother's fertile partnerships.

Finally, the effects of timing of family complexity on children's well-being and development are unexplored in this thesis. Disentangling the timing of family complexity as a process in children's lives is difficult and may be best done using qualitative data it would enrich the advice for policy makers who wish to reduce the problems children experience as a result of their exposure to family complexity. If family complexity is understood as a process rather than an event looking at children's outcomes longitudinally is likely to improve the strength of understanding of family complexity. As the Millennium Cohort Study continues into the future with new waves released in the years since this thesis was commenced, there is significant scope to expand this work to relate the outcomes over time to family complexity.

Chapter 19. Conclusion

At the beginning of this thesis a number of research questions were posed from the existing literature, and a number of gaps in the literature were identified. This chapter relates my findings back to the original research aims and is followed by an assessment of how well this research fills the identified gaps in the literature. This summarises the discussions presented in the analytical section. Three research questions were originally posed.

Research question 1: How is children's well-being and development affected by parental partnership? Does this vary depending on how you measure it?

Regardless of how parental partnership is measured there is a consistent association with poorer externalising behaviour and poor reading ability. There is consistently no association between problematic internalising behaviour and parental partnership, once the economic characteristics of the household have been taken into account.

Looking at the externalising outcome, being in a household with a biological and social parent is associated with consistently poorer outcomes regardless of the initial partnership of the parents. There is a distinctly poorer behaviour associated with being the child of an initially unpartnered mother, regardless of their subsequent partnership history. These results accord well with the established literature. More unexpectedly there is a strong cohabitation disadvantage, which appears in both the models which include cohabitation, with both current and erstwhile cohabiters disadvantaged.

Looking at the reading outcome once again children who live with one biological and one social parent are at the greatest risk of poor reading ability. The disadvantage associated with the birth partnership of the parents is even more pronounced for poorer reading ability with the children of initially unpartnered mothers having particularly poor reading ability. This is a significant factor in the significance of the lone parent category in the status model. Once again the children whose parents were initially or currently cohabiting were at a disadvantage compared with the children of the married. This result is at odds with some of the existing literature, but is not unprecedented and perhaps reflects different analytical strategies.

There are differences by model type, with the differences not just by partnership transitions and partnership type. How important these differences are depends on the type of question you are

asking. Here when investigating a detailed parental partnership question the subtleties are important, but for many purposes a measure of birth and current partnership of the parent(s) will be sufficient. Overall, children's propensity to display problematic externalising behaviour is higher when they live with a stepparent than with partnered biological parents, and children whose parents were either not in partnership or cohabiting at their birth are further disadvantaged. The findings for poor reading ability are broadly similar.

Research question 2: How is children's well-being and development affected by their structural sibling relationship?

Structural sibling relationship refers to the biological degree of relatedness between siblings. In particular if siblings are full or half siblings. Relatively little research has examined the relationship between structural sibling relationship and children's well-being. The results obtained in relation to this research question are not straightforward. This is in part due to the difficulties in determining an appropriate reference group, as there is no normative sibling group, in the end I chose the no full, half or step siblings as a reference group for my models as this is a phase all families go through at some point.

There are some significant associations between structural sibling group and children's well-being, some of which serve to highlight the differences between only children and those with siblings. I found an association between externalising, internalising and reading ability with structural sibling group. Here I focus on the more complicated sibling groups.

Looking at the externalising outcome we observe that having younger full siblings reduces the likelihood that a child displays problematic externalising behaviour relative to children without siblings. Of more relevance to the investigation of family complexity we see that children with younger maternal half siblings, maternal half siblings with multiple non shared parents and other siblings (mainly various paternal half siblings and step siblings) are at increased risk of problematic externalising behaviour. Children who have older half siblings do not seem to share this heightened risk relative to only children.

Children with older full siblings or older and younger full siblings or older maternal half siblings are at a reduced risk of problematic internalising behaviour, relative to their peers who have no siblings. This indicates that in some instances complex sibling groups can outperform simple ones.

Finally, if we turn to reading ability children with older maternal half siblings and maternal half siblings with multiple non shared parents have significantly poorer reading ability than their peers who have no siblings. There are no significant differences between only children and children who live with their younger half siblings. This suggests that this is either the result of selection or a legacy issue arising from events before the child was born, rather than a function of stress in the family in the child's lifetime.

Looking at well-being and development there are differences between well-being and development. The most complicated sibling groups, those which include siblings with at least four different parents, have a greater likelihood of displaying problematic externalising behaviour and poor reading ability. Looking at those children who have younger half siblings from only one parental partnership it is apparent that they are at higher risk of displaying problematic externalising behaviour but at no greater risk for problematic internalising behaviour or poorer reading ability. Children with older maternal half siblings on the other hand do appear to be at greater risk of poor reading ability, but are less likely than only children to display problematic internalising behaviour and only as likely to display externalising behaviour. It therefore seems that the relative age and parentage of the half sibling(s) is important for determining whether children have problems with their behaviour or their development.

Research question 3: How is children's well-being and development affected by family complexity?

Initially this question was answered with reference to all children. Subsequently the specific group of children who lived with stepparents were considered in order to ascertain if the stepparent effect was, as has been suspected, actually a half sibling effect.

My initial approach to family complexity was to try and retain as much detail as possible from the parental partnership and sibling variables by using interaction effects. This did not prove practical because in a substantial number of possible models there were no significant interaction effects. Of more relevance was that for all three outcomes in the fully controlled models which jointly modelled parental partnership and sibling group structure (so no interaction effects), parental partnership was not significant, whereas sibling group was. This was the first indication that parental partnership did not have an independent effect on children's well-being and development once the structure of the child's sibling group had been controlled for. The generally unsatisfactory nature of the interactions approach counsels against over interpreting this finding.

The joint measure of family complexity separates out simple families, stepfamilies and three different types of blended families, depending on where the child sits in relation to parental partnership. So children who are the joint children in stepfamilies are considered separately to the stepchildren in families with joint children, and children were there is evidence of multiple partnerships are in the reblended group (e.g. older maternal half siblings and a stepparent to the focal child in the household). This single variable indicates that for the problematic externalising behaviour and the poor reading ability there is a hierarchy to the likelihood of poor outcomes. There is no evidence that children who live with stepparents only have poorer outcomes than children who live with biological parent(s) only and with no half or step siblings. All of the children in the blended families are at higher odds of poor outcomes than children who live with biological parent(s) only and with no half or step siblings. Children who have the most complex reblended families have the poorest overall outcomes, children who have half siblings only varying depending on the relative age of the half sibling, with poorer reading outcomes for children with older half siblings, and more externalising behaviour amongst children with younger half siblings. There are no associations between family complexity and problematic internalising behaviour. The joint measure of family complexity can be criticised for prioritising sibling group type over parental partnership, but this is in line with the findings from the earlier jointly controlled models which suggest that sibling group is more important than parental partnership in explaining children's outcomes.

In order to test the apparent finding that there is a half sibling effect on children's well-being children living in stepfamilies with and without half siblings were compared using a propensity score model which was intended to remove any latent selection into further fertility which may have been behind the observed differences between children in stepfamilies and those in blended families. The results show that the differences observed in reading ability are the result of selection into further fertility, but the differences between externalising behaviour are the result of the presence of biological children to the new partnership.

The evidence suggests that family complexity does have significant effects on children's well-being and development, and although the effects on development can be partially explained by selection, the effects on the externalising scale of socio-emotional well-being are significant. This thesis focuses on younger half siblings and explaining the observed stepparent disadvantage already established in the literature, but there are important effects of older half siblings even when the focal child's parental partnership is uninterrupted. The evidence presented here suggests that sibling complexity is an important element of explaining family complexity. Parental partnership is not

irrelevant but sibling complexity appears to have the greater impact on children's lives, with the findings clearest for young stepchildren who acquire half siblings.

Glossary

This section introduces the key concepts used in this thesis and their definition. The core concept of family complexity is described along with other relevant aspects of family structure.

A1.1 What is family complexity?

Family complexity can be interpreted as both a structural and a functional description. Structural complexity refers to the biological relationships between family members whereas functional complexity refers to the roles and obligations of family members to each other. Structurally complex families may be functionally complex, but it is important to note that family complexity under investigation here is a structural not a functional designation.

I have chosen to use a minor child focused definition of family complexity, because my interest is in relating children's outcomes to the characteristics of their families – although family complexity could be examined from the perspective of the parents, or from the perspective of adult children but this would suit alternative research interests. The definition of family complexity used in this thesis is the changes in parental partnership experienced by a child over their lifetime combined with the structure of their sibling group and how this changes over time, so if the child has half or step siblings and if these are maternal or paternal and if they are older or younger. This definition is intended to capture all families which differ from the baseline of partnered biological parents with all children in the household being to this union.

There are a number of important clarifications which are necessary for this definition. Firstly, there is evidence that parental bereavement has different effects on children than parental partnership breakdown, so those children who have suffered a parental bereavement are excluded (Amato and Anthony, 2014). Secondly, children who do not live with either parent or who have at any point lived apart from both parents are excluded from this definition.

The definition of family complexity requires a definition of what constitutes a change in parental partnership and what constitutes a sibling. Instinctively this seems obvious given the structural approach taken but these relationships are not necessarily designated. Children have two biological parents and when these parents are not in partnership with each other it is entirely possible for the child to spend time with both parents and hence for the evolution of the partnerships of both separated parents to have important consequences for the children. Equally it is possible for a child

to have little or nothing to do with one of their biological parents and for their partnership history to be irrelevant to the child. When parental partnership is defined this capture this variation needs to be captured, and restrict the definition to parents with whom the children have a consistent relationship. Finally, it is entirely possible for an individual to keep their partnerships completely apart from their child, (e.g. they may have a series of casual partners who they do not introduce to their child). From the perspective of a social researcher who prefers neat categorisations to negotiated relationships on a continuum this is a problem. This means it is probably necessary to restrict the definition of parental partnerships to co-resident or otherwise defined by the parents as a significant part of their household rather than everyone with whom they have had a brief relationship since their child was born. A sibling relationship can be defined legally and biologically, but the focus of this thesis is the social relationship rather than necessarily the biological relationship. It is acknowledged that siblings are not necessarily aware of each other's existence, and in these cases these siblings are irrelevant for family complexity. Following on from this even where siblings are aware of each other if they do not have a regular contact with each other, they are broadly irrelevant for the definition of family complexity, an example of this may be half siblings who live far apart from each other. Finally, half siblings may have large age gaps between them and older siblings can already be adults before the younger half siblings are born, and would have an adult-child relationship rather than a child-child relationship. The analysis is restricted to those siblings who spend time together as a family unit, and therefore spend at least some time as part of the same household (even if they normally reside elsewhere). Foster siblings and child relatives who live in the household as siblings (e.g. cousins who live with their Aunt/Uncle) are excluded from the definition of family complexity because the complexity that led to their inclusion in the household is unrelated to the partnership choices of the focal child's co-resident biological parent which is at the centre of the definition of family complexity.

The definition of family complexity used here has two constituent aspects, namely parental partnership and the parentage of the other children in the child's sibling group. A number of different terms are used in the main body of this thesis which relate to different aspects of parental partnership, sibling relationships and family complexity some of which may be somewhat ambiguous. This section defines these terms as the will be applied in this thesis.

A.1.2 Parental partnership

Parental partnership status

The marital status of the parents. There are five basic partnership statuses, married, cohabiting, never married, divorced and widowed; however this thesis is not looking at partnership status per se but parental partnership status. For parental partnership status the relationship with the focal child is also important, and the distinction between widowed and divorced is not usually made. The appropriate categorisations of parental partnership are therefore married biological parents, cohabiting biological parents, lone biological parent, married biological and social parent, cohabiting biological and social parent. As there are relatively few biological and social parent couples the legally married are not often distinguished from the cohabiting. Whilst marital status is widely understood and fairly easy to collect there is some confusion amongst respondents as to the definition of legally separated as this frequently selected, when this is a rare legal alternative to divorce, not the prelude to a divorce or an individual post-cohabitation.

Parental partnership trajectory

This is a measure of parental partnership status over time. It is intended to dynamically capture all changes, even if they only prove to be temporary to parent's marital status over the child's lifetime. So if the parents are cohabiting at the child's birth, subsequently marry, then divorce before finally a social parent is introduced this variable would record all of this with appropriate distinction for marital status. In principle there are a large number of possible trajectories, which for practical use would require simplification, but it is important to maintain those distinctions which are considered important. In the example trajectory the biological parents marriage in the child's early years may have been ignored, and the period of living with a lone parent implied rather than explicitly stated in order to obtain an analytically manageable sample.

Parental partnership transitions

This measure focuses on the changes in parental partnership rather than the partnership status of the parents at any given point. All children who had not experienced a change in their parent's partnership would be grouped together, regardless of what this parental partnership was. Sometimes parental partnership transitions is conceived of as a count measure but this fails to distinguish between repartnering with a child's biological parent and partnering with a social parent. It is reasonable to assume that there are important differences between the two.

A.1.3 Sibling group measures

Sibling group structure

This is the biological relationship between siblings. At its broadest it includes relative age and gender of siblings of a focal child as well as common parentage. The most comprehensive measure would record, for example, two older full sisters, one younger maternal half-brother and an older step brother, biological child of the social father, to a cohort boy if that were appropriate. This thesis does not look at the gender differences in sibling relationships so would only record older full siblings, younger maternal half sibling and older step sibling to the cohort child. The number of siblings is not captured in this variable however it is implicit to a degree as lots of different structural relationships mean that there are lots of siblings. The most important aspects for this thesis are the biological degree of relatedness between siblings, and where there are half siblings if these are maternal or paternal and if they are older or younger.

Complex sibling group

For the purposes of this thesis a complex sibling group is one in which at least one of the siblings of the focal child is a half sibling. A simple sibling group is its opposite and includes children with only full siblings and children without any siblings.

A. 1.4 Family complexity

Step family

A family in which there are two parents, with at least one child who is a biological child of only one of the partners, and there are no shared biological children to the couple heading the family. A step family would contain a biological parent, a social parent, a focal child and either no siblings or full siblings only or stepsiblings to the focal child and their full siblings; children in the family are either all stepchildren of the focal child's social parent, or stepchildren of the focal child's resident biological parent.

Blended family

A family in which there are two parents, with at least one child who is a biological child of only one of the partners, but which also includes at least one biological child of the parents heading the

family. These families must contain at least one half sibling to the focal child, and this half sibling has both biological parents in the household. All half siblings in the household must be the biological child of the focal child's social parent. Where there are step siblings these are also half siblings to the focal child's half sibling. Families are also blended families when the focal child is the child of both the resident parents but there are half siblings in the household from one of the biological parents' previous partnerships.

Reblended family

A family in which there is evidence of at least three partnerships to the shared biological parent, so this may be half siblings from three different relationships, or half siblings from two different relationships and a stepparent to both of these children in the household. These are the most diverse families, as they include families otherwise defined as stepfamilies above but in which there are half siblings to the focal child who are also stepchildren to the focal child's social parent. Where there are step siblings to the focal child who are also half siblings to the focal child's half sibling these do not count as reblended families, as there is no evidence of three partnerships to the biological parent.

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