DOCTOR OF PHILOSOPHY

Understanding the disparity of educational attainment

The role of socio-demographic and school factors on GCSE attainment in Northern Ireland

Early, Erin

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Abstract

In the mainland of the United Kingdom (UK), primary and post-primary attainment trends according to a pupil's demographic profile and school level factors are well documented. However, when examining the Northern Ireland context, less is known due to the lack of available data for analysis. As Northern Ireland reflects a somewhat unique cultural, historical and political landscape, studies from the rest of the UK cannot be relied upon to fully understand the effects of socio-demographics and school factors on attainment trends in Northern Ireland. This study aimed to address the gap in the current literature by executing quantitative analysis on the first dataset in Northern Ireland to combine the Census (2011), School Leavers Survey (2010-2014) and School Census (2010-2014). Multilevel modelling examined the effects of socio-demographics and school factors on GCSE (General Certificate of Secondary Education) attainment in Northern Ireland, namely socio-economic status (measured through eight indicators), religion, gender and school type. The data used for analysis provided the first opportunity in Northern Ireland to examine attainment trends for three whole population cohorts who sat their GCSEs in consecutive academic years (2010/2011, 2011/2012, 2012/2013). The data also provided an opportunity to examine socio-economic measures (namely maternal qualifications, paternal qualifications, maternal occupational status, housing tenure, property value and the Northern Ireland Multiple Deprivation Measure (2010) for income) that had not previously been available for analysis in educational research in Northern Ireland. When examining the within model effects, the analysis found attending a grammar school had the greatest effect on GCSE attainment, followed by gender (in favour of females). The socio-economic factors of a mother's and a father's education qualifications (degree level qualification), free school meal entitlement and housing tenure (residing in a privately owned property) reflected the highest socio-economic effects within analysis. This study also found religion had a varying effect on GCSE attainment. Most notably, the attainment difference between Catholic and Protestant pupils was negligible. Interaction terms were also executed to examine the multiplicative effects of factors on GCSE attainment, which is currently limited in Northern Ireland. As attainment patterns can be understood in various ways using different perspectives, two theories were used throughout to consolidate our understanding. Social identity theory predominantly explained attainment trends

according to religion, gender and school type, whilst Bourdieu's (1986, 1984) concepts of capital and habitus were predominantly used to understand the effects of socio-economic status and school type. Based upon the findings, this thesis addressed current gaps in the literature and provided direction for future research and policy interested in educational attainment according to socio-economic status, religion, gender and school type, especially in the Northern Ireland context.

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List of Abbreviations

ADRC-NI	Administrative Data Research Centre Northern Ireland
ADRN	Administrative Data Research Network
AQE	Association for Quality Education
BHPS	British Household Panel Survey
CAT	Cognitive Abilities Test
CCEA	Council for the Curriculum, Examinations and Assessment
CI	Confidence Intervals
DUP	Democratic Unionist Party
EMU	Education for Mutual Understanding
EPPSE	Effective Pre-School, Primary and Secondary Education
FSM	Free School Meals
FSME	Free School Meal Entitlement
GCSE	General Certificate of Secondary Education
GCSEs	General Certificates of Secondary Education
GL Assessment	Granada Learning Assessment
ICT	Information Computer Technology
ID	Identification
LPS	Land and Property Service
LSYPE	Longitudinal Study of Young People in England
MCS	Millennium Cohort Study
NI	Northern Ireland
NI-MDM	Northern Ireland Multiple Deprivation Measure
NISRA	Northern Ireland Statistics and Research Agency
NS-SEC	National Statistics Socio-Economic Classification
NVQ	National Vocational Qualification
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Square
ONS	Office for National Statistics
PISA	Programme for International Student Assessment
PTE	Progress Test in English
PTM	Progress Test in Maths

List of Abbreviations (continued)

RSU	Research Support Unit
SCQF	Scottish Credit and Qualifications Framework
SD	Standard Deviation
SDLP	Social Democratic and Labour Party
SE	Standard Error
SEN	Special Educational Needs
SES	Socio-Economic Status
SOA	Super Output Area
SOAs	Super Output Areas
SURE	Safe User of Research data Environment
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UPRN	Unique Property Reference Number
USA	United States of America
UUP	Ulster Unionist Party
VPC	Variance Partition Coefficient

Chapter 1: Introduction

Post-primary attainment is of key importance to a pupil's academic trajectory in post compulsory education, whilst also a key determinant in later life outcomes such as employment (Lessof et al., 2018; Nunn et al., 2007). Post-primary attainment is therefore central to driving social mobility in society and is of great importance to understand (Crawford, Macmillan and Vignoles, 2014; Scherger and Savage, 2010; Nunn et al., 2007). In the United Kingdom (UK), post-primary attainment is commonly measured according to a pupil's grades in GCSEs (General Certificates of Secondary Education). The grading of GCSEs has followed an alphabetical ranking, with A* reflecting the highest pass grade and G reflecting the lowest pass grade. However, in recent years, the grading system of GCSEs has shifted towards a numerical structure ranging from 9 to 1, with 9 reflecting an A* grade, whilst a score of 1 reflects a G grade (Department for Education, 2016). Throughout the UK, pupils undertake their GCSEs during the last year of compulsory education when they are aged between 15 and 16 years old. In Northern Ireland (NI), pupils completing their GCSEs are in Year 12 of the compulsory education system, whilst in England and Wales, pupils undertaking their GCSEs are in Year 11. As this thesis focuses upon GCSE (General Certificate of Secondary Education) attainment in Northern Ireland, 'Year 12 pupils' is commonly discussed throughout. It is therefore important to understand this contextual distinction of year groups between Northern Ireland and the rest of the UK.

The post-primary attainment of pupils according to their socio-demographic profile is of key interest to researchers and policy makers to understand what factors are predictors of high educational attainment. By understanding such relationships, it provides an opportunity to critically examine how the performance of lower achieving pupils can be improved. A wide range of socio-demographics have been focused upon in existing research examining post-primary attainment trends in the UK. For example, a pupil's socio-economic status (SES) (Diemer et al., 2013; Dubow, Boxer and Huesmann, 2009; Shavers, 2007; Connolly, 2006; Davis-Kean, 2005; Considine and Zappala, 2002), religion (Burns, Leitch and Hughes, 2015; McManus, 2015; Mulvenna, 2012; Purvis, 2011), gender (Department for Education, 2018a, 2018b, 2017a; Francis and Skelton, 2005; Gorard, Rees and Salisbury, 2001), ethnicity

(Strand, 2014, 2008), Special Educational Needs (SEN) (Farrell et al., 2007; Rouse and Florian, 2006), physical health (Hale and Viner, 2018) and mental wellbeing (Gutman and Vorhaus, 2012), have all been previously examined as predictors of post-primary attainment. School level factors are also of interest due to their impact upon pupils' attainment. School level factors that have previously been examined in research across the UK include: school type (grammar/non-grammar) (Gorard and Siddiqui, 2018; Andrews, Hutchinson and Johnes, 2016; Coe et al., 2008; Gallagher and Smith, 2000), management structure (associated religious affiliation - Northern Ireland only) (Daly, 1991) and ethos (Baars et al., 2018; Ellis, 2013; Glover and Coleman, 2005). The Northern Ireland context is somewhat unique compared to the rest of UK due its transition to a post-conflict society, its selective education system, (academically and according to religious affiliation), and its socio-historical and cultural factors. Due to these characteristics, educational research outside of Northern Ireland is limited in explaining its attainment patterns and cannot therefore be relied upon to infer knowledge about Northern Ireland.

Based upon the socio-historical context and cultural factors associated with Northern Ireland, the predictors of key interest in this study are: socio-economic status, religious affiliation, gender and school type. Socio-economic status is a multidimensional concept that can be measured using various indicators. Across socio-economic indicators, research highlights the consistently negative influence of lower socio-economic background on attainment. As a result, SES continues to be a prominent issue in educational attainment across the UK (Hobbs, 2016; Strand, 2014; Themelis, 2013; Strand, 2011; Connolly, 2004). In addition, religion remains a key indicator of social identity in Northern Ireland (Ysseldyk, Matheson and Anisman, 2010; Muldoon et al., 2007; Mitchell, 2005). Discourse suggests religious affiliation has a noteworthy influence on educational outcomes in Northern Ireland, with the underachievement of Protestant working class boys cited across studies (Burns, Leitch and Hughes, 2015; McManus, 2015; Lundy et al., 2012; Mulvenna, 2012; Purvis, 2011). However, few studies have statistically tested the relationship between religious affiliation and GCSE attainment in Northern Ireland. Moreover, gendered attainment patterns in favour of female pupils are consistently reported across the UK (Department for Education, 2018a, 2018b, 2017a; Francis and Skelton, 2005; Gorard, Rees and Salisbury, 2001). However, recently, few studies have statistically tested this relationship in Northern

Ireland. Lastly, the selective structure of the Northern Ireland education system influences attainment rates, with grammar schools continually reflecting higher GCSE attainment (Gallagher and Smith, 2000; Shuttleworth and Daly, 2000; Shuttleworth, 1995). The relationship between grammar school attendance and GCSE attainment was statistically tested in this thesis to provide an updated insight into such relationship.

In Northern Ireland, due to the lack of in-depth data available for analysis, few studies have had the power to quantitatively examine multiple predictors of GCSE attainment at the pupil level and school level. This has limited the extent to which we can consolidate our understanding of how pupil level socio-demographics and school level factors influence GCSE attainment. In turn, it limits the ability of effectively informing policy of which factors have the greatest influence on attainment and how, in practice, we can improve the outcomes of pupils with lower GCSE attainment. This thesis uses the first dataset in Northern Ireland to link the Census (2011), School Leavers Survey (2010-2014) and School Census (2010-2014) to examine GCSE attainment trends in Northern Ireland. As the first administrative dataset in Northern Ireland to link these three data sources for analysis, it provided a unique opportunity to examine a range of variables that had not been commonly studied in education research in Northern Ireland (namely maternal qualifications, paternal qualifications, maternal occupational status, housing tenure, property value and the Northern Ireland Multiple Deprivation Measure (2010) for income). In addition to the number of predictor variables provided, data were also provided for three whole population Year 12 cohorts, allowing the effects of predictor variables to be controlled for across three consecutive academic years (2010/2011, 2011/2012 and 2012/2013); something of which has not been previously executed in Northern Ireland. The data therefore provided the largest pupil cohort that has been available for education research in Northern Ireland to date (n=61,373). The findings presented in this thesis are subsequently dependent upon the data that was used to conduct analysis. In relation to this, to align with protocols from the Northern Ireland Statistics and Research Agency (NISRA), who linked the datasets for this study, all analysis that is presented in this thesis has been approved by two staff members of the Research Support Unit (RSU) at NISRA. Moreover, to align with the procedures outlined by NISRA, no analysis with values of less than 10 cases (be it

pupil or school level cases) were permitted for inclusion in reporting of this study. As a result, all analysis presented in this thesis is non-disclosive.

The overall aim of this thesis was to examine educational attainment inequalities in Northern Ireland through the individual and collective influences of socio-economic status, religion, gender and school type. This study is a timely addition to the literature and policy context of Northern Ireland as it heavily aligns with the New Decade New Approach deal of the restored Northern Ireland Assembly which stated, "The Executive will… examine and propose an action plan to address links between persistent educational underachievement and socio-economic background, including the long-standing issues facing working class Protestant boys" (Northern Ireland Office, 2020, p.7). To fulfil the overall aim of this thesis, four research questions were created to direct analysis:

1. Which socio-economic status factor has the greatest effect on GCSE attainment?

2. How does a pupil's socio-economic status, religion, gender and school type affect their GCSE attainment?

3. How do possible interactions between independent variables influence GCSE attainment? (Are Protestant working class boys underachieving when compared to other groups?)

4. What is the unexplained variation in GCSE attainment in the full multilevel model at the individual and school level?

To answer the research questions, a quantitative approach was taken to execute multilevel models on the dataset which linked the Census (2011), School Leavers Survey (2010-2014) and School Census (2010-2014). In Northern Ireland, no previous studies have examined the relative within model effects of various SES measures on GCSE attainment. Moving beyond existing education research in Northern Ireland, this thesis examines eight SES factors at the pupil level. These factors were: free school meal entitlement (FSME), housing tenure, property value, mothers' and

fathers' education qualifications, mothers' and fathers' occupational status, and the Northern Ireland Multiple Deprivation Measure 2010 (NI-MDM) for income. In addition, this thesis critically examines the discourse suggesting Protestant pupils and more specifically, Protestant working class boys are underachieving in the education system. The interactions between socio-economic status, religion, gender and school type were also examined in this thesis. The interaction terms provided a key contribution as they explored the multiplicative effects of independent factors on GCSE attainment, which is currently lacking in education research in Northern Ireland.

With the overall aim of examining the individual and collective within model effects of pupil level socio-demographics and school level factors on GCSE attainment in Northern Ireland, this thesis is comprised of five chapters: introduction, review of the literature and theoretical framework, methodology, results and discussion.

The first chapter, the introduction, provides background to the study, along with its rationale and aims.

The second chapter provides an extensive review of existing literature according to the key factors of interest. This chapter engages with existing studies examining educational attainment trends in Northern Ireland and the wider UK context. Knowledge gaps evident within the literature which this study aims to explore are also outlined. The theoretical framework of this thesis is extensively discussed throughout this chapter. This thesis uses two theoretical perspectives to understand attainment trends: one theory that places the individual at the centre of all processes (social identity theory) and one that places the individual within the societal structures (Bourdieu's (1986, 1984) concepts of capital and habitus). The complementary perspectives of each theory and how effectively they work together to deepen our understanding of attainment trends are outlined in Chapter Two. In addition, Chapter Two highlights the lack of primary school attainment data available in Northern Ireland to understand the influence of socio-demographics such as gender. To begin to fill this knowledge gap, analysis of Granada Learning (GL) Assessment data for Northern Ireland that became available for analysis during the period of this research project is presented.

The third chapter provides an in-depth description of the methodological approach and analytical strategy of this thesis. The research aims, questions and hypotheses are also presented. This chapter outlines the data used for analysis which was the first instance in Northern Ireland that the administrative data sources of the Census (2011), School Leavers Survey (2010-2014) and School Census (2010-2014) were linked for analysis. The data used for analysis is extensively discussed along with the chosen method of multilevel modelling.

The fourth chapter presents the findings from the analysis of this thesis. Chapter Four discusses the within model effects of pupil level and school level factors on GCSE attainment in Northern Ireland according to three different multilevel model structures: the socio-economic model, the full model and the interaction models. The proportion of unexplained variation in GCSE attainment at the pupil level and school level in the full model are also discussed. The results presented in this chapter illustrate the richness of the linked administrative dataset which provided the opportunity to examine post-primary attainment in Northern Ireland according to factors that have not been previously available.

The fifth and final chapter of this thesis provides a discussion based on the results presented in Chapter Four. According to each of the key factors, the results of this thesis are examined in relation to existing literature and the theoretical framework of this study. This chapter also highlights the theoretical and empirical importance of the study to the field of education research. This chapter concludes by highlighting the key messages and the implications for policy and practice. By doing so, this thesis emphasises where attention on attainment differences between social groups should be placed in future policies and research.

Chapter Two: Review of the Literature and Theoretical Framework

2.1 Introduction

Attainment disparities across social groups are evident throughout compulsory education in the UK, with some groups experiencing higher educational attainment than others. This chapter aims to examine attainment disparities across the socio-demographic and school level factors of socio-economic status, religion, gender and school type, whilst providing theoretical explanations for why such trends are apparent. This chapter provides context for the current study, whilst highlighting the gaps in the wider literature this thesis aims to address. The chapter aim reflects the overall aim of this study to examine the individual and collective influences of socio-economic status, religious affiliation, gender and school type on post-primary attainment in Northern Ireland. Linked administrative data combing the Census (2011), School Leavers Survey and School Census that have never before been available in this structure are used in this thesis. The data used provide pupil and school level information for three whole population Year 12 (aged 15-16 years) cohorts in Northern Ireland. The magnitude of the data in terms of the number of pupils and factors available for analysis provide the first opportunity to examine attainment trends across whole population Year 12 cohorts in Northern Ireland to this extent. A narrative systematic review was conducted as part of this thesis to explore the existing literature within the field and has since been published in the Review of Education (2019). This systematic review explored the influences of gender and SES on the Programme for International Student Assessment (PISA) outcomes in the UK between 2000 and 2012 and is cited throughout as *Early et al., (2019).*

The current chapter begins with an introduction to the theoretical framework used within this thesis to help explain attainment trends according to the outlined socio-demographics and school level factors. The various measures of attainment used throughout compulsory education in the UK are then outlined. Primary and post-primary attainment trends across the UK are discussed in relation to socio-economic status, religion and gender, with theoretical explanations for such trends provided throughout. Summary paragraphs are provided at the end of each section to give an overview of the key trends and theoretical explanations. The collective influences of

socio-economic status, religion and gender on attainment are then considered. Following this, the chapter focuses upon school level factors and cross-level interactions that influence attainment. The concluding sections provide a summary of the key points and an overview of the existing gaps in the literature that frame this thesis.

2.2 Theoretical Framework

Two theories (social identity and Bourdieu's (1986, 1984) concepts of capital and habitus) are used within this chapter and throughout the wider thesis as a framework to help explain attainment differences according to socio-demographics and school factors. In relation to social identity theory, the socio-demographic factors considered within this study are to an extent assigned to individuals. For explanatory purposes, it is therefore assumed that an individual's socio-economic position, religious affiliation, gender and school type attended reflects their identity. However, it is acknowledged that the extent to which this is true for all individuals may vary. Although this may be deemed deterministic, such use of social identity theory can help process how socio-economic position, religious affiliation, gender and school type attended, individually and collectively influence identity, and subsequently influence an individual's behaviours, attitudes and outcomes. This closely aligns with the focus of this study and will provide appropriate theoretical explanations to understand attainment trends across socio-economic status, religion, gender and school type categories.

Social identity was defined as an individual's "…knowledge that he belongs to certain social groups together with some emotional and value significance to him of this group membership" (Tajfel, 1972, p.292). In sum, social groups are comprised of similar individuals belonging to the same social category (Tajfel and Turner, 1979). Social identity theory outlines three stages of the identity process: categorisation, identification and comparison. Throughout the social categorisation process, individuals are consciously and subconsciously reflexive as they categorise themselves based on common characteristics as belonging (in-group) and not belonging (out-group) to social groups (Turner, 1985). Through this reflexive process, social categorisation provides an individual with a tool of self-reference, as the social group provides an identity and a clear position within society (Sherriff, 2007; Tajfel

and Turner, 1979). Central to the social categorisation process is an individual viewing themselves as part of the social group (in-group) rather than an individual (Hogg, Terry and White, 1995; Turner, 1985). When this depersonalisation occurs, individuals represent social groups through cognitive prototypes which inform behaviour, whilst allowing behaviour to be understood externally through the social group lens (Hogg et al., 2004). Following the process of social categorisation is social identification which sees an individual openly identify with a social group through their behaviour which reflects the group norms (Hogg et al., 2004). Individuals then compare themselves based on the social groups they identify with (in-group) with opposing social groups (out-groups) to create a positive social identity based on their social categorisations (Tajfel and Turner, 1979).

Hogg, Terry and White (1995) highlight social identity theory is a beneficial perspective as it provides an insight into the socio-cognitive processes that are central to the creation and internalisation of identities and aligned behaviour. However, Hornsey (2008) notes that a potential criticism is the oversimplification of the identity process, with Brown (2000) adding that in different social contexts, the strategies of identity creation may vary from those outlined above, and such variability is not acknowledged or discussed by Tajfel and Turner (1979). Huddy (2001) also notes there is a lack of discussion within social identity theory about whether some individuals attempt to avoid categorisation and at what point do they begin to internalise social identities. As such, Huddy (2001) suggests individual differences are not focused upon, despite the individual being central to the theory. Such discussion may help explain attainment differences within social groups as not all individuals associated with such group may accept and enact the identity to the same extent.

A core limitation of social identity theory in relation to this study is its inability to explain how factors such as poverty affect behaviour and outcomes. As a result, Bourdieu's (1986, 1984) concepts of capital and habitus are drawn upon to better inform our understanding of socio-economic differences in educational attainment and to help bridge this gap in the theoretical framework of this thesis. Socio-economic differences and education are central to Bourdieu's theory (Edgerton and Roberts, 2014). It would therefore be difficult to fully understand the influence of socio-economic status on attainment without referring to some of Bourdieu's work.

Although social identity theory can help explain how individuals are categorised according to their socio-economic position, for some factors such as parental education and occupation, it is difficult to solely base an individual's identity on their parents' status as these factors do not directly create an individual's identity but instead help inform its structure. By incorporating Bourdieu's (1984, 1986) concepts of habitus and capital into the theoretical framework of this thesis, it provides a more inclusive, diverse and in-depth understanding of the underlying socio-economic processes that affect educational attainment.

A key focus of this thesis is on socio-economic differences in educational attainment, which Bourdieu's concepts of habitus and capital heavily align with. Bourdieu (1984, p.170) described habitus as "…a structuring structure, which organises practices and the perception of practices…". The habitus reflects internal representations of external structures as it embodies our thoughts, beliefs and interests (Bourdieu, 1984). In relation to this, Yang (2014) summarises that habitus reflects a cognitive system of social structures that is internally embedded within an individual. As a product of the internalisation of social structures, habitus therefore indicates an individual's dispositions, whilst shaping their behaviour (Yang, 2014). Habitus has a double purpose as it shapes social structures, whilst social structures shape our habitus; thus highlighting the interdependence of internal and external structures. Although habitus is primarily shaped unconsciously through socialisation and guides an individual's present and future behaviour, it is not fixed as it adapts to various settings and situations over an individual's life course (Bourdieu and Wacquant, 1992). Habitus therefore shapes an individual's behaviour and perspective but it does not constrain them (Edgerton and Roberts, 2014). Habitus is closely linked to forms of capital as they help structure such dispositions and determine the position of individuals within the given field, of education, in this instance.

Bourdieu (1986) discusses various forms of capital (economic, cultural and social) that are independent but also interact with one another. The possession of these capital forms determines an individual's trajectory and are related to an individual's habitus. Bourdieu (1986) believed economic capital was central to the transmission of one capital form to another. Economic capital refers to monetary resources and other resources of economic importance such as property ownership. Cultural capital is

acquired through social circumstances and refers to one's cultural position based on their tastes and knowledge of literature, arts and music (Bourdieu, 1984). However, Lareau and Weininger (2003) broadened the definition of cultural capital to encompass the possession of cultural and social competencies such as knowledge of institutional contexts, processes and expectations, along with the linguistics and cognitive skills to accompany these competencies such as reading, communication and analytical reasoning. Yang (2014) outlined that cultural capital is evident in three states: objectified and institutionalised, referring to the possession of cultural products, and embodied, which incorporates the habitus as it refers to the ability of understanding cultural codes through material objects such as literature and paintings. The structure and dispositions of an individual's habitus subsequently affect the level of embodied cultural capital they possess. Throughout this chapter, cultural capital is discussed generally and distinctions are not made between the different states. The final capital form discussed in this thesis is social capital. Social capital refers to the social network an individual belongs to, which is somewhat dependent upon an individual's economic and cultural capital (Bourdieu, 1986).

Education was of key interest to Bourdieu (1986) as he viewed it as determining status and power within society, whilst also exacerbating inequality through selection, content and qualifications which classified individuals (Jenkins, 1992). Cultural capital is central to educational success as it assists an individual in a system where curriculum and teaching is heavily aligned with high levels of such capital. Bourdieu (1994) suggested economic and cultural capital were linked in the education system as educated middle class parents have experience of how the education system works (cultural capital) and have the economic capital to invest in their child's education to ensure their success.

Despite Bourdieu's emphasis on the importance of cultural capital, some do not view it as a useful concept (Kingston, 2001). Lamont (1992) suggests that cultural capital is more complex today as societal shifts such as social mobility are apparent since the time of Bourdieu's writing. In addition, in today's society, individuals participate in activities from various social institutions meaning cultural boundaries vary across contexts and social groups, not just social class. Others criticise the concept of habitus, believing it is too vague to make any clear contributions to the field (Van de Werfhorst,

2010). Despite this, Edgerton and Roberts (2014) suggest that using cultural capital and habitus together continues to provide substantial explanations. Edgerton and Roberts (2014) continue that some view habitus as a deterministic concept that undermines individual agency, suggesting those from lower socio-economic positions are socialised into dispositions that reaffirm disadvantaged conditions. However, by considering later work and subsequent refinements made to the concept, Edgerton and Roberts (2014) suggest habitus can be viewed more openly as a concept unique to each individual that means social origins do not determine later outcomes. Moreover, as the context of Bourdieu's work was based in France, it is questioned whether it can explain socio-economic differences in various geographical contexts (Hjellbrekke and Korsnes, 2010). Hjellbrekke and Korsnes (2010) highlight that outcomes in one country cannot be predicted by Bourdieu's analysis of French data, however this does not mean Bourdieu's work is completely irrelevant to explaining outcomes in different social contexts.

Others are more positive of Bourdieu's work, with DiMaggio (2007) highlighting that his work on education and capital provides an opportunity to understand individual attainment within the social structure of the school. Bourdieu's work has subsequently allowed critical exploration into the effects of economic capital and non-monetary capital on attainment and educational advantage at the individual level (Vryonides, 2010; DiMaggio, 2007). As highlighted by Edgerton and Roberts (2014), most educational research focuses upon either habitus or cultural capital and only occasionally are both concepts used. This chapter and broader thesis will reference both habitus and capital forms (mainly economic and cultural capital) to provide the most appropriate explanations to the educational attainment trends reflected in empirical studies and the findings of this thesis.

To summarise, two overarching theoretical perspectives are used within this chapter and wider thesis to help explain educational attainment differences according to socio-demographics and school factors. Social identity is the predominant theory used to explain attainment differences according to gender, religion and the interaction of social categories. Social identity theory highlights that people categorize themselves as part of a social group and then identify within it. However, as outlined there are some limitations to this perspective. As a result, Bourdieu's (1986, 1984) concept of

capital and at times, habitus are used to bridge the gap in the theoretical explanations that social identity falls short on, especially when considering attainment differences according to socio-economic status and school type. However, as outlined these concepts are also limited. By using both theories, one that places the individual central to all processes (social identity) and one that places the individual within the societal structures (Bourdieu), the theoretical perspectives incorporate levels of both individual and structural arguments, providing a more in-depth and rounded perspective than one theory alone could provide.

2.3 Measuring Attainment in the UK

To provide context to attainment disparities amongst pupils in post-primary school, it is important to understand attainment trends at an earlier stage of the compulsory education system. As a result, primary school attainment trends are also considered in this chapter. It should be highlighted that the ages of pupils in primary years differ in Northern Ireland from the rest of the UK. As a result, there is differences in the stated ages of pupils depending on the UK country discussed in this chapter. Throughout primary schooling in the UK, pupils are assessed at the end of each key stage on literacy and numeracy. In England, national curriculum assessments are introduced at the end of Key Stage 1 (age 6-7 years), when teachers assess pupils in English (reading and writing), mathematics and science. At the end of Key Stage 2 (age 10-11 years), pupils are again subject to national curriculum assessments which have a core focus on English (reading, grammar, punctuation and spelling) and mathematics (Roberts, 2017). In the past, and currently, Northern Ireland has no statutory testing in primary school unlike the rest of the UK. In 2012, assessments were introduced in Key Stage 1, 2 and 3 in Northern Ireland to examine skills of communication (reading, writing, talking and listening), mathematics and computers (Information Computer Technologies (ICT)). Across primary school years 3-7 (age 6-11 years), teachers conduct the assessment in schools by structuring them as on-going class work (Council for the Curriculum, Examinations and Assessment (CCEA), 2018a). Teachers must decide upon the level (ranging from 1-5, 5 being the highest) that is achieved by each pupil at the end of the given Key Stage (CCEA, 2017). Pupils receive a separate numerical level for communication, mathematics and ICT (CCEA, 2018a). These are viewed as summative outcome measures of progress that can provide formative

information to teachers to shape their future teaching and pupils' learning (CCEA, 2018a). In Years 4 and 7 (ages 7-8 years and 10-11 years; the final year of Key Stage 1 and 2, respectively), the progression level achieved by a pupil is reported to parents (CCEA, 2017). Although these are termed standardised assessments, as teachers decide the level a pupil has achieved, there may be some discrepancies between teachers and schools. However, internal standardisation processes are outlined by CCEA (2017) to ensure there is agreement on the progress levels given to pupils. In addition, an external moderation process takes place to ensure assessments across schools are consistent (CCEA, 2017). In contrast to England where data on primary school assessments are available for analysis, data of the same nature are not available in Northern Ireland, limiting our knowledge of attainment trends according to socio-demographic factors in primary school.

Across the UK (excluding Scotland), in the final year of compulsory post-primary education (age 15-16 years), pupils undertake GCSEs which provide a standardised framework for assessing post-primary attainment. GCSE attainment is commonly measured according to an alphabetical grading system. Grades A*-G are regarded as a pass and grade U indicates the minimum standard to achieve a grade was not met. A commonly used measure of post-primary attainment is achieving 5 or more GCSEs A*-C, including English and maths. This reflects a binary structure, placing pupils into the categories of 'achieved' and 'did not achieve'. This can be deemed a deterministic approach to examine post-primary attainment as it fails to acknowledge the continuum of different GCSE attainment rates. In recent years, there has been a shift towards a numerical grading system for GCSEs in England and Northern Ireland, ranging from 9 (equivalent to A*) to 1 (equivalent to G), helping overcome the deterministic binary attainment measure.

2.4 Socio-Economic Status

2.4.1 Socio-Economic Status Definitions

Since the 1950s, research has viewed socio-economic status as a major theoretical concern due to its established influence on attainment (Shain and Ozga, 2001). Socio-economic status refers to an individual's access to resources such as wealth, power and social status (Gorard, Huat See and Smith, 2008; Mueller and Parcel, 1981). Socio-

economic status can be measured at three levels: individual, school and neighbourhood (Gorard, Huat See and Smith, 2008; Sirin, 2005). This study will examine how SES affects attainment at the individual level due to the availability of such indicators in the data used for analysis. Existing studies use a range of indicators to measure individual level SES. These include: free school meal entitlement, parental education, parental occupation, parental income, home ownership, residential location and Super Output Areas (SOAs) (Leitch, Hughes and Jordan, 2014; Diemer et al., 2013; Dubow, Boxer and Huesmann, 2009; Shavers, 2007; Davis-Kean, 2005; Considine and Zappala, 2002; Marks, 1999; Mueller and Parcel, 1981).

Free school meal entitlement is commonly used as a proxy of SES in educational research. Free school meal entitlement is provided to pupils residing in a household with a total income of £16,190 or less, or those residing in households receiving the following benefits: income support, income-based jobseekers allowance, income-related employment and support allowance, state credit pension, child tax credit, working tax credit or universal credit (House of Commons Education Committee, 2014). In England, 13.7% of primary school pupils and 12.4% of post-primary school pupils were eligible and claimed free school meals (FSM) in 2017/2018 (Department for Education, 2018c). In Scotland, 53.4% of primary school pupils and 14.1% of post-primary pupils were registered for FSM in 2017 (Scottish Government, 2017a), whilst in Wales, 18.3% of primary school pupils and 16.5% of post-primary school pupils were eligible for FSM in 2017 (Welsh Government, 2017). In Northern Ireland, around 30% of primary and post-primary pupils have been entitled to FSM in recent years (Department of Education, 2017a; 2016a; 2015a).

According to Duncan, Featherman and Duncan (1972), there are three core elements of SES; parental education, occupation and income. Parental education provides an insight into the cultural and social capital available to a pupil, whilst also indicating parental income (Erola, Jalonen and Lehti, 2016; Sirin, 2005). Parental occupation provides information about income and education, whilst parental income reflects the social and economic resources available to a pupil (Sirin, 2005). Overall, parental position in the socio-economic structure has a noteworthy influence on attainment across compulsory education (Sirin, 2005; Considine and Zappala, 2002). Subsequently, by including more than one parental status variable, it provides a more

inclusive and in-depth understanding of how socio-economic status and more specifically, parental status influence attainment than would be possible if only one factor was included in analysis (Early et al., 2019).

Other indicators used to measure SES are property based variables. Housing tenure refers to the ownership of property, which is a proxy for the economic resources and social capital available to an individual (Considine and Zappala, 2002). The property value in which an individual resides also provides an insight into a family's SES position. Relating to property based variables, residential location indicates the extent to which an individual is exposed to spatial deprivation. More specifically, the Northern Ireland Multiple Deprivation Measure (2010) provides an indication of deprivation based on where an individual resides through a range of different indicators such as income. The NI-MDM income indicator identifies the proportion of the population experiencing income deprivation, based on the number of individuals living in households in receipt of the following benefits and tax: income support, state pension credit, income based jobseeker's allowance, income based employment and support allowance, housing benefit, working tax credit or child tax credit (NISRA, 2010). These outlined factors will be considered in greater detail in the following sections.

An individual's socio-economic position continually influences their social identity, as it categorises people and provides them with a self-definition and behavioural guide (Turner, 1996). However, the extent to which an individual identifies with a group based on their SES may vary and this should be acknowledged as it can result in identities having a varied influence on individuals' behaviour and outcomes (Huddy, 2001). Although social identity theory is a beneficial framework to understand how an individual's socio-economic position impacts their categorisation and identity, it does not provide reasons for why higher socio-economic positions are viewed more positively, which may positively affect an individual's outcomes and trajectory. In addition, social identity theory does not explain or account for factors such as poverty having a substantial influence on an individual's behaviour and outcomes. Drawing upon social identity theory alone may not be sufficient in understanding socio-economic differences in attainment. As a result, Bourdieu's framework on capital can bridge this gap as socio-economic status is a fundamental concept to his understanding

of society (Martin, 2010). Bourdieu and Passeron (1979) and Bourdieu (1986) viewed the education system as a primary mechanism that exacerbated socio-economic inequalities as it reaffirmed the existing social hierarchy. Bourdieu and Passeron (1979) highlight the consistency between middle class socialisation and the school environment. Middle class children are taught practices and expectations that align with the education system, which they internalise from an early age. In addition, they develop appropriate forms of cultural and social capital to assist with their success in the education system. More specifically, children from higher socio-economic backgrounds share commonalities of speech and interactions with teachers, meaning the school curriculum, teaching styles and expectations align with their socialisation and developed capital. In contrast, for children from lower socio-economic backgrounds, the education system reflects a new experience that may differ from their socialisation and community dispositions, leaving them to feel somewhat out of place (Bourdieu and Passeron, 1979). This suggests that children from higher socio-economic backgrounds benefit from the commonality of the home and school, whilst those from lower socio-economic backgrounds are more likely to experience difficulty due to the disparity between the home and school environments. Subsequently, lower socio-economic children fail to reach the higher levels of education as they are excluded due to low attainment or because they exclude themselves due to the difficulties they faced within the system (Goldthorpe, 2007). Incorporating both social identity theory and Bourdieu's (1986, 1984) concept of capital to understand socio-economic differences in educational attainment therefore provides a greater understanding than using only one of these theoretical explanations.

2.4.2 Socio-Economic Status and Attainment

2.4.2.1 Free School Meal Entitlement

The negative influence of FSME on attainment is evident across compulsory education, with pupils entitled to FSM having lower attainment than their non-entitled peers. In England, Sammons, West and Hind (1997) examined the influence of pupil characteristics and school level factors on Key Stage 1 attainment in inner-city London primary schools. This study found FSME had a negative effect on Key Stage 1 English (β= -0.25, SE=0.03, $p \leq 0.05$), mathematics (β=-0.16, SE=0.02, $p \leq 0.05$), science (β=-0.12, SE=0.02, $p \leq 0.05$) and overall attainment (β=-0.53, SE=0.07, $p \leq 0.05$). Strand

(1999) also examined London primary schools and found between ages 4 and 7 years, pupils entitled to FSM made less progress in all subjects than their non-entitled peers. More recently, the Department for Education (2018d) reported that in 2018 in England, a lower proportion of pupils entitled to FSM achieved the expected attainment standard than their non-entitled peers in Key Stage 1 reading (60% and 78%, respectively) and mathematics (61% and 79% respectively). Overall, in England, the attainment gaps in Key Stage 1 English, mathematics and science assessments remained consistent according to FSME from 2016 (Department for Education, 2018d; Department for Education, 2017b). In Scotland, Croxford et al., (2003) found FSME pupils had lower baseline attainment in reading and made less progress throughout Primary 1 (aged 5-6 years). The lower reading attainment of FSME pupils was also evident in Primary 4 (aged 8-9 years) and Primary 6 (aged 10-11 years) (Croxford et al., 2003). Moreover, the Welsh Government (2018a) reported that in 2017, a lower proportion of pupils entitled to FSM achieved the expected Level 4 than their non-entitled peers, in Key Stage 2 English (80.4% and 93.5%, respectively), mathematics (82.3% and 94%, respectively) and science (82.3% and 94.3%, respectively). Similar trends were also reflected in Northern Ireland. Lower proportions of Primary 4 pupils (aged 7-8 years) living in deprived areas (based on the level of FSM uptake and whether the school attended was located within a neighbourhood renewal area) achieved the expected standard or above in English assessments (Levels 2 and 3), when compared to pupils living in areas of low deprivation (93% and 99%, respectively). This trend was also evident in achieving Levels 2 and 3 in mathematics in Primary 4 (aged 7-8 years) (93% and 97.5%, respectively) (Miller et al., 2008). By Primary 7 (aged 10-11 years), the same patterns were apparent, with 67% of pupils living in deprived areas achieving the expected standard or above in English (Levels 4 and 5), compared to 79% of Primary 7 (aged 10-11 years) pupils from less deprived areas. The lower rates of attainment amongst pupils living in deprived areas, when compared to their less deprived peers were also reflected in achieving the expected standard or above (Level 4 and 5) in mathematics in Primary 7 (aged 10-11 years) (68% and 90%, respectively) (Miller et al., 2008).

The attainment differences according to FSME that are apparent in primary school become consistently observed patterns in post-primary school such that overall, in post-primary education, pupils entitled to FSM have lower attainment than their non-

entitled peers. In England, 33.4% of pupils entitled to FSM achieved 5 or more GCSEs A*-C, including English and maths, compared to 61.1% of their non-entitled peers in 2015/2016 (Department for Education, 2017c). In England, based on the Effective Pre-school, Primary and Secondary Education project (EPPSE), Sammons et al., (2014) found on average, pupils entitled to FSM attained one grade lower in GCSE English and mathematics than non-entitled pupils. In addition, Sammons et al., (2014) found pupils entitled to FSM were less likely to achieve 5 GCSEs A*-C, including English and maths. Spencer et al., (2017) found similar trends, highlighting that socio-economic background influenced attainment, as non-entitled pupils had approximately double the odds for attaining A*-C in GCSE English Literature and mathematics, when compared to pupils entitled to FSM (OR=2.37 and OR=2.11, respectively). Similarly, in Wales, a higher proportion of pupils not entitled to FSM achieved 5 or more GCSEs A*-C, including English and maths, than those entitled to FSM (54.6% and 28.6%, respectively) (Dauncey, 2018).

When considering attainment differences between pupils based on their FSME, social identity theory can help explain such differences. As highlighted, when an individual identifies as belonging to a social group, behaviour can be understood within the group context (Hogg et al., 2004). When an individual is categorised as belonging to the social group of entitled to FSM, once this definition is internalised, it can affect behaviours and attitudes, and subsequently educational outcomes. If the in-group of being entitled to FSM is viewed more negatively than the competing out-group of not entitled to FSM by peers and those with power in the education system, it can negatively influence how pupils perceive themselves. Such perceptions can affect education trajectories and outcomes, as individuals embody the social group they belong to and act according to their group norms. By identifying with a social group such as being entitled to FSM, an individual internalises norms and expectations of being a member, which places them in a defined position relative to other groups (Brewer, 2001). The lower attainment rates of pupils entitled to FSM can also be understood by Bourdieu and Passeron's (1979) argument that education is a construct of the middle class, meaning it is difficult for pupils from less advantaged backgrounds to achieve within it. This is the result of pupils from less advantaged backgrounds having lower levels of the appropriate cultural and social capital to help them achieve within the education system. As the academic culture of the school environment may

be unfamiliar to pupils from lower socio-economic backgrounds, it can lead to feelings of alienation and inferiority as schools fail to acknowledge or understand the cultural differences of pupils from less advantaged backgrounds, thus negatively impacting upon their educational attainment (Travers, 2017).

In Northern Ireland, Shuttleworth (1995) examined FSME as an indicator of deprivation. Using the Secondary Education Leavers Survey 1990/1991 that contained a random sample of Northern Ireland school leavers (n=1,480), this study found not being eligible for FSM had a positive effect on GCSE attainment in Northern Ireland, when accounting for other pupil level and school level factors (β=0.16, SE=0.05, $p \leq 0.05$). This conclusion was drawn from a statistical model that also included the following factors: gender, religion, mother in employment, father in employment, both parents employed, number of siblings, proportion of pupils receiving FSM per school, school type and school sex (single sex or mixed). In addition, Shuttleworth and Daly (2000) examined FSME in a model with: gender, fathers' occupation, number of siblings, transfer test grade and school type. From their sample of 1,784 Year 12 pupils in the academic year of 1998/1999, Shuttleworth and Daly (2000) reported that FSME had a negative effect on GCSE attainment, with pupils entitled to FSM having lower GCSE attainment than non-entitled pupils (β=-2.79, SE=0.93, $p \leq 0.05$). Moreover, Borooah and Knox (2017) provided analysis using probability modelling on a binary measure of GCSE attainment (achieved/did not achieve 5 or more GCSEs A*-C, including English and mathematics) for the academic year 2013/2014 (n=22,764). The authors found pupils entitled to FSM were less likely to achieve the above attainment benchmark than their peers who were not entitled to FSM (marginal probability= -16.3%, $p \leq 0.01$). In more recent academic years (2017/2018), analysis of Northern Ireland continues to show a lower proportion of pupils entitled to FSM achieved 5 or more GCSEs A*-C, including English and maths, in comparison to non-eligible pupils (51.6% and 79.6%, respectively) (Department of Education, 2019a).

The selective education system in Northern Ireland adds a further dimension to this disparity and is discussed in more detail later in this chapter (Section 2.8.1). Across all management structures, figures from 2018 show non-grammar schools have higher proportions of pupils entitled to FSM, when compared to grammar schools (39.4% and 14.3%, respectively) (Department of Education, 2019a). As grammar schools reflect

lower rates of FSME, those pupils entitled to FSM attending grammar schools experience a dilution of deprivation, resulting in higher GCSE attainment (Shuttleworth, 1995). This is illustrated by 84.8% of pupils entitled to FSM in grammar schools achieving 5 or more GCSEs A*-C, including English and maths, compared to 41% of pupils in non-grammar schools in 2017/2018 (Department of Education, 2019a). The attainment difference between pupils entitled to FSM in grammar and non-grammar schools could reflect differences in their social identity based on the school type they attend. As the majority of grammar school pupils are not entitled to FSM, the predominant social identity may be a 'grammar school pupil', rather than a 'grammar school pupil entitled to FSM', which positively influences outcomes. For pupils entitled to FSM attending non-grammar schools, the opposite influence on social identity and the deprivation dilution is likely to be apparent.

Overall, Blanden and MacMillan (2016) found educational inequality had declined at GCSE level in recent UK cohorts due to the improved performance of pupils entitled to FSM. Such decline in educational inequality was driven by deprived pupils catching up with the attainment of their less deprived peers. Blanden and MacMillan (2016) suggest this may be explained by education policies providing increased investments in initiatives aimed at improving outcomes and the greater use of school league tables from the 1990s. However, at the highest levels of attainment, educational inequality remained stable (Blanden and MacMillan, 2016). Lee and Bowen (2006) outlined potential reasons for the attainment gap, highlighting that parents from lower SES backgrounds, as measured by FSME, reported less involvement in their child's schooling, had fewer educational discussions with their child and had lower expectations of their child's educational attainment, when compared to parents whose children were not entitled to FSM.

2.4.2.2 Free School Meal Entitlement Evaluation

The adequacy of FSME as a measure of SES in educational research has been examined by several studies. Harwell and LeBeau (2010) argue the binary structure of FSME hinders its sensitivity and practicality for analysis, as households with an income of just over £16,190 are placed in the same category and deemed more comparable with households with an income of £100,000, rather than £16,000. Ware (2017) adds that although data on FSME are accessible and easily understood, placing

the complex concept of poverty into a binary structure distorts analyses related to its influence across the education system. Its binary structure labels pupils as either eligible or not eligible, meaning degrees of disadvantage are not considered on a continuum, therefore limiting its explanatory power in education studies (Ware, 2017; Coe et al., 2008). Despite its limitations, Ware (2017) notes that FSME data are readily available and remains the sole indicator of SES in many studies due to its ability to be generalised across locations to provide valuable comparisons. Such an indicator continues to be reaffirmed at the government level as an adequate measure through its repeated use in reports. In support of FSME, Ilie, Sutherland and Vignoles (2017) studied its effectiveness as an indicator of socio-economic deprivation. The authors used the Longitudinal Study of Young People in England (LSYPE) (Wave 1) and the Census (2001) to statistically compare the effects of different SES measures on GCSE attainment in 2006 using multilevel linear regression models (n=12,678). Ilie, Sutherland and Vignoles (2017) found parental education (household highest) and occupation (household highest based on the National Statistics Socio-Economic Classification (NS-SEC)) were the best predictors of attainment, closely followed by FSME. The authors emphasised the greater explanatory power gained by parental education and occupation was marginal (2-3 percentage points of individual level variance) when compared to FSME. Despite FSME not identifying all children experiencing deprivation, the authors concluded it was still an effective measure due to its wide availability and practicality, reassuring its use in research and policy (Ilie, Sutherland and Vignoles, 2017). Moreover, using Northern Ireland data, Shuttleworth (1995) also supported FSME as an adequate measure of SES as it accounts for income when determining a pupil's eligibility. Although Ilie, Sutherland and Vignoles (2017) provide an in-depth exploration into the effectiveness of FSME against other SES measures, they examined FSME across the six years prior to completing GCSEs and not just the year a pupil completed their GCSEs. It would be a valuable addition to the literature to examine the within model effects of FSME in the year a pupil completed their GCSEs to provide a clear picture of a pupil's SES when they completed such examinations. Moreover, it would be a valuable addition to the literature to examine whether the statistical effects and explanatory power of parental education and occupation remain as high when a mother's and father's position are investigated separately. In addition, the comparative effectiveness of these measures within the

Northern Ireland context are as yet unknown and would be useful to compare trends across UK countries.

2.4.2.3 Housing Tenure

Housing tenure provides an indication of the socio-economic position of a household (Lessof et al., 2018). In many developed countries, including the UK, a governmental commitment to increase rates of home ownership is evident due to the positive association between better housing, residential stability and social capital (Wiltshire, 2010). Studies predominantly examined post-primary attainment and found housing tenure to be an important determinant, as pupils residing in property owned outright or with a mortgage had the highest rates of attainment (Lessof et al., 2018; Ilie, Sutherland and Vignoles, 2017; Whelan, 2017; Bramley and Karley, 2007; Ermisch and Francesconi, 2001). In England, O'Brien and Jones (1999) found pupils living in households owned outright or with a mortgage were 58% less likely to achieve GCSEs at grades D-G and around two-and-a-half times more likely to achieve 5 or more GCSEs A*-C. More recently, Ilie, Sutherland and Vignoles (2017) found pupils residing in privately owned property had the highest GCSE attainment when compared to those residing in housing rented from a housing association, council or a local authority in England. In addition, Lessof et al., (2018) used the LSYPE (2012/2013) which consisted of a sample of 13,100 Year 11 pupils (aged 15-16 years). This study found pupils living in council rented properties had the lowest GCSE attainment, followed by those living in privately rented properties. However, those pupils residing in property owned outright or with a mortgage had the highest GCSE attainment averages. Finally, Bramley and Karley (2007) examined trends in both England and Scotland across primary and post-primary education and concluded home ownership positively affected primary and post-primary attainment. Despite studies examining the relationship between post-primary GCSE attainment and housing tenure, no study has examined this in the Northern Ireland context due to the lack of available data.

As housing tenure provides an indication of economic capital, of which Bourdieu (1986) believed was the most important capital form, neighbourhoods with high proportions of privately owned households tend to have higher average income levels and subsequently contribute more extensively to the capital accumulation of residents. Ball (2003) discusses the interconnections of capital forms which is of relevance to

this housing tenure discussion. The economic capital of socio-economic advantaged parents means there are readily available resources to buy better housing and educational activities to enhance a child's knowledge and cultural capital to improve educational attainment. In addition, based on a parent's economic and cultural capital, a parent's social capital may provide the opportunity to access networks which provide insights into the education processes and expectations to help individuals succeed within the system. This highlights that social capital is never fully independent from the other forms of capital (economic and cultural) (Yang, 2014). Overall, Veenstra (2010) notes that social contexts like neighbourhoods provide an opportunity to accumulate different forms of capital as they gather similar people together in one location.

The relationship between housing tenure and educational attainment has also been examined in the international context, with similar trends to the UK being reflected. Literature focusing on the United States of America (USA) consistently found a positive relationship between home ownership and educational attainment (Haurin, Parcel and Haurin, 2003, 2001). Green and White (1997) examined home ownership in the USA, using three national datasets (Panel Study of Income Dynamics, Census 1980 and High School and Beyond). The authors found home ownership was a statistically significant determinant of whether pupils stayed on at school at age 17 years. In addition, Haurin, Parcel and Haurin (2001) found the cognitive outcomes of pupils living in privately owned property were 9% higher in mathematics and 7% higher in reading than pupils residing in rented property. Such results were also apparent when parents' socio-demographic characteristics were controlled for, along with pupils' gender, health, number of siblings and household locality. This study concluded that home ownership was related to increased pupils' cognition and later educational outcomes. Bramley and Karley (2007) highlighted home owners tend to reside in the same property and location for longer periods than those renting. As a result, social networks in neighbourhoods with higher rates of home-owning families are more likely to be stable, positively impacting education outcomes. Such explanations provide context to Whelan (2017) who argued that although children residing in privately owned property had higher education outcomes, residing in privately owned property does not directly cause improved attainment, but instead its influence is mediated through processes that take place at the household and

neighbourhood levels. Newman and Harkness (2002) provided further explanations adding that neighbourhood influences are manifested in three ways; directly through parental practices, wealth and the home environment; indirectly through the effects of a positive neighbourhood on social capital and interactively through the interplay of the above direct and indirect factors. Moreover, Newman and Harkness (2002) found a positive correlation between educational attainment and home ownership in the USA for children below the poverty line but such correlation was not evident for pupils from higher income families.

2.4.2.4 Housing Tenure Evaluation

Although housing tenure is used to study the relationship between educational attainment and SES in the national and international context, certain factors such as household income, parental occupational status, home learning environment and neighbourhood characteristics have the potential to mediate its influence on attainment. For example, household income and parental occupational status influence housing tenure. This is the result of households with higher incomes potentially being more likely to privately own the property they reside in. This relates to parental occupational status as those with a higher status are more likely to have a higher income and subsequently be in a better position to privately own the property they reside in (Bourdieu, 1986). In addition, regardless of the housing tenure of the property in which a pupil resides, if they have access to a home learning environment with educational resources and support, it will positively influence their education trajectory and outcomes. This is supported by Sammons et al. (2014) who found pupils with access to a home learning environment, in terms of parental engagement, support and involvement in educational activities within the home, had higher GCSE attainment. Moreover, Sammons et al. (2014) highlighted neighbourhood characteristics such as safety, unemployment rates, crime rates and deprivation levels can influence GCSE attainment. The neighbourhood is influential as pupils are involved in a greater number of activities outside of the home and in the neighbourhood as they grow up. It is therefore important for future research to identify and examine the factors that may mediate the influence of housing tenure on attainment to ensure for accurate interpretations, whilst allowing appropriate and informed discourse and policy to be developed.

2.4.2.5 Property Value

The property value in which a pupil resides is influential on educational attainment. Property value can provide an insight into socio-economic position as it is the highest valued asset that a family own (Ware, 2017). The relationship between educational attainment and the property value in which a pupil resides is not commonly studied in the UK. This is likely to be the result of restricted data examining the relationship between these factors. Instead, analysis has examined the relationship between property value and school performance ratings. The Department for Education (2017d) found a positive relationship between property value and the distance from a high achieving school in England. Property value near lower performing schools was lower than those near higher performing schools. In addition, Gibbons and Machin (2006) found higher primary school performances were associated with increased property values in England, whilst Glen and Nellis (2010) reported the same trend for state-funded post-primary schools in England. Gibbons and Machin (2006) noted that neighbourhoods where schools are located are stratified by income, meaning the poorest pupils are subsequently excluded from top-performing schools. However, the Department for Education (2017d) argued that property value cannot be attributed to school quality alone as analysis does not control for other factors that affect house prices. Despite this, there was a correlation between children whose parents could afford higher valued property being more likely to achieve the expected standards at Key Stage 2 (Level 4 or above in reading and mathematics) and Key Stage 4 (aged 14-16 years) (5 GCSEs A*-C, including English and maths). This is likely to be because parents of higher SES positions are more able and likely to move to a location with a good school, where they spend more money on property (Orford, 2018; Department for Education, 2017d). This reflects the importance of economic capital, as emphasised by Bourdieu (1986). In the USA, Brasington and Haurin (2006) found parents who were home owners placed greater worth on a school's examination scores and expenditure rather than value-added measures of academic performance. As a result, the average examination scores of schools in the area were influential in affecting the local property value. In addition, Ware (2017) found property value had a significant and positive relationship with mathematics attainment through analysis of a Midwestern city in the USA. Ware (2017) concluded the influence of property value on educational attainment is worth future analysis and attention. With no study

statistically testing the relationship between property value in which a pupil resides and GCSE attainment in the UK, it reflects a current gap in the literature.

2.4.2.6 Parental Education

In their systematic review examining the influence of SES and gender on PISA attainment in the UK, Early et al., (2019) reported a positive relationship was evident across studies between higher parental education and higher attainment in reading, mathematics and science. However, a limitation of this review was that eligible studies did not examine the separate influences of maternal and paternal education level on attainment. As a result, the following section looks specifically at their separate influences.

Studies have found a positive relationship between pupil attainment and higher maternal qualifications. In Northern Ireland, Melhuish et al., (2004) found maternal qualifications significantly influenced pre-school attainment, as children with mothers who had no qualifications achieved lower literacy and numeracy scores than children with mothers who had some level of education. In England, Mensah and Kiernan (2010) used the Millennium Cohort Study (MCS) to examine pupils' development in communication, language and literacy during their first year of primary school (aged 5-6 years). This study found children whose mothers had no qualifications scored around 20 points lower in communication, language and literacy than children whose mothers held a Level 4-5 National Vocational Qualification (NVQ) ($p<0.05$). In addition, the authors found 10% of attainment variation in communication, language and literacy was predicted by maternal qualifications. Also using the MCS, King et al., (2017) found a positive relationship between higher maternal education and reading scores at age 7 years.

At post-primary, Sammons et al., (2014) considered the effects of maternal qualifications in England and found they had a significant influence on GCSE attainment. Pupils whose mothers held a degree gained the highest overall GCSE scores and highest GCSE English and mathematics grades (Sammons et al., 2014). This finding from Sammons et al., (2014) was based on the EPPSE that had a total sample of 2,746 pupils. More recently, Lessof et al., (2018) used the LSYPE and found a positive relationship between maternal qualifications and GCSE attainment,

reflecting the same patterns found by Sammons et al. (2014). Reay (1998) suggested potential reasons for attainment differences based on a mother's socio-economic position. Reay (1998) highlighted that although mothers of lower socio-economic position engaged in their child's education, their lower education qualifications meant they had less knowledge about the education system than mothers of a higher socio-economic position. This meant lower socio-economic mothers felt they were not in a position to assist with their child's education, especially as they progressed to post-primary school. Central to this argument is mothers from lower socio-economic positions did not have the level or resources of cultural capital that allowed them to effectively support their child's education and subsequent attainment, nor were they confident in the school environment or communicating with teachers (Travers, 2017; Reay, 1998).

Studies have also found a positive relationship between attainment and higher paternal qualifications. In Northern Ireland, Melhuish et al., (2004) found pre-school pupils whose fathers had any level of education had higher literacy and numeracy attainment than pupils whose fathers had no qualifications. Melhuish et al., (2004) concluded maternal and paternal qualifications had a similar influence on their child's pre-school attainment, regardless of the child's gender. This was supported in the English context by Jerrim and Micklewright (2011) who found no significant difference in the statistical effects of mothers' and fathers' education qualifications on their child's mathematics attainment in PISA cycle 2003. Such findings suggest that a parent's gender is less important than the household's possession of higher education qualifications that can help establish different forms of capital (Bourdieu 1986). Davies and Guppy (2006) reflect upon this and suggest that families of higher socio-economic position develop and accumulate more cognitive and non-cognitive skills that are rewarded by the school. Socio-economic advantage therefore equates to an educational advantage (Davies and Guppy, 2006). In relation to this, Eccles (2005) suggests the higher attainment of children whose parents have higher qualifications is likely to be the result of parents learning something during their longer schooling years. This has a positive influence on a parent's skills and knowledge of the education system which subsequently enhances the learning practices they engage in at home with their children (Eccles, 2005). Lareau and Cox (2011) add that these parents have a greater accumulation of institutional knowledge and problem solving skills which

they use to effectively guide their child's education trajectory. The relationship between habitus, capital and power is therefore central to our understanding.

Although some studies have found maternal and paternal qualifications have a similar influence on a child's attainment, such argument is not the consensus. Continuing the comparison of parental education, Sammons et al., (2014) concluded mothers' qualifications had a greater impact on a child's GCSE attainment than fathers' qualifications. Similarly, Ermisch and Francesconi (2001) used the first seven waves of the British Household Panel Survey (BHPS) to examine post-primary attainment and found mothers' education level had a stronger relationship with their child's GCSE outcomes than the education level of the father (n=1,157). Jerrim and Micklewright (2011) suggested highly educated mothers were more likely than fathers with the same qualification level to make greater investments in their child's cognitive development through the quantity and quality of the time and resources they provided. Harding, Morris and Hughes (2015) add that mothers with high education levels provide further support to their child's education through practical inputs such as the use of extensive vocabulary, whilst using their skills and knowledge to contribute effectively to their child's homework. Reay (2005) also found that mothers reflected the most influence over a child's education in the home. The greater influence of maternal qualifications may be the result of mothers remaining the predominant care provider in the home (Ermisch and Francesconi, 2001). Oakley (1993) suggests that the division of labour reflects that mothers spend the most time on childcare and are therefore the parent that is central to the development of cultural capital. As the family are the key transmitter of cultural capital, this is where children derive knowledge and thinking styles (Reay, 2000). Building upon this, the higher education qualifications of women may increase their bargaining power at home, providing greater control of resources such as income, which can be used to invest in home resources to improve educational outcomes (Jerrim and Micklewright, 2011; Ermisch and Francesconi, 2001).

Despite the above focus on the centrality of mothers, fathers and extended family members also provide the necessary capital and support to encourage educational attainment. As highlighted by Gimenez-Nadal and Molina (2013), who examined the relationship between parents' education and time spent on educational childcare in the UK; higher maternal education levels were associated with a greater amount of time

spent by fathers on educational childcare. In sum, parents who had degree level qualifications spent more time on educational childcare activities than those with secondary level qualifications. Pomerantz, Moorman and Litwack (2007) outlined two core models that illustrate parental involvement in the school and home that enhance their child's educational attainment. The first model (skill development) suggests parental involvement enhances a child's educational attainment through parents teaching their child: cognitive skills (language and phonological awareness), metacognitive skills and developing their learning process. In turn, parental involvement allows an insight into the child's academic ability and the content of what they are learning, which parents can use to create clear expectations of their child, whilst also developing specific cognitive skills to improve their academic outcomes. In the second model (motivational development), parental involvement positively influences a child's attainment by providing motivational resources such as reasons for continuing in education, a sense of control over their academic trajectory and positive attitudes towards schools. In sum, Pomerantz, Moorman and Litwack (2007) suggest parental involvement is likely to enhance a child's educational outcomes through both skill and motivational development, as parents provide simultaneous resources that develop skills and motivation. Overall, higher parents' education level relates to higher educational expectations of their children, which positively influences their child's educational attainment (Eccles, 2005). In relation to this, Bourdieu (1977) suggested that higher levels of parental education correlated with high levels of cultural capital. However, such argument has been criticised for failing to capture the multidimensional nature of cultural capital (Sullivan, 2001). Building upon such criticism, cultural capital is widely operationalised in research studies, which raises methodological issues of the various ways cultural capital has been quantitatively operationalised as it can lead to different results in relation to the direction and statistical significance of relationships based on the measure used (Vryonides, 2010).

2.4.2.7 Parental Occupation

Parental occupation has been examined in various ways in educational research. The household's highest occupational status, maternal occupational status and paternal occupational status have all been evident in previous studies. Across all parental occupational status measures, a positive relationship is reflected between a higher occupational status and higher attainment. When considering the household's highest

occupational status, Lessof et al., (2018) used the LSYPE (2012/2013) and found pupils from professional/managerial households, followed by intermediate households had the highest GCSE attainment, whilst pupils in routine/manual households and unemployed households had the lowest GCSE attainment, respectively. A positive relationship between a higher household occupational status and higher GCSE attainment was therefore reflected. The systematic review conducted by Early et al., (2019) highlighted that parental occupation reflected a positive relationship with reading and mathematics attainment in PISA 2000-2012. This meant a pupil's attainment increased as parental occupation status increased. Early et al., (2019) noted that two studies (Lenkeit, Schwippert and Knigge, 2018; Thorpe, 2006) found parental occupation had the largest effect on reading attainment in PISA 2000. However, like parental education, the eligible studies of this review did not examine the separate influences of maternal and paternal occupation on attainment. As a result, the following section looks specifically at their separate influences.

When examining the influence of maternal occupational status on educational attainment, studies often considered whether a mother was in full time, part time or no employment, rather than her occupational rank. Shuttleworth (1995) found a small but positive relationship between having an employed mother and GCSE attainment in Northern Ireland, although it was not statistically significant (β=0.12, SE=0.08, $p>0.05$). In addition, using the BHPS, Scott (2004) found mothers' status of full time, part time or stay at home had no significant effect on male GCSE attainment, whilst part-time employment had a positive influence on female GCSE attainment compared to full time maternal employment.

Scott (2004) also examined the influence of fathers' occupational status on GCSE attainment and found it had a positive effect but was not statistically significant. However, Shuttleworth (1995) found a positive and statistically significant relationship between having an employed father and GCSE attainment in Northern Ireland (β=0.17, SE=0.06, $p\leq0.05$). In support of Shuttleworth (1995), Shuttleworth and Daly (2000) found pupils with fathers in non-professional occupations had lower GCSE attainment than pupils with fathers in managerial/professional occupations (β=-3.50, SE=0.89, $p\leq0.05$). Shuttleworth and Daly (2000) reported this was a small but statistically significant effect in their analysis of 1,784 Year 12 pupils in the academic

year of 1998/1999. Other studies in England such as Sammons (1995) also found that pupils with a father in a semi/unskilled occupation, or those with an unemployed father had lower attainment at the end of primary school, with such gaps increasing in post-primary school. More recently, using the National Child Development Study and British Cohort Study, Connelly and Gayle (2017) found that fathers' NS-SEC was influential on a child's cognitive outcomes. Pupils with fathers in the highest NS-SEC category had the highest cognitive ability test scores, whilst those with fathers in the lowest NS-SEC category had the lowest cognitive scores (Connelly and Gayle, 2017). Croxford et al., (2003) examined attainment trends in Scotland and found the influence of paternal occupation was considerable. Pupils with fathers in professional occupations had higher attainment in Standard Grades (47 points), when compared to pupils whose fathers were in skilled manual occupations (35 points). Overall, recent studies examining the relationship between paternal occupational status and attainment across the UK provide a consensus that pupils whose fathers were in non-professional occupations achieved lower attainment on average than their peers whose fathers had professional occupations (Hobbs, 2016; Shuttleworth and Daly, 2000).

Kalmijn (1994) noted that maternal and paternal occupational status are highly correlated, leaving the assumption that mothers' characteristics add little explanatory power to analysis or account for further variation in attainment. In addition, few mothers worked outside the home when attainment research began to explore the influence of occupational status on attainment, meaning mothers' occupational status was viewed as not as important as fathers' (Kalmijn, 1994). This assumption was exacerbated as data on mothers' occupational status and subsequent SES were not routinely collected in previous nationally representative surveys. However, this has now changed with such data being routinely collected along with fathers (Kalmijn, 1994). Subsequently, Kalmijn (1994) concluded that mothers' occupational status has a substantial influence on pupils' attainment, which is independent and as strong as the influence of fathers' occupational status in dual earner families.

Overall, Korrup, Ganzeboom and van der Lippe (2002) emphasised the importance of parental occupational status in analysis as its exclusion underestimates the scope of examining the intergenerational status transfer. This is also the case when only one parent's SES background is considered. If mothers' educational or occupational status

is not included in analysis, it can overestimate the influence of fathers (Korrup, Ganzeboom and van der Lippe, 2002). Despite this, in the UK, the House of Commons Education Committee (2014) highlighted that nationally representative data on educational attainment based on parental NS-SEC classifications continues to be less frequently collected than measures such as FSME, meaning it is used less frequently in research. Accounting for both maternal and paternal occupational status is therefore integral as it provides a fuller picture of intergenerational status transfer and the influence of occupational status on educational attainment.

When considering explanations for the positive relationship between higher parental occupational status and higher attainment, McCullouch (2017) highlighted that pupils from higher SES backgrounds, according to their parents' occupational status, had higher educational aspirations, which was thought to reflect the greater emphasis their parents placed on education. Similar arguments are forwarded by Erikson and Jonsson (1996) who argued family background played a crucial role in shaping a pupil's educational aspirations and attainment, which remain relatively consistent over time. However, McCullouch (2017) acknowledged aspirations do not assume a causal role in attainment. Travers (2017) notes that families from lower socio-economic positions have access to different forms of economic, cultural and social capital than their less deprived peers, which impacts their educational outcomes. This relates to Devine (2004) who argued that middle class parents have clear expectations of their children's academic attainment as they believe their children are able and as parents, they understand how to ensure success in the education system. In contrast, parents from lower socio-economic positions may have similar academic attainment expectations for their children but they may not possess the same resources or knowledge to warrant such confidence. The educational system and socialisation process that provides children with social and cultural capital therefore reproduces the dominance of less deprived pupils having higher attainment (Garrett, 2010).

As an individual's economic situation impacts upon their identity, it highlights that parental occupation affects the social categorisation of their child. The nature of its effects on a child's identity can be understood through Bourdieu (1986), who believed economic and cultural capital were the most important capital forms. Economic capital directly relates to parental occupation and can be used to invest in educational

resources in the home to improve a child's readiness for school by developing their cultural capital and knowledge of the curriculum content (Veenstra, 2010). In addition, social capital of parents relates to occupational status and their subsequent position in society, highlighting the interconnectedness of social capital with economic and cultural capital (Yang, 2014). This can affect a child as it can provide exposure to networks that share beneficial information about the education system to assist with their success (Ball, 2003).

Although Bourdieu (1986) reflects upon the importance of social capital to accumulate other capital forms and vice versa, Veenstra (2010) notes that he failed to include social capital measures in his empirical study of capital transfers in France, partly due to the lack of suitable social capital indicators in his survey. Despite this, Andres (2010) notes that most studies focusing upon cultural and social capital operationalise such concepts through measures of parental education and occupation status. However, Marks (2010) is critical of cultural capital, suggesting studies may not have incorporated a sufficient level of background control factors that mediate the effects of cultural capital. Marks (2010) suggested cultural capital can be explained by reading patterns rather than cultural participation as both are measures of cultural capital. This suggests the cultural knowledge produced by different forms of capital are more important than the cultural participation itself (Zimdars, Sullivan and Heath, 2010). Similarly, Sullivan (2001) found that the cultural knowledge derived from activities such as reading had a significant influence on GCSE attainment, whilst participation in formal culture, such as attending the theatre, listening to classical music or playing a musical instrument did not. Sullivan (2001) continued that pupils' reading habits accounted for significant variation in linguistic ability and cultural knowledge, in contrast to participation in formal culture. This may be the result of reading exposing individuals to new information and vocabulary that can improve linguistic skills that are rewarded in school (Sullivan, 2001). Overall, Sullivan (2001) concluded that when examining cultural capital, reading had the greatest statistical effect in her analysis on GCSE attainment when compared to other factors.

2.4.2.8 Spatial Deprivation

Spatial deprivation is also an influential factor on educational attainment as it works to reaffirm social origin (Garner and Raudenbush, 1991). Overall, studies highlight

that those pupils experiencing spatial deprivation have lower educational attainment than those who are not exposed to spatial deprivation. In Northern Ireland, Miller et al., (2008) found 93% of Primary 4 (aged 7-8 years) pupils living in deprived areas (based on the level of FSM uptake and whether the school attended was located within a neighbourhood renewal area) achieved the expected standard or above in English (Levels 2 and 3), compared to 99% living in areas of low deprivation. By Primary 7 (aged 10-11 years), 67% of pupils living in deprived areas achieved the expected standard or above in English (Levels 4 and 5), compared to 79% from less deprived areas. This study highlights that the SES attainment gap between pupils is not only persistent but widens throughout primary education. Overall, primary school pupils living in deprived areas in Northern Ireland are less likely to achieve the highest levels or nationally expected standards of Key Stage 2 English, maths and science (Melhuish et al., 2013; Miller et al., 2008). Such trends were also reflected in Scotland, where primary school pupils from less deprived areas (based on the Scottish Index of Multiple Deprivation 2016) outperformed their deprived peers in reading and mathematics according to the Scottish Survey of Literacy and Numeracy. In reading, an 18% difference in favour of less deprived pupils was evident in Primary 4 in 2016 (aged 8-9 years) (Scottish Government, 2017b). In mathematics, there was an attainment gap of 21% between the least and most deprived pupils in Primary 4 in 2015 (aged 8-9 years) (Scottish Government, 2016a), whilst in science, a higher proportion of the least deprived pupils achieved 80% or more in national assessments, when compared to their most deprived peers in Primary 3 (aged 7-8 years), in 2007 (60% and 40%, respectively) (Scottish Government, 2007).

Across the UK, attainment disparities persist at GCSE level between pupils from the least and most deprived areas. Individuals with lower SES are more likely to live in deprived areas where schools have poorer outcomes and pupils have lower attainment (Bhattacharyya, Ison and Blair., 2003; Garner and Raudenbush, 1991). Subsequently, pupils from socially advantageous areas tend to outperform their peers living in deprived wards. In England, 26% of pupils living in the 10% most deprived areas (based on the Index of Multiple Deprivation 2004) achieved 5 or more GCSEs A*-C, compared to 72% in the 10% most affluent areas in 2002 (Smith et al., 2005). In addition, using the Scottish Index of Multiple Deprivation for 2015/2016, it was reported that 74% of pupils living in the 20% most deprived areas of Scotland achieved

1 or more Standard Grade at level 5 or higher, compared to 94.9% of pupils from the 20% least deprived areas (Scottish Government, 2016b). In Northern Ireland, Leitch et al., (2017) used the NI-MDM (2010) to examine GCSE attainment in seven of the top 20% most deprived wards. The authors found a range of individual, school and structural factors influenced educational attainment disparities across the seven wards experiencing high levels of deprivation.

Social identity and an individual's habitus can help our understanding of how spatial deprivation experienced by a residential location can affect educational attainment. As social identities reflect the internalisation of group norms and expectations, if these are negatively affected by a residential location experiencing spatial deprivation, it can lead to negative perceptions of one's place in the education system. Ingram (2011) highlights that those who share similar backgrounds will also share a similar habitus structure as their dispositions are likely to align with their experiences such as growing up in a particular neighbourhood. Moreover, Bourdieu (1986) viewed economic capital as the most important capital form that is central to all other capital transmissions. For individuals living in locations that experience spatial deprivation, they are less likely to possess high levels of economic capital, which subsequently impacts cultural capital development and accumulation; both of which can negatively affect educational attainment (Veenstra, 2010). As contexts such as neighbourhoods bring people of similar positions together, if those within a neighbourhood have low levels of economic, cultural and social capital, it will be difficult for individuals residing in such locations to accumulate greater levels of these capital forms that positively influence educational attainment through resources, knowledge and networks. These arguments structured by Bourdieu reaffirm that our spatial location and economic position constrain the social identities available to us (Roseneil and Seymour, 1999).

Ilie, Sutherland and Vignoles (2017) compared the effectiveness of numerous SES indicators using the LSYPE (Wave 1) and the Census (2001). Using the Income Deprivation Affecting Children Index which ranks neighbourhoods based on the proportion of children living in low income households, the authors found such neighbourhood based measure was not a strong predictor of GCSE attainment, when compared to indicators such as FSME, highest parental education and occupation

status. Ilie, Sutherland and Vignoles (2017) suggest a problem with neighbourhood based measures is that they do not identify all children living in low socio-economic households as they could live in less deprived neighbourhoods, whilst some children that are not deprived could live in highly deprived neighbourhoods. The authors illustrate this argument by highlighting that a substantial proportion of pupils entitled to FSM do not reside in highly deprived neighbourhoods in England.

Despite this, a positive correlation between living in deprived wards in Northern Ireland (based on the Northern Ireland Multiple Deprivation Measure 2010) and FSME is evident. A total of 63.3% of pupils living in the 10% most deprived wards were entitled to FSM, compared to 10.3% of pupils residing in the 10% least deprived wards (Department of Education, 2016b). The negative relationship between attainment and FSME, in turn, reflects the negative association between living in deprived wards and attainment. When considering the selective education system in Northern Ireland, Shuttleworth and Daly (2000) analysed the effects of residential location on school type attended and found approximately 60% of pupils living in the 25% least deprived wards attended grammar schools, compared to 20% living in the 25% most deprived wards. These results illustrated a negative correlation between residing in deprived wards and attending grammar schools, which negatively impacted educational attainment. Despite the data of this study being derived from the School Leavers Survey in 1992 and Census from 1991, it continues to provide an insight into the spatial dimensions of educational attainment in Northern Ireland.

Locality is therefore an important concept to consider for understanding class based inequalities (Leathwood and Archer, 2004), as it provides an identity and structures an individual's habitus. More specifically, Connolly and Healy (2004) examined the importance of gender and locality in educational aspirations of working class and middle class males in Belfast. The authors found locality held greater importance for working class boys than middle class boys. Travers (2017), Archer et al., (2010) and Ingram (2009) also highlight that in many working-class communities, a strong level of attachment to locality is evident as it provides a sense of security and belonging, along with a social network. Locality is therefore an important factor that provides an individual with a social identity, which is core to their sense of belonging, behaviour and outcomes. Community characteristics relating to locality may help explain its

influence on educational attainment further. Areas characterised by high levels of deprivation may have high unemployment and anti-social behaviour rates. These factors discourage young people from committing to education as their family and wider neighbourhood may expect low levels of attainment and feel unemployment or minimum wage employment is inevitable (Leitch et al., 2017). Such neighbourhoods may lack positive role models in encouraging pupils to commit to education. For a young person who identifies strongly with their community, they may subsequently internalise their community's education norms before even reaching the school setting. Particularly relevant to the Northern Ireland context, Goeke-Morey et al., (2012) indicated that areas which experience protracted political conflict are more likely to have risk factors that can negatively affect educational attainment. These areas usually consist of neighbourhoods that are characterised by economic and social deprivation, which reflect the negative influence of deprivation and protracted violence on the community, family and ultimately the education outcomes of an individual (Goeke-Morey et al., 2012). Ferguson and Michaelsen (2015) add that those from lower socio-economic backgrounds may have less choice in where they reside due to financial restraints. This means they cannot move from highly deprived areas where they face spatial deprivation, which therefore continues to limit their access to high quality schools and resources that would improve educational outcomes (Ferguson and Michaelsen, 2015).

2.4.3 Socio-Economic Status Summary

Overall, social identity theory clearly indicates an individual's socio-economic position informs their identity. However, social identity does not explain why higher socio-economic positions are viewed more positively than others, thus generating a more positive identity and outcomes for individuals. These factors are somewhat part of a mutually reinforcing cyclical process. Bourdieu (1986, 1984) can help explain the mechanisms behind the social identity process and bridge the explanatory gap through the concept of capital. Together, these two theories provide a fuller understanding of socio-economic differences in attainment as one theory (social identity) is an individual centred approach, whilst the other (Bourdieu) views the individual as embedded within social structures that influence position and outcomes.

Regardless of the implemented measure, the attainment gap according to SES is a prominent issue across compulsory education (Hobbs, 2016; Strand, 2014; Themelis, 2013; Strand, 2011; Connolly, 2004). Its prominence has recently been reiterated by the restored Northern Ireland Executive in the New Decade New Approach deal. The Northern Ireland Executive has agreed to examine the persistent links between socio-economic background and lower educational attainment to develop an action plan to address such issues (Northern Ireland Office, 2020). Across the UK, at every stage of the education system, the most deprived children make less progress and are more likely to underachieve than their less deprived peers (Save the Children, 2013). All socio-economic measures provide a potential avenue of categorisation and identity for an individual. Across primary and post-primary school, pupils entitled to FSM have lower attainment than non-entitled pupils. This can be explained using social identity theory as entitlement categorises a pupil and can negatively impact upon their self-conception. Bourdieu (1994) adds that those from lower socio-economic backgrounds have lower levels of cultural capital needed to succeed in the education system, which is an overarching middle class construct. These trends and explanations in relation to FSME also apply to Northern Ireland but the added dimension of a selective education system must also be considered. This again links to social identity theory as pupils entitled to FSM in grammar schools experience a dilution of deprivation and their identity is more likely to be comprised from attending a grammar school than their FSME status.

Property factors including housing tenure highlight a positive relationship between residing in a privately owned property and higher attainment. Overall, home ownership provides an indication of economic position and provides an environment for developing cultural and social capital. However, the influence of housing tenure is likely to be mediated by interacting factors such as income, occupation, home learning environment and neighbourhood characteristics. When examining the relationships between housing tenure, property value and GCSE attainment, a gap in the literature is apparent in Northern Ireland, likely because of the lack of available data to explore such relationships.

When exploring parental status, the positive relationship between higher parental education/occupation status (both mothers and fathers) and higher attainment can be

explained through Bourdieu's (1986, 1984) concept of cultural capital, with higher education/occupation status providing parents with greater knowledge and resources that benefit their child's education. It is debated within the literature whether the education qualifications of mothers or fathers have greater influences on their child's education. Some studies argue mothers have a greater influence and this can be linked to the division of labour were mothers continue to have the greater responsibility for childcare and remain the key transmitter of cultural capital and skill development (Oakley, 1993). When considering this debate in relation to occupational status, mothers occupation has been explored according to employment status (full time/part time), rather than occupational rank, highlighting the need for future research. However, higher paternal occupation is positively associated with higher attainment of pupils. Overall, it is important to include both parents' occupational status in analysis to ensure the influence of one parent is not overestimated.

Spatial deprivation is also used as a measure of SES, with a negative relationship evident between residing in a deprived area and educational attainment. This can be explained through social identity theory and Bourdieu's (1986, 1984) concepts of habitus and capital, all of which are influenced by an individual's residential location and the extent to which they are exposed to deprivation. Although this is an important measure that is embedded within theoretical explanations, it has been argued it is not as strong or effective a predictor as other factors such as FSME, parental education and parental occupation (Ilie, Sutherland and Vignoles, 2017).

Early et al., (2019) noted the multidimensional structure of SES through the large range of measures used to explore its relationship with (PISA) attainment. In their review, the authors found parental education and occupation were two of the most common measures to examine the influence of SES on PISA attainment. Ware (2017) highlighted that the suitability of using a specific SES indicator is dependent upon the research context. The common use of FSME likely reflects its ready availability, whilst parental background factors are difficult to compile, despite being more conceptually aligned with SES (Ware, 2017). Ware (2017) concluded that it was beneficial to use multiple SES measures in analysis as one indicator cannot fully capture the complex dynamics of SES and its effects on educational attainment. In addition, using several measures of SES ensures results are not dependent upon one indicator which may have

both conceptual and methodological limitations. Within the UK context, the House of Commons Education Committee (2014) highlights the importance of allowing education attainment data to be linked with family background data to allow for the effects of parental education, parental occupation and income to be examined. Linking such sources that are already available is a cheap, convenient and efficient way to improve educational attainment research and to move away from the over-emphasis of FSME as the most common proxy of SES.

When considering the influence of SES on educational attainment more broadly, in Travers' (2017) study of white working class boys (measured by FSME), one participant suggested some pupils may have an initial disadvantage from their home environment which is exacerbated within the education system. Travers (2017) forwards that this initial disadvantage could be factors such as; a low socio-economic background, being male, having a mother with no qualifications, raised in a single parent family and not having been read to at home. Travers (2017) suggests it could be argued the school habitus views white working class males as not being academic, which negatively impacts on the internal educational processes that take place. Overall, children of less deprived backgrounds reflect an advantage in the education system as their home environments have prepared them for educational success. Parallels are evident between the home environment and school for less deprived pupils, meaning they share common speech, vocabulary and social capital with their teachers and are prepared for the curriculum and teaching styles used. In contrast, children from deprived backgrounds are less likely to experience commonality between their home and school environment. Moreover, the lack of economic capital amongst pupils from lower SES backgrounds means learning resources that could assist educational learning within the home are less likely to be availed of (Hirsch, 2007). Consequently, within the school environment, pupils from lower socio-economic background are less likely to be equipped socially and cognitively for the expectations of the school learning environment. Subsequently, lower SES background is associated with poorer educational attainment (Thiele et al., 2016; Hoare and Johnston, 2010; Smith and Naylor, 2001). Bhattacharyya, Ison and Blair (2003) conclude that although SES has a substantial influence on attainment, it is not the sole explanation for low educational attainment as there are cases where those from deprived backgrounds have high attainment levels. Socio-economic status therefore

continues to be an important factor shaping educational attainment but works in complex ways by interacting with other factors (Raffo et al., 2007). This chapter and broader thesis will therefore explore the influences of religious affiliation, gender, school type and their interactions with SES on GCSE attainment in the following sections.

2.5 Religion

2.5.1 Religious Identity in Northern Ireland

Religious affiliation providing a form of identity is somewhat unique to Northern Ireland, when compared to the rest of the UK. In other UK countries, a greater focus is placed upon ethnicity as a form of identity. Ysseldyk, Matheson and Anisman (2010) suggest ethnicity may be equally effective in defining identity in other geographical contexts, when compared to religious affiliation in Northern Ireland. As Northern Ireland remains ethnically homogenous, with only 1.8% of the population belonging to minority ethnic groups in the 2011 Census (98.2% of the Northern Ireland population are of white ethnicity) (NISRA, 2012), it suggests that in Northern Ireland, religion may be a more effective identity marker. As religious affiliation is a core concept for identity in Northern Ireland, it raises the question; can religion be viewed as an equivalent to ethnicity as a form of identity? Connolly, Kelly and Smith (2009) argue ethnicity is not always marked by physical difference through race but can be identified through other factors such as nationality, culture or religion. In the Northern Ireland context, the two dominant religions of Catholic and Protestant reflect no physical differences, yet by age six, children develop their affiliation to one of these groups (Connolly, Kelly and Smith, 2009). The authors subsequently deem Northern Ireland to have ethno-religious divisions as religion is the main source of ethnic identity. Although religion has been viewed as supporting ethnic identity as interactions between the two concepts simultaneously inform identities (Bradley and Taylor, 2004), Mitchell (2006) is critical of associating religious dimensions of identity with ethnicity as it downplays the role religion individually plays in establishing ethnic identity. Relating this discussion back to the question, although ethnicity and religion may interact to form an identity, one is not an equivalent to the other. Ethnicity and religion are two separate entities that have differential impacts on attainment and should be analysed as such. However, as highlighted by Connolly,

Kelly and Smith (2009), in the context of Northern Ireland, the interpretation of ethnicity reflects a degree of fluidity and can be identified as differences in religious affiliation, creating the concept of ethno-religion.

The Census of 2011 highlighted that the Northern Ireland population predominantly affiliated with one of two religions; Protestantism (48.4%) and Catholicism (45.1%) (NISRA, 2012). These two religions are central to the religious demographic of Northern Ireland, with other religions and no religion accounting for 0.9% and 5.6% of the population, respectively (NISRA, 2012). As highlighted by Muldoon et al., (2007), although the number of people identifying as not religiously affiliated has increased, this remains a low proportion and religious identification continues to be of importance in Northern Ireland. This reaffirms the argument outlined by Schubotz and Devine (2011) that young people in Northern Ireland continue to grow up in society that remains divided according to religious lines. Religion is a form of individual, collective and social identity in Northern Ireland, as affiliation with Protestantism or Catholicism is the most widely recognised form of identity (Ysseldyk, Matheson and Anisman, 2010; Muldoon et al., 2007; Mitchell, 2005). Social identity theory is therefore core to understanding social group divisions and comparisons in Northern Ireland. Despite religious affiliation providing a predominant source of identity in Northern Ireland (Schubotz and Devine, 2011), there is not necessarily any religious content or values behind the identity labels (Mitchell, 2006, 2005). Even nominally, religion has an important role for constructing a sense of self and group membership that involves no personal religious beliefs, practices or institutional engagement (Mitchell, 2005). This idea closely reflects Demerath's (2000) concept of cultural religion which is identification with a religious heritage without any institutional or religious participation. Instead, it is about cohesion with past generations of the same identity and ensuring differences with rival groups (Demerath, 2000). In Northern Ireland, cultural religion is a unique type of religion that is structured around its social importance as its theological links are extremely weak (Demerath, 2000). Religious affiliation is therefore integral to comparisons in Northern Ireland as it provides substantial content to analysis (Muldoon et al., 2007; Mitchell, 2005; Brown, 1996).

Northern Ireland was deemed a Protestant State by its first Prime Minister James Craig in 1934, meaning Catholics were viewed as the out-group. Despite progressing to a

post-conflict society, religious segregation in Northern Ireland remains evident across structures such as housing and education. The importance of religious identity therefore remains as religious affiliation often determines an individual's place in the social and political structures, highlighting religious identifications deep embeddedness in Northern Ireland (Mitchell, 2005). The heightened importance of identity was prevalent during the conflict which polarised the two religions and identities of Catholic and Protestant further. Hughes (2011) noted the religious categories of Catholic and Protestant are closely aligned to political stances of Nationalist and Unionist, respectively. However, as Mitchell (2005) highlights, religious identification only marks an individual's identity with a community rather than their political stance as one can feel they belong to the Catholic or Protestant community without associating with the ethnic politics. Despite religious identities being difficult to renegotiate in Northern Ireland, they are not fixed as they can change focus from personal to collective, and theological to cultural, according to the individual and context (Mitchell, 2010; Muldoon et al., 2007; McLaughlin, Trew and Muldoon, 2006). Muldoon et al., (2007) developed this further, highlighting that religious identity can be personal through faith and worship, whilst at other times, it provides a collective identity, with politics rather than spirituality being at its core. This reflects the heterogeneous nature of social identities (Deaux, 1995), as identifying with a social group may not have the same meaning to all individuals (Huddy, 2001; Brown, 2000; Deaux, 2000; Skevington and Baker, 1989; Brown and Williams, 1984). Brown (2000) highlights that in relation to the varying identity functions, a weakness of social identity theory is its inability to effectively discuss and describe all these functions and the implications of the different identity meanings of the same group.

Connolly, Kelly and Smith (2009) found that Catholic and Protestant children at age three and four years had begun to internalise the cultural dispositions of their respective communities before they had the ability to develop the knowledge and justifications for such. From a young age in Northern Ireland, children grow up on one side of the religious divide and are exposed to cultural markers associated with their ethnic group (Connolly, Kelly and Smith, 2009). This provides an explanation for why, at the age of three years, children begin to develop cultural habits and dispositions associated their community (Connolly, Kelly and Smith, 2009). The importance of religion for communal identity is a given as the identities of Catholic and Protestant

are placed upon people from an early age and are central to issues such as school choice (Mitchell, 2005). Religious identity is deeply embedded in existing social structures and underpins a segregated school system in Northern Ireland. Despite the public expression of desire for children to learn together, only 8.8% of post-primary school pupils were educated in an integrated school setting in 2018/2019 (Department of Education, 2019b). This was an increase from the 7% of pupils in 2015/2016 (Department of Education, 2015b).

2.5.2 Religion and School Management Structure in Northern Ireland

Northern Ireland has a selective education system that is divisive according to academic ability and religious affiliation. In Northern Ireland, primary and post-primary schools are defined according to their management structure, which pupils predominantly attend based on their religion. Management structures of schools in Northern Ireland are; controlled, Catholic maintained, integrated, Irish medium and other maintained, with the addition of voluntary schools at post-primary level. Controlled schools are non-denominational and are managed by the Education Authority and a board of governors (Perry, 2016; Lundy et al., 2012). Catholic maintained schools are managed by the Council for Catholic Maintained Schools and a board of governors, whilst integrated and voluntary schools are under the management of a board of governors. The Department of Education (2019c) highlighted in 2018/2019, there was a total of 196 post-primary schools. There were 48 controlled non-grammar schools, 16 controlled grammar schools, 60 Catholic maintained non-grammar, 29 grammar schools (voluntary) under Catholic maintained management, 21 grammar schools (voluntary) under 'other management', and five controlled integrated schools and 15 grant maintained integrated schools. The remaining two schools were Irish medium maintained schools. It should be highlighted that the analysis of this thesis focuses upon the management structures of controlled, Catholic maintained, integrated and voluntary. In addition, this thesis does not differentiate between grammar and non-grammar schools of different management structures. Instead school type and management structure are examined as two separate variables due to the structure of the data provided.

School structures in Northern Ireland remain predominantly segregated by religion

(Machin, McNally and Wyness, 2013; Gallagher, McKeown and McKeown, 2000; Shuttleworth, 1995). This is illustrated by the composition of pupils in each school structure. In controlled schools. 70.4% of pupils are Protestant, whilst 6.6% are Catholic. Catholic pupils (96.3%) predominantly attended Catholic maintained schools, with only 0.9% of pupils affiliating as Protestant attending these schools. In voluntary schools, 28.1% of pupils were Protestant, whilst 60.2% of pupils were Catholic. The religious divide is less prominent in integrated schools, with 37.4% of pupils being Protestant and 41.2% of pupils being Catholic in grant maintained integrated schools, whilst in controlled integrated schools, 50% of pupils were Protestant and 24.4% were Catholic (Department of Education, 2015b).

The argument that school management structures in Northern Ireland are divided according to religion suggests the management structure of the school can affect a pupil's social identity based on religion. If the school structure reflects an ethos and values related to a religion, it may influence or reinforce a pupil's identity based on the particular religion. Based on the argument that school management structures are divided by religion, it could be argued that such a system works to exacerbate opposing social identities based on religion, subsequently reinforcing difference and the 'in-group, out-group' concept, which can have either a positive or negative affect on pupils' attainment and trajectory. However, as school management structures are not explicitly attended by one religion, they cannot be used as an exclusive school level proxy for a pupil's religion and the extent to which management structures influence an individual's identity may vary. The importance of individual agency should be acknowledged further here within social identity theory as it can determine the extent to which an individual affiliates with a social group and the subsequent influence that identity has on their outcomes (Huddy, 2001).

2.5.3 Religion and Attainment

At present, there is a lack of available data and studies statistically examining primary and post-primary attainment according to religious affiliation in Northern Ireland. The Department of Education (2019d) highlight that a marginally higher proportion of Catholics (71.4%) achieved 5 or more GCSEs A*-C, including English and maths compared to Protestants (69.7%) in 2017/2018. However, the difference between

religious groups in GCSE attainment is so slight, it questions the extent to which this presented difference is practically meaningful. This is evidenced by Shuttleworth (1995), who statistically tested the differences in GCSE attainment according to religious affiliation. Shuttleworth (1995) found in his analysis of 1,480 Year 12 pupils from the Secondary Education Leavers Survey 1990/1991, that religion (coded as Catholic and all other denominations) had a small effect on GCSE attainment in favour of Catholic pupils but was not statistically significant (β=0.11, SE=0.08, $p>0.05$). Despite this, analysis provided by Borooah and Knox (2017) on the influence of religion (coded as Catholic, Protestant and other) for the academic year 2013/2014 (n=22,764) found Catholic pupils were more likely to achieve 5 or more GCSEs A*-C, including English and maths than their Protestant peers (marginal probability=8.8%, $p\leq0.01$). Moreover, in their case study of seven of the top 20% most deprived wards in Northern Ireland (three of which were predominantly Catholic and three were predominantly Protestant), Leitch et al., (2017) found that a higher proportion of pupils in the predominantly Catholic wards achieved 5 GCSEs A*-C than the pupils in the three predominantly Protestant wards in 2012/2013. However, this relationship was not statistically tested. It is therefore apparent that there is a lack of consensus amongst existing studies on the influence of religion on GCSE attainment in Northern Ireland. This highlights the need for further examination into such relationship.

Community and cultural factors are important explanations for attainment disparities according to religious affiliation in Northern Ireland. Due to the historical discrimination experienced, Catholic communities traditionally viewed education as an opportunity to overcome societal biases and improve their overall status (Shuttleworth, 1995). In contrast, Protestant communities traditionally joined trade occupations and prioritised such training over education (Mulvenna, 2012; Purvis, 2011). This was problematic following the labour market shift towards a service based economy, as the skills of those employed in trades with no formal qualifications failed to match the new requirements of the labour market (Purvis, 2011). Despite the shift in the labour market, the tradition of manual employment continues, with Protestants being most likely to enter job training than continuing in education (Burns, Leitch and Hughes, 2015). This suggests religious identity continues to provide a sense of belonging, whilst creating boundaries between religious groups and providing

continuity with previous generations (McLaughlin, Trew and Muldoon, 2006). In addition, Leitch et al., (2017) found that attainment differences according to religious affiliation in Northern Ireland were associated with: school absenteeism (lower in Catholic wards than Protestant wards), rates of community cohesion (higher in Catholic wards), level of attachment to school and value placed on education (both were higher in Catholic wards). Despite such explanations, a criticism of focusing on only one dimension of social identity such as religion is its oversimplification of the problem in focus. As Lowe and Muldoon (2010) highlight, differences according to politics and economics in Northern Ireland interact to create similarities and differences between the two main religious groups. Such interactions should be acknowledged and studied to provide a fuller understanding of the relationships between factors. This is a current gap in educational research in Northern Ireland that this thesis aims to explore.

2.5.4 Attainment in Post-Conflict Societies

Northern Ireland is a society emerging from a period of armed conflict (The Troubles), which remains socially, geographically and politically segregated along religious lines (Connolly, Kelly and Smith, 2009). As a result, young people continue to grow up on one side of the divide, which reaffirms their religious identity and leads to the development of cultural habits associated with their respective community (Schubotz and Devine, 2011; Connolly, Kelly and Smith, 2009). However, this is not true for all young people, as there is considerable variation in identity within each group (Connolly, Kelly and Smith, 2009). Despite this, with 37% of the Northern Ireland population living in segregated areas (Nolan, 2014), Murtagh (2004) highlights how in many parts of Northern Ireland, housing is divided along religious lines, whilst Gallagher (2004) notes the normalisation of religious segregation in schools. Schubotz and Devine (2011) summarise that belonging to Catholic and Protestant communities is characterised by segregated housing and segregated schooling. Segregation is evident in the education system, with 96.3% of pupils attending Catholic maintained schools affiliating as Catholic and 70.4% of pupils attending controlled schools affiliating as Protestant (Department of Education, 2015b). Only 8.8% of pupils in Northern Ireland are educated in an integrated school (Department of Education, 2019b). Religious divisions of education in Northern Ireland means pupils grow up

and associate mostly with those of the same religion, leaving their identities to be influenced through indirect involvement with other religious groups (McLaughlin, Trew and Muldoon, 2006). Segregated schools and communities therefore encourage exclusivity and difference (McLaughlin, Trew and Muldoon, 2006). This reinforces the in-group/out-group structures and formations of contrasting social identities, rather than promoting inclusivity and cohesion (McLaughlin, Trew and Muldoon, 2006). When considering the historical context of Northern Ireland, it should be highlighted that the religiously segregated education system in Northern Ireland was evident before the conflict from 1968-1998. It is therefore problematic to argue the religiously segregated education system is a result of 'The Troubles'. Instead, it should be acknowledged that the nature of conflict has shaped the education system of Northern Ireland today but has not caused it.

Generally, disparities in education structures and outcomes are evident between conflict affected countries and those that have experienced no conflict. Educational attainment is compromised by conflict in three main ways (Justino, 2014). Firstly, through the destruction of resources needed to maintain an education system, along with the limited ability to sustain funding and administrative support, as education is often viewed as a symbol of the state (Justino, 2014; Montjourides, 2012; United Nations Educational, Scientific and Cultural Organisation (UNESCO), 2011). Secondly, displacement of communities affects how consistently children are educated which can become a barrier to education (UNESCO, 2011). Inconsistencies are exacerbated when educational resources reaching schools are limited in certain areas and teachers move from conflict affected areas (Justino, 2014; Save the Children, 2006). Thirdly, due to potential displacement, access to education may be limited and some social groups may be prevented from attending school. Conflict can therefore stagnate educational progress and reinforce national inequalities for particular social groups (Justino, 2014). Overall, children in countries experiencing conflict are more likely to have spent fewer years in education, limiting their attainment progression (Justino, 2014; Shemyakina, 2011; UNESCO, 2011).

Smith (2005) considered education in post-conflict societies and highlighted the need for physical and ideological reconstruction of educational structures to enhance the democratisation of education systems. Smith (2005) emphasised the need for

education systems to be conflict sensitive in countries presently affected by conflict and post-conflict societies, where education can be part of its reconciliation. Smith (2005) highlighted post-conflict reconstruction in education is not only about rebuilding the physical education infrastructure but also about providing individuals with the opportunity to build relations and inclusive curriculums that are conflict sensitive. Smith (2005) concluded that it is not currently accepted universally that education has a role in dealing with conflict legacies as part of the wider reconciliation process. Smith (2005) added that this may be due to the lack of a conceptual understanding of how education can effectively contribute. However, in Northern Ireland, Education for Mutual Understanding (EMU) is embedded in the curriculum following guidance outlined in the Education Reform (Northern Ireland) Order 1989. Through a range of inter school activities, the EMU initiative aims to increase inter-cultural contact to promote respect, understanding and relationships between pupils of different religious backgrounds (Smith and Robinson, 1996). This is because most pupils are educated in non-diverse educational settings, which some view as an obstacle for promoting the reconciliation process in Northern Ireland following 'The Troubles' (Richardson, 1997). In addition, EMU aims to teach pupils about the interdependence of people in society by highlighting similarities of different religious groups which work together to promote a functional society (Smith, 1999). Schubotz and Devine (2011) concluded that cross-community programs between schools were likely to be the most effective in developing positive attitudes amongst young people about integration of religious groups in Northern Ireland. Although the cross-community contact between schools is a voluntary element of EMU, the cross-community relations that can potentially be built between schools of different management structures provide pupils with a practical understanding of differences within society (Smith and Robinson, 1996). More generally, Gallagher (2016) forwarded that collaborations between different school structures may promote greater social cohesion in Northern Ireland and further afield, as it allows pupils and teachers to move between schools to take classes, providing a degree of mixing between social groups, whilst protecting the existence and ethos of separate school structures for different religions. From their analysis in Northern Ireland, Hayes and McAllister (2009) found those attending integrated schools had more positive views of cross-community contact and relations. This led the authors to the conclusion that in a post-conflict society, an integrated education system fosters better community relations,

which can be used as a starting point to build a successful post-conflict society. This finding reflects the benefits of integrated education in post-conflict societies, which have also been reiterated by other studies (Hayes, McAllister and Dowds, 2006; McGlynn et al., 2004; Montgomery et al., 2003). Yet, only 8.8% of pupils are educated in an integrated setting in Northern Ireland (Department of Education, 2019b).

2.5.5 Summary

Religion is a somewhat unique concept to the Northern Ireland context and religious identity remains of key importance. The variation of meaning attached to religious identity in Northern Ireland highlights that variation within one social group is apparent and no social group is homogenous. Despite transition to a post-conflict society and the importance of education in post-conflict societies for reconciliation, religious segregation in education remains in Northern Ireland. However, the Northern Ireland education system aims to promote reconciliation and understanding between different religious groups through the EMU initiative. When considering attainment trends according to religion, marginal differences in favour of Catholic pupils are apparent which may be explained through the interactions between social identity and cultural factors. However, the data available for analysis are limited and subsequently, so are the number of studies statistically examining this relationship. Overall, this section clearly highlights that within the Northern Ireland context, the relationship between religion and attainment cannot be ignored, and subsequently, we have a real need for more analysis into this to provide a more informed discourse.

2.6 Gender

2.6.1 Attainment in Primary School

Gendered attainment patterns are evident across compulsory education in the UK. Croxford et al., (2003) noted a lower number of studies focused upon gender differences in primary school attainment, when compared to post-primary. The authors suggested this was due to the lack of information about attainment prior to standardised examinations at the end of post-primary schooling. Despite the predominant focus in the literature on post-primary attainment, since the work of Croxford et al., (2003), there has been an increase in the number of studies examining gendered attainment patterns in primary school.

Primary school studies have found that across the UK, girls were more likely than boys to achieve the highest grades at Key Stage 2 (aged 8-11 years in England and Wales, and aged 7-11 years in Northern Ireland) (Adcock, Bolton and Abreu, 2016; Melhuish et al., 2013; McPhillips and Jordan-Black, 1994). Throughout primary school, girls outperformed their male peers in reading assessments in England (Department for Education and Skills, 2007), Scotland (Tymms, Merrell and Buckley, 2015; Croxford et al., 2003; Tinklin et al., 2001), Wales (National Statistics for Wales, 2017; Gorard, Rees and Salisbury, 2001), and Northern Ireland (Sturman et al., 2012). It has been suggested that girls' higher performance in reading assessments can be understood through the transmission of social norms. Social norms inform an individual's identity and socialisation, both of which affect how pupils perceive different subjects. When considering this in relation to attainment, if social norms view a subject such as English (reading) as feminine, it is likely to be perceived as heavily aligned with a female social identity, rather than a male social identity. Such social norms and their subsequent influence on social identity may provide females with more appropriate behaviours and attitudes that foster higher performance in English (reading), when compared to the behaviours and attitudes transmitted to males through social norms about the same subject and their gender identity. This process is assisted by socialisation which is often gendered in nature. The socialisation process can result in individuals internalising behaviours associated with their gender, which subsequently exacerbate gender differences if varying attitudes and behaviours are taught about different subjects (Schmader and Block, 2015). For example, female outperformance in subjects such as English may align with their socialisation and subsequent gender construction which encourages the expression of emotion (Chaplin and Aldao, 2013; Francis and Skelton, 2005). Gender identity and the socialisation process can also be adapted and used to explain gender attainment trends in mathematics and science.

When considering mathematics and science attainment, little difference has been reported between genders in England during Key Stage 1 (aged 5-7 years) and Key Stage 2 (aged 8-11 years) (Warrington, Younger and McLellan, 2003). In Scotland, although boys made greater progress in mathematics by the end of Primary 1 (aged 5-6 years) (Tymms, Merrell and Buckley, 2015; Tinklin et al., 2001), no significant differences were reported between genders in mathematics and science attainment in

Primary 4 (aged 8-9 years) and Primary 7 (aged 11-12 years) (Horne, Bejtka and Miller, 2008; Tinklin et al., 2001). In Northern Ireland, when using the Trends in International Mathematics and Science Study from 2011, the magnitude of score differences between male and female pupils in mathematics and science was marginal, to the extent it reflected no meaningful difference (Burge, Classick and Stacey, 2016; Sturman et al., 2012). As a result, no statistically significant difference between genders in mathematics and science attainment was reported in Northern Ireland (Burge, Classick and Stacey, 2016; Sturman et al., 2012). Despite consistent trends in England, Scotland and Northern Ireland, a marginally higher proportion of boys reached Level 3 in Key Stage 1 mathematics and science in Wales (National Statistics for Wales, 2017; Gorard, Rees and Salisbury, 2001). When considering such trends, although an individual's identity is informed by their gender, these identities and their characteristics are not fixed but continuously shift as society and its norms evolve over time (Condor, 1996). When comparing the theoretical explanations for gendered attainment trends in English (reading), mathematics and science, it could be suggested there is a greater shift in gendered socialisation and identity construction in relation to mathematics and science. This shift may be the result of a more equal emphasis on ability and subject importance for both genders in mathematics and science through the transmitted behaviours and attitudes from their socialisation and identity. Such explanation may provide an understanding for the smaller attainment differences in mathematics and science when compared to English (reading).

Primary school attainment data are not statutorily collected or available for analysis in Northern Ireland. However, as part of this thesis, data was made available by GL Assessment for 36 consenting primary schools in Northern Ireland. The data related to the following online administered assessments for the academic year 2016/2017: Progress Test in English (PTE) (from 32 schools), Progress Test in Maths (PTM) (from 32 schools) and Cognitive Abilities Test (CAT) (4^{th} Edition) (from 36 schools). For the PTE and PTM, data were provided for pupils in Primary 3 (aged 6-7 years) to Primary 7 (aged 10-11 years) in the given academic year (2016/2017), whilst CAT data was provided for pupils in Primary 5 (aged 8-9 years) to Primary 7 (10-11 years). The key strength of the GL Assessment data was its availability for analysis, as no other primary school attainment data is available in Northern Ireland. At the time this analysis was conducted, the GL Assessment data were the only data the project had

access to due to delays in the main dataset becoming available. However, the GL Assessment data had some limitations that are important to acknowledge when considering the results of the presented analysis. Firstly, the data accounted for only 36 primary schools in Northern Ireland. In 2016/2017, there were 821 primary schools in Northern Ireland (Department of Education, 2017b), meaning the sample accounted for only 4.4% of primary schools. The data were therefore not a representative indication of primary school attainment trends across Northern Ireland due to the small sample of pupils and schools. In addition, the sample was not randomly selected from the population and may therefore be biased in an unknown direction. Secondly, the GL Assessment data were cross-sectional, meaning the attainment trends of different primary years could not be accurately compared as they did not relate to the same pupils. Subsequently, attainment trends could only be analysed according to each primary year as longitudinal data on pupils across the different primary years were not provided. Finally, the data provided limited pupil level socio-economic status indicators. This was a key limitation for this thesis which has a central focus on the within model effects of socio-economic status on attainment. Moreover, a pupil's religious affiliation was not provided, again limiting the effectiveness of this data in relation to the focus of this thesis. Despite this, the overriding strength that this was the first primary school attainment data in Northern Ireland made available for analysis was important. A summary of analysis in relation to the effects of gender on English, mathematics and cognitive abilities attainment is provided below, with a more detailed write-up provided in Appendix A. The executed multilevel models included the following factors: gender, free school meal entitlement, school management structure, school location (Education and Library Board), percentage of pupils in a school entitled to FSM and percentage of pupils in a school with SEN.

When considering the within model effects of gender on English attainment across age groups, female pupils had higher scores than males. This was reflected at age 7 years (Script 07) (d=0.10, 95% CI: -0.02, 0.23), age 8 years (Script 08) (d=0.12, 95% CI: -0.002, 0.24), age 9 years (Script 09) (d=0.09, 95% CI: -0.03, 0.21), age 10 years (Script 10) (d=0.09, 95% CI: -0.03, 0.21) and age 11 years (Script 11) (d=0.07, 95% CI: -0.06, 0.20). It was evident, the gender gap in English, although consistently in favour of female pupils, did not increase in magnitude in older primary school years. Moreover, the confidence intervals (CI) of the given effects were not statistically significant. This

suggests there was no meaningful difference in the attainment of pupils based on their gender across all ages (scripts) in English. In mathematics, the gender difference in attainment was marginally in favour of female pupils at age 8 years (Script 08) (d=0.002, 95% CI: -0.12, 0.12), and age 11 years (Script 11) (d=0.02, 95% CI: -0.11, 0.15). Despite this, the differences between genders were so slight and the confidence intervals wide that they provided no evidence of an attainment gap between genders in mathematics. At age 7 years (Script 07) (d=-0.04, 95% CI: -0.17, 0.09), age 9 years (Script 09) (d=-0.05, 95% CI: -0.16, 0.06) and age 10 years (Script 10) (d=-0.02, 95% CI: -0.14, 0.10), female pupils had marginally lower scores than their male peers in mathematics. However, across all ages in mathematics, the confidence intervals of the given effects were not statistically significant. When considering CAT, the score difference between female and male pupils at ages 8-9 years (Level A) was in favour of females but was small in magnitude (d=0.02, 95% CI: -0.06, 0.11). This was also reflected at age 10 years (Level B) (d=0.08, 95% CI: -0.01, 0.19). At age 11 years (Level C), the direction of the score difference was opposite to that reflected in Level A and Level B, with females having marginally lower scores than their male peers (d=-0.03, 95% CI: -0.24, 0.17). However, across all ages, the attainment differences in CAT were small in magnitude and not statistically significant.

In summary, the analysis highlighted that in English (PTE), girls had higher scores than boys across all ages. However, the confidence intervals associated with the given effects indicated the gender differences were not statistically significant nor practically meaningful. The direction of the gender difference in mathematics attainment (PTM) reflected greater variation than English. In mathematics, the gender attainment difference was in favour of female pupils at age 8 years (Script 08) and age 11 years (Script 11). In the remaining age groups/scripts, the mathematics attainment difference was in favour of males. However, across all age groups, the magnitude of the gender difference in mathematics was small and not statistically significant. In the Cognitive Abilities Test, there was also variation in the direction of the within model effects, with the gender difference in favour of female pupils at age 8-9 years (Level A) and age 10 years (Level B), whilst at age 11 (Level C), female pupils had marginally lower scores than their male peers. The gender differences in CAT attainment were small in magnitude across all age groups and not statistically significant. This analysis reflected the gendered attainment difference was greater in magnitude in English than

mathematics in Northern Ireland. However, these attainment differences based on pupils' gender were not found to be statistically significant across all ages in primary school.

2.6.2 Attainment in Post-Primary School

At post-primary, the consistently higher attainment of female pupils was evident across the UK. From 2017 in England, there was a transition in the grading system of GCSEs from an alphabetical scale to a numerical scale ranging from 9 to 1. The highest alphabetical grade (A*) had the highest numerical score (9), whilst the lowest alphabetical pass grade (G) had the lowest numeric score of 1. Grade U was not included in the numerical grading scale. This numerical grading system has also been introduced in Northern Ireland and will apply to grades achieved in 2019 (CCEA, 2019). However, in Wales, the alphabetical GCSE grading system remains (CCEA, 2019). In England, a further transition is underway; instead of the binary measure of achieving 5 GCSEs A*-C, including English and mathematics, an 'Attainment 8' score is now provided that measures a pupil's achievement across eight subjects. In Attainment 8 scores, English and mathematics scores are double weighted to highlight their importance (Department for Education, 2016).

The emerging gender differences that are apparent in primary school become consistently observed patterns in post-primary school such that overall, in post-primary education, girls, on average, outperform boys. When accounting for the grading system change to Attainment 8 scores in England, girls had higher average Attainment 8 scores than their male peers (49.2 and 43.6, respectively), in 2018 in state funded schools (Department for Education, 2018a). In 2015/2016 in England, a higher proportion of girls achieved 5 or more GCSEs A*-C, including English and maths, compared to boys (62.6% and 52.3%, respectively) (Department for Education, 2017a). In 2016/2017, a higher proportion of girls achieved 5 or more GCSEs A*-C, including English and maths, compared to boys in Wales (58.8% and 50.7%, respectively), and Northern Ireland (73.8% and 66.8%, respectively) (Department for Education, 2018b). In Scotland, a higher proportion of girls achieved one or more qualifications at Scottish Credit and Qualifications Framework (SCQF) Level 6 or

better (e.g. Standard Grade Credit or better) than boys in 2016/2017 (67.2% and 55.5%, respectively) (Department for Education, 2018b).

In addition to the theoretical explanations outlined previously to explain gender differences in attainment, it has also been suggested school ethos and curriculum favour female learning strategies, leading to their higher relative performance when compared to males. It has been argued that the learning styles of male pupils may be less conducive to high levels of academic attainment (Leitch et al., 2017). This can result in frustrations with the formal nature of the classroom and school structure, which in a cyclical process, affects their learning strategies and educational outcomes (Warrington, Younger and McLellan, 2003; Younger, Warrington and Williams, 1999). Subsequently, some have argued the lack of connection between the school environment, curriculum and lives of male pupils may negatively affect attainment, helping explain their relatively lower attainment than females (Connolly, 2004; Warrington, Younger and McLellan, 2003). However, male pupils do not underperform in comparison to girls in all subjects, as in some subjects such as mathematics and science, gender differences are not so starkly in favour of girls. This could be explained by multiple forms of masculinity existing within schools and not just those that reflect male frustrations with the education system. As masculinity is a multidimensional concept, it is not homogeneous to all male pupils but is flexible and continually changing (Travers, 2017). The form of masculinity an individual male encompasses may therefore vary according to time, social context and interactions with such setting (Travers, 2017; Imms, 2000). Masculinity culture is a contributing factor that shapes a male's social identity, which can affect their attainment. When a male identifies with a specific masculinity, behaviour and outcomes can be understood through the group norms. Masculinity studies suggest several types of masculinity co-exist within schools. Lyng (2009) identified masculinity in schools in the forms of: macho, geek, golden boy and nerd, providing an explanation for variation in male attainment. By acknowledging different types of masculinity and the fluidity of this concept, it shifts focus from deterministic gendered assumptions to an understanding that not all male pupils with lower educational attainment identify with a macho masculinity. However, Connolly (2004) notes that if schools continue to implement processes that do not meet male learning strategies, it may lead to the reinforcement of masculine identities that contribute to the restriction of boys overall educational

development and outcomes. Despite furthering our understanding, masculinity theories fail to examine the culture of femininity and its influence on attainment, which accounts for half of the explanation of the gendered education attainment gap (Schippers, 2007).

2.6.2.1 English Attainment at Post-Primary School

Across the UK, female pupils outperformed their male peers in achieving A*-C in GCSE English. In 2017/2018, in England, a higher proportion of female pupils achieved A*-C (score 9-4) in GCSE English, when compared to their male peers (72% and 56%, respectively) (Department for Education, 2018e). The higher proportion of female pupils achieving A*-C in GCSE English, when compared to male pupils was also evident in Wales in 2017/2018 (71.8% and 53.9%, respectively) (Welsh Government, 2018b), and Northern Ireland (86.8% and 73.7%, respectively) (CCEA, 2018b). In Scotland, girls also had higher literacy performances, with 92% achieving Third Level or better in literacy, compared to 83% of male pupils (Scottish Government, 2018). Several studies examining trends in England and Wales commented that the gender gap in favour of female pupils in English assessments widened as pupils progressed through compulsory education, meaning gaps in post-primary English attainment were larger than those in primary school (Department for Education and Skills, 2007; Gorard, Rees and Salisbury, 2001, 1999). In their systematic review of 23 studies examining the influence of gender and socio-economic status on PISA attainment between 2000 and 2012 in the UK, Early et al., (2019) highlighted that all eligible studies in their review reported the higher performance of females in reading compared to males, regardless of PISA cycle or UK country in focus.

As the socialisation process of which boys and girls are exposed to differs, it could be argued it positively/negatively alters their; perception of subjects, learning strategies and later educational outcomes. Moreover, as a higher proportion of teachers are female, the feminisation of teaching can lead to female pupils being exposed to more positive role models in education, which positively affects their academic attitudes. The feminisation of teachers may also result in female teachers favouring female learning styles, which could negatively affect the delivery of the curriculum for male

pupils. Teacher expectations and attitudes may therefore influence pupils' gendered attitudes of certain subjects (Salisbury, Rees and Gorard, 1999; Younger, Warrington and Williams, 1999). If a teacher reflects high expectations of female pupils in specific subjects, it may positively influence female pupil attitudes and subsequent attainment. This feeds into a pupil's gender identity which can be positively or negatively influenced by teacher attitudes and expectations, which in turn may influence a pupil's academic trajectory and outcomes. However, a criticism of social identity theory is that it assumes a positive social identity is dependent upon favourable intergroup comparisons (Brown, 2000). Despite this, members of the out-group can continue to have a positive social identity and high attainment, regardless of the outcome of intergroup comparisons in the education system.

2.6.2.2 Mathematics and Science Attainment at Post-Primary School

In the past, gender differences in mathematics attainment favoured males at post-primary level (Stobart, Elwood and Quinlan, 1992). However, recent figures from 2018 illustrate the decline of the male advantage, with a similar rate of female and male pupils achieving A*-C (score 9-4) in GCSE mathematics in England (66% and 63%, respectively) (Department for Education, 2018e). This marginal gender difference was also evident in Wales, with 1% more girls achieving A*-C than male pupils (67.4% and 66.4%, respectively) (Welsh Government, 2018b). Similarly, in Scotland, 59% of girls achieved Third Level or better in numeracy, compared to 53% of male pupils (Scottish Government, 2018). In Scotland, the gender difference in the proportion of pupils achieving both Third Level and Fourth Level was smaller for mathematics when compared to the gender difference achieving the same levels in literacy (Scottish Government, 2018). Northern Ireland reflected the same pattern as the rest of the UK, with a marginally higher proportion of females achieving A-C in GCSE mathematics than males (69.1% and 67.1%, respectively) (CCEA, 2018b). However, when using the alternative attainment measure of PISA to examine trends, Early et al., (2019) noted that eligible studies consistently reported that males outperformed their female peers in mathematics. Despite this, the magnitude of males' higher attainment varied across studies, PISA cycle and UK countries. In addition, Early et al., (2019) reported that two studies (Marks, 2008; Gill, Dunn and Goddard, 2002) found males' higher mathematical attainment in PISA 2000 was not statistically

significant, whilst in 2012, one study (Organisation for Economic Co-operation and Development (OECD), 2014a) reported the gender difference in favour of males in Northern Ireland was not statistically significant, in contrast to other UK countries. Although the direction of the relationships consistently reflected the higher attainment of male pupils in mathematics, the variation of the relationship magnitude and statistical significance may be the result of other factors in analysis meditating the influence of gender on mathematics attainment.

In science, female pupils are also outperforming their male peers across the UK in recent years. In 2017/2018, a marginally higher proportion of female pupils achieved A*-C (score 9-4) in double award science, compared to their male peers in England (37% and 32%, respectively) (Department for Education, 2018e). Similar trends were also apparent in the rest of the UK in the academic year 2017/2018, with a higher proportion of girls achieving A*-C in a core science subject in Wales (66.2% and 59.9%, respectively) (Welsh Government, 2018b) and Northern Ireland (75.7% and 66.9%, respectively) (CCEA, 2018b). In 2017/2018 in Scotland, a higher proportion of female pupils compared to males achieved grades A-C in National 5 examinations in Biology (74% and 70%, respectively), Chemistry (79% and 75%, respectively) and Physics (84% and 72%, respectively) (Scottish Qualification Authority, 2018).

The reduction of gendered attainment differences in mathematics and science, along with the marginally higher rates of female attainment highlights that individuals do not automatically accept predetermined gendered behaviour, traits and assumptions about subject ability but continually build and negotiate their gender identity and role (Imms, 2000). Such argument assists in explaining attainment differences. This is a less deterministic perspective than the gendered socialisation approach which suggests individuals internalise behaviours that are perceived as strongly linked to the gender they identify with (Schmader and Block, 2015). However, the socialisation process can be linked to an individual's social identity as Wetherell (1996) highlights how Tajfel forwarded that socialisation allows individuals to place themselves within established social groups that they have a common characteristic with. An individual's social identity based on their gender can influence attitudes, expectations and outcomes of certain subjects based on the norms of the group they affiliate with. Female pupils viewing subjects such as mathematics and science more positively may

therefore reflect a recent shift in social group norms of the affiliated female identity. Such attitudes may now align more closely with those traditionally associated with a male gender identity, which may positively affect their attainment in subjects that were traditionally viewed as male dominated. This may help explain the decreasing gender gap in mathematics and science in recent years. Francis (2000) therefore suggests the discourse surrounding the ability of female pupils is now questioning the traditional discourse of gender differences in ability in different subjects. Although social identity theory can help explain attainment differences between genders, it could be argued some individuals place greater emphasis on their own attributes affecting their outcomes, rather than the social group such as gender they affiliate with (Huddy, 2001; Francis, 2000); something of which social identity does not consider (Huddy, 2001).

2.6.3 Gender Attainment Trends in the International Context

The gendered attainment patterns evident in the UK across primary and post-primary school were also reflected in the international context. At primary level, girls had higher performances on reading assessments than boys in elementary school in the USA (Loveless, 2015; Chudowsky and Chudowsky, 2010). This is evidenced by the Progress in International Reading Literacy Study in 2011 reporting that girls had significantly higher reading attainment in fourth grade (aged 9-10 years), with a mean score of 562, compared to a mean score of 551 for boys (SD (of gender gap) = 0.15, $p<0.05$) (Loveless, 2015). However, Loveless (2015) highlights the statistical significance of the gender score gap may not be meaningful due to the large sample sizes used. For example, 12,726 pupils in 370 schools completed the Progress in International Reading Literacy Study in the USA in 2011 (Mullis et al., 2012). When considering mathematics attainment at primary level, there was no consistent gender gap in the USA, as girls and boys performed equally on achieving the basic level in mathematical assessments (Chudowsky and Chudowsky, 2010). However, a greater proportion of boys achieved the advanced level in mathematical assessments (Chudowsky and Chudowsky, 2010).

At post-primary, boys relatively lower academic performance than girls were evident across the Western World (USA, Canada, Australia, New Zealand and Denmark) (Tinklin et al., 2001; Epstein et al., 1999). More specifically, PISA indicates that girls

had significantly higher reading scores than boys in all participating countries (OECD, 2014a). In the USA, Loveless (2015) highlighted in PISA 2012, female pupils had higher mean scores than their male peers (513 and 482, respectively; SD (of gender gap) = 0.34, $p<0.05$). However, Loveless (2015) highlights the statistical significance of the gender score gap may not be meaningful due to the large sample sizes used in PISA (6,111 pupils in the USA completed PISA 2012 (OECD, 2014b)). However, in PISA mathematical assessments, the extent of the gender gap in favour of males varied across participating countries (OECD, 2014a). With variation in international trends in mathematical attainment, it could be argued that geographical context and the situational gendered expectations influence attainment (Ceci et al., 2014). West and Zimmerman's (1987) theory of 'doing gender' helps explain this further. West and Zimmerman (1987) argued 'doing gender' involves perception, interaction and micro-politics that define activities as either masculine or feminine. Although gender may be considered biological by some, it is created by organised social performances encompassing the above three factors. Gender is therefore a product of practices and interactions taking place within social structures that validate and maintain gender distinctions, consequently producing gendered social norms. As gender is not within an individual but is reinforced through social interactions, the geographical context is important as expectations of genders may vary, along with how an individual 'does gender'. Gender is therefore fluid rather than a static concept involved in complex social processes and interactions that vary according to geographical context. Differences between countries in their social structures and gendered expectations and norms may result in variation in how each country 'does gender'. West and Zimmerman's (1987) theory of 'doing gender' may therefore help explain variation in gendered attainment trends, especially mathematics in the international context.

2.6.4 Summary

Arnot et al., (1998) summarised gender attainment trends across primary and post-primary education, highlighting girls performed better in reading assessments at Key Stage 1 (aged 6-8 years in England/Wales and aged 5-7 years in Northern Ireland), and maintained their lead in Key Stage 2 (aged 8-11 years in England/Wales and aged 7-11 years in Northern Ireland) and Key Stage 3 (aged 11-14 years). In mathematics and science, boys and girls performed at similar levels between Key Stage 1 and 3. More recently, such trends continue to be reflected throughout the UK, as girls consistently

outperformed boys in GCSE English, yet differences in mathematics and science achievement were marginal, though consistently in favour of girls (Francis and Skelton, 2005; Gorard, Rees and Salisbury, 2001). Burgess et al., (2004) matched exam results of English pupils who took Key Stage 3 tests in 1999 and GCSEs in 2001. The authors concluded the gender gap at post-primary was driven by performance differentials in English from primary school. This argument is supported by other studies (Department for Education and Skills, 2007; Francis and Skelton, 2005; Quicke, 1998). As highlighted throughout this section, there are various theoretical explanations that can assist our understanding of gender attainment differences across compulsory education. For reading/English attainment, it could be forwarded that gendered socialisation, expectations and norms impact upon the identity of pupils, leaving them more likely to enact gendered behaviour such as reading for girls. Our gender identity and socialisation are therefore somewhat intertwined and can help explain gender attainment differences. For mathematics and science, the perspective that gender informs our identity can continue to be used but a shift may be apparent in gendered socialisation and expectations in relation to these subjects. In essence, we may be challenging mathematics and science gendered social norms, however, this may not be happening with reading/English to same extent, thus explaining the larger gender attainment difference.

With gender attainment disparities beginning in primary school, the attainment gap is often more complex than suggested, meaning only focusing on the relative lower attainment of boys is too simplistic (Tinklin et al., 2001). A criticism of examining gender attainment trends in isolation is the conceptualisation of genders as relatively homogeneous groups which is problematic due to their interactions with other socio-demographic factors (Smith, 2003; Gorard, Rees and Salisbury, 2001). Indeed, in conjunction with social identity theory, as various forms of masculinity co-exist within the school environment, it can help illustrate the identity variation evident within one social group such as gender. Collins, Kenway and McLeod (2000) suggested rather than focusing upon the gender gap, it is more appropriate and effective to examine the 'gender jigsaw', as males and females are not homogeneous groups. Attainment differences between social groups is a multidimensional issue, meaning the gender gap cannot be understood in isolation, as variation in attainment trends are evident across the UK when other socio-demographic factors are considered (Elwood, 2010;

Department for Education and Skills, 2007; Francis and Skelton, 2005; Connolly, 2004; Tinklin et al., 2001; Warrington and Younger, 2000; Epstein et al., 1999). In the complex debate of educational attainment, gender only plays one part. It is therefore important to consider gendered attainment patterns in relation to other socio-demographics to examine how such factors interact to affect attainment.

2.7 Interactions of Social Categories

The social identity process is complex as individuals complete the social categorisation process for their various characteristics, beliefs and values to identify with as many suitable groups. This results in an individual having more than one identity. Although social identities are often viewed in isolation from one another (O'Connor, 2001), social identity theory is a beneficial theoretical perspective as it allows the exploration of how individuals affiliate with more than one social group and subsequently have multiple identities in a highly differentiated society (Stets and Burke, 2000). Of interest to this thesis is an individual's categorisation according to their socio-economic background, religious affiliation and gender. As individuals can have as many identities as the groups they belong to (Hogg et al., 2004), Worchel et al., (2000) suggest behaviour is not the outcome of a single identity but is the accumulation of numerous identities acting simultaneously. Hogg and Abrams (1988) highlight that the social groups individuals categorise themselves into belong to a structured society and exist against contrasting categories (for example: male and female; Catholic and Protestant; highly deprived background and affluent background). These identities can intersect, leaving an individual categorised as an out-group member in more than one category (Crisp and Hewstone, 2000). Based on such intersecting identities, individuals may be a member of a double in-group, a double out-group or in-between groups. However, Roccas and Brewer (2002) suggest multiple social categories interact to provide a single social identity and a single in-group (for example, Catholic female), as those not sharing the combined identity are classified as the out-group. Despite such debate, Stets and Harrods (2004) question the extent to which social identity theory acknowledges an individual's agency in constructing and positioning their identities. Stets and Harrods (2004) suggest that the multiple groups an individual belongs to in society and their subsequent identities should reflect their relative

importance to an individual by determining which identity is most prominent within an individual's self.

Bloomer and Weinreich (2004) found social identity theory is a dominant theoretical underpinning of research in the Northern Ireland context. Brown (2000) suggests this can be explained by its core understandings of intergroup relations and competing social identities that are key to understanding social groups in Northern Ireland. Social identity theory is also a useful theoretical framework as it acknowledges the role of social, economic, historical and political factors in the identity creation process in Northern Ireland (Cairns, 1982). To fulfil the explanatory power of social identity theory, it is important to move beyond only examining one aspect of an individual's social identity and relating behaviours and outcomes to this specific identity, for example: religion or social class. Instead, an operationalised measure of various social identities is needed (Hooper, 1976), to answer the questions posed by Hogg et al., (2004) of whether identities are related to one another and whether multiple identities can be simultaneously as important as one another. This thesis can begin to explore such questions raised by Hogg et al., (2004) using interaction terms. This thesis examines two and three way social identities based on an individual's socio-economic background, religious affiliation and gender, and their influences on GCSE attainment in Northern Ireland.

2.7.1 Gender and Socio-Economic Status

Gender and SES interact to positively and negatively influence educational attainment (Connolly, 2004). When considering the separate influences of gender and SES (based on FSME as the most commonly used SES measure), the gender gap in attainment is smaller than that of SES in the UK (Department for Education and Skills, 2007; Tinklin et al., 2001). Such difference suggests that if gender is studied in isolation, it masks the influence of socio-economic background on attainment (Connolly, 2004). In England, it was reported that female pupils entitled to FSM outperformed their entitled male peers, whilst both genders entitled to FSM had lower attainment than their non-entitled peers (Department for Children, Schools and Families, 2009). In Northern Ireland, the same trend was apparent in 2017/2018, however, the Department of Education (2019a) highlight the attainment gap between male and female pupils

entitled to FSM in Northern Ireland is narrowing due to an increase in the performance of male pupils. For example, 79.5% of female pupils entitled to FSM achieved 5 or more GCSEs A*-C, compared to 69.3% of males in 2017/2018 (Department of Education, 2019a). Studies have statistically tested the interactions between gender and FSME. Analysis of the National Pupil Database (2006) in England found the interaction between FSME and gender at GCSE was smaller than their separate effects (Department for Education and Skills, 2007). However, the smaller effect of the interaction between gender and FSME was to be expected. What is of key importance is the evidence of a measurable interaction between these variables that affects GCSE attainment. In an Ordinary Least Square (OLS) regression model measuring GCSE score according to the independent variables of: gender, ethnicity, FSME, pupil mobility, English as a foreign language, SEN, age and looked after status; the Department for Education and Skills (2007) found the interaction effect between gender and FSME was statistically significant (β=-2.1, $p \leq 0.05$). The results of the regression analysis suggested the influence of gender varied across FSM categories, with the effects of FSM being slightly higher for girls than boys. The interaction term found female pupils not entitled to FSM had the highest GCSE attainment, whilst male pupils entitled to FSM had the lowest GCSE attainment. Connolly (2004) forwards that the relative underperformance of boys is evident in all social groups, with his later work (Connolly, 2006) suggesting that this can be related to different forms of masculinity developed by males from different socio-economic backgrounds. This also relates to social identity, with Connolly (2006) arguing identity is an important explanatory factor of the multilevel relationship as individuals have intersecting identities. For example, gender identities interact with other aspects of social identity, including socio-economic background and religion, which all impact on attitudes towards education and subsequent attainment (Connolly, 2006). Despite the Department for Education and Skills (2007) reporting a statistically significant interaction, Cassen and Kingdon (2007) used data from the Pupil Level Annual School Census for England from 2003 and the Census (2001) to find no significant difference in GCSE attainment between groups within the interaction term of gender and FSM. Variation in the statistical significance of this interaction is therefore evident in existing analysis. However, no study has examined this interaction in such structure in the Northern Ireland context. Borooah and Knox (2017) provided analysis on the interactions between male and FSME, and female and FSME in Northern Ireland,

using probability modelling on a binary measure of GCSE attainment (achieved/did not achieve 5 or more GCSEs A*-C, including English and mathematics) for the academic year 2013/2014 (n=22,764). The analysis found male pupils entitled to FSM were less likely to achieve the outlined attainment benchmark than their male peers not entitled to FSM (marginal probability= -13.5%, $p \leq 0.01$). The same pattern was evident in the female and FSME interaction (marginal probability= -19.3%, $p \leq 0.01$). However, the presented analysis by Borooah and Knox (2017) did not examine between gender and between FSME status differences in GCSE attainment in one interaction term. As a result, throughout this thesis, it is stated that the interaction of gender and FSME is not statistically tested in a way that allows between gender differences and between FSME status differences to be examined in the Northern Ireland context.

When considering mothers' education as the SES measure, Mensah and Kiernan (2010) found mothers' education level had a strong influence on literacy and mathematical attainment in primary school for both male and female pupils. In a multivariate model for literacy attainment, girls whose mothers had no qualifications scored 8.3 points less than girls whose mothers held a NVQ Level 4 or 5. The score difference in literacy for boys was 9.7 points. In mathematics, girls whose mothers held no qualifications scored 6.9 points less than girls whose mother held an NVQ Level 4 or 5, whilst the score difference for boys was 8.8 points. From this analysis, it can be argued that male pupils with mothers who had no qualification had lower literacy and mathematics attainment in primary school compared to their female peers with a mother who had a NVQ Level 4 or 5. Glaesser and Cooper (2012) examined the relationship between gender, parental education and GCSE attainment. The authors concluded there was a specific mechanism at play, meaning the interaction between gender and SES (parental education in this instance) was the result of greater compatibility between girls' behaviour and middle-class culture/values within the education system. However, no study in Northern Ireland has statistically tested the interaction between gender and maternal qualifications, and how it influences GCSE attainment.

2.7.2 Gender and Religion

As the social categorisation process can result in multiple identities interacting in complex ways, intergroup affiliations go beyond the simplistic religion categories of Catholic and Protestant, as socio-demographics such as gender interact with religion to categorise social groups further (Crisp, Hewstone and Cairns, 2001; Cassidy and Trew, 1998). The interaction between gender identity and religious identity differentiates social groups into four categories: Catholic females, Protestant females, Catholic males and Protestant males. Examining social identity in Northern Ireland through this perspective supports the argument forwarded by Ashmore, Deaux and McLaughlin-Volpe (2004) which emphasised the importance of viewing identity within a multidimensional framework that accounted for numerous elements such as social embeddedness. The perspective of this thesis accepts Deaux's (1996) argument that social identity is dependent upon the given social context, its ecological characteristics and the distribution of individuals within a specific environment.

In Northern Ireland, a slightly higher proportion of Catholics achieved 5 GCSEs A*-C, including English and mathematics compared to Protestants (71.4% and 69.7%, respectively) (Department of Education, 2019d). When gender is included in analysis, female pupils outperformed their male peers in both religions, with the largest gender gap (around 11%) being evident amongst Protestants. Females from both religions had similar attainment rates. A total of 75.6% of Catholic females achieved 5 or more GCSEs A*-C, including English and mathematics, compared to 75.5% of Protestant females. A 3.4% attainment gap is evident between Catholic and Protestant males. A marginally higher proportion of Catholic males achieved 5 or more GCSEs A*-C, including English and mathematics, when compared to their Protestant male peers (67.6% and 64.2%, respectively) (Department of Education, 2019d). The descriptive statistics indicate that the attainment difference within genders when accounting for religion is marginal. However, the interaction between gender and religion has not been statistically tested in the Northern Ireland context to examine whether such effects are statistically significant and practically meaningful. This thesis aims to explore this further and fill this gap.

When considering the interaction between gender and religion in relation to social identity theory, a criticism of such theory is its tendency to treat multiple identities as

theoretically equivalent, however in reality, the importance of different identities will vary across individuals (Deaux, 1993). Mitchell (2005) suggests that existing social structures, along with historical, economic and social factors shape what dimensions of identity are important for an individual. Such an argument questions the extent to which social identity theory acknowledges an individual's agency to create and shape their identities (both ascribed and achieved). Stets and Harrod (2004) argue that agency is important in determining which identity is most prominent for an individual. However, Mitchell (2005) forwards that an individual's agency operates within the constraints of existing social contexts and relationships. As highlighted, the identities being focused upon in this thesis are mainly ascribed to an individual rather than achieved. Therefore, although an individual could define himself as male (gender) and Catholic (religion), one of these identities might be more prominent within an individual's self (Ysseldyk, Matheson and Anisman, 2010), which could lead to and explain variation in attainment within social groups, as the meaning and salience of an identity is rarely homogenous across individuals in the same social group (Ysseldyk, Matheson and Anisman, 2010; Stryker and Serpe, 1994).

2.7.3 Religion and Socio-Economic Status

Shuttleworth (1995) discusses the interaction between religion and FSME in his study of GCSE attainment in Northern Ireland. His analysis found Catholics not entitled to FSM achieved higher GCSE attainment than non-Catholics entitled to FSM. Shuttleworth (1995) also reported no statistically significant difference in the GCSE attainment of non-Catholics not entitled to FSM and Catholics entitled to FSM. Shuttleworth (1995) did not provide further details on this interaction within the analysis, highlighting the need for further work in this area.

More recently, studies examining the interaction between religious affiliation and SES have used residential location as an indicator of SES. In Northern Ireland, based on the Investigating Links in Achievement and Deprivation study (ILiAD), Leitch (2014) provided a presentation which reported that 70% of the 20 most deprived wards in Northern Ireland are Catholic, 20% are Protestant and 10% are mixed religion areas (based on the Northern Ireland Multiple Deprivation Measure 2010). Drawing on the assumption that the more deprived a ward, the lower the attainment, it would be

expected that Catholic pupils had lower attainment than Protestants. However, Leitch (2014) found the wards reflecting educational underachievement were 55% Protestant, 35% Catholic and 10% mixed religion areas. It is important to highlight that the interaction between religious affiliation and residential location were not statistically tested but descriptively discussed by Leitch (2014). Similar findings were evident in Scotland, with twice as many Catholics living in the ten most deprived areas than Protestants (16% and 8% respectively), yet Catholics outperformed Protestants in educational attainment (Scottish Government, 2015). Such findings suggest that deprivation alone is not a sufficient explanation of educational attainment but instead the interaction of factors such as religion with deprivation provide a greater understanding of underachievement. This links to an individual having multiple identities based on different social groups they belong to. By only examining one dimension of identity, it undermines the influence of other identity sources. The interaction between identities based on religion and socio-economic position therefore provides fuller explanations of attainment patterns than only one of these elements. This interaction of religion and SES suggests the characteristics and values of an individual's religious identity may mediate the influence of deprivation, with the Catholic religious identity having a more positive input to education trajectories than the Protestant identity, due to the relayed education values and expectations to individuals through such identity. With a higher proportion of the most deprived wards in Northern Ireland being Catholic yet the wards with the highest levels of underachievement being Protestant, the interaction between religion and deprivation on educational outcomes is an area that needs further statistical consideration to gain a greater understanding of the educational attainment disparities.

2.7.4 Gender, Religion and Socio-Economic Status

Although religious identity is central to analysis in Northern Ireland, it is important to acknowledge, as outlined, that other demographics such as gender and SES provide identity to individuals (Crisp, Hewstone and Cairns, 2001). Socio-economic status is directly linked to attainment through its sole influence but also indirectly through its interactions with gender and religion (Connolly, 2006). When considering the influence of religion on attainment, the disparity between religious groups in Northern Ireland is minimal, to the extent that it does not warrant great concern. A marginally

lower proportion of Protestants achieved 5 or more GCSEs A*-C, including English and maths (69.7%), compared to Catholics (71.4%) (Department of Education, 2019d).

More specifically, a lower proportion of Protestant males entitled to FSM achieved 5 or more GCSEs A*-C, including English and maths, compared to their female Protestant peers (37.2% and 49.1% respectively). Protestant males also had lower GCSE attainment than Catholic male and female pupils entitled to FSM (46.7% and 57%, respectively) (Department of Education, 2019d). This has resulted in the rhetoric of the underperformance of Protestant working class boys (Burns, Leitch and Hughes, 2015; McManus, 2015; Lundy et al., 2012; Mulvenna, 2012, Purvis, 2011). In the New Decade New Approach deal, the Northern Ireland Executive renewed its aim to examine and address such issue in the education system (Northern Ireland Office, 2020). However, what is not popularly discussed through the Protestant working class boys rhetoric is how attainment rates for both genders and religions drops substantially when religion and FSME are considered simultaneously. For example, in comparison to the figures presented above, 71.6% of Protestant males and 82.1% of Protestant females not entitled to FSM achieved 5 or more GCSEs A*-C, including English and maths, whilst 76.4% of Catholic males and 83.3% of Catholic females achieved the same benchmark (Department of Education, 2019d). Although the data raise the question of why Protestant working class boys have the lowest relative GCSE attainment, what also needs to be questioned is the reporting of this figure, which is often provided in isolation to the finding that attainment decreases when considering other gender and religion categories simultaneously from lower socio-economic backgrounds.

Borooah and Knox (2017) statistically examined the collective influence of FSME and religion on GCSE attainment for each gender in Northern Ireland. The authors found no significant difference in the probability of Catholic or Protestant males entitled to FSM achieving 5 or more GCSEs A*-C, including English and maths. However, it was reported that Catholic females entitled to FSM were more likely than Protestant females entitled to FSM to achieve 5 or more GCSEs A*-C, including English and maths (marginal probability=13.8%, $p \leq 0.01$) (Borooah and Knox, 2017). In addition, Catholic males not entitled to FSM were more likely to achieve the outlined

benchmark than their non-entitled Protestant male pupils (marginal probability=7.9%, p≤0.01). This trend was also evident for non-entitled female pupils (marginal probability=10.2%, p≤0.01). However, similar to the discussion outlined in Section 2.7.1, Borooah and Knox (2017) examined the interaction of FSME and religion separately for each gender, meaning between gender differences and between FSME status differences in GCSE attainment cannot be statistically tested in such analysis. As a result, similar to the interaction between gender and FSME (Section 2.7.1), throughout this thesis, it is stated that the interaction of gender, religion and SES is not statistically tested in a way that allows between gender differences and between FSME status differences to be examined through one interaction term in the Northern Ireland context.

Overall, despite focusing on Scotland and ethnicity rather than religion, Tinklin (2003) highlights the need for a more complex definition of underachievement as focusing specifically upon male pupils' lower academic performance inaccurately presents the attainment differences according to the collective influence of gender, social class and ethnicity. Tinklin (2003) argued the need for interactions between socio-demographics such as gender, social class and ethnicity to be collectively analysed to provide greater understandings of the complex nature of inequalities in educational attainment. These arguments reaffirm the position of Ashmore, Deaux and McLaughlin-Volpe (2004) which emphasised the importance of viewing identity as part of a multidimensional framework. Such concluding argument from Tinklin (2003) provides a sound justification and rationale for the current study which examines SES, religion and gender, both separately (as co-variates) and collectively (as interaction terms), to determine their influence on educational attainment in Northern Ireland.

2.7.5 Summary

Overall, this section highlights that individuals have multiple identities that interact to provide more specific identities than one social category. This section has indicated the importance of acknowledging intersectionality between identities as it can provide greater understandings of attainment differences than examining the effects of only one identity source. Such arguments are embedded within social identity theory which highlights identity is not a deterministic or static concept as it has a varying influence on individuals. A strength of using social identity theory as an explanation to

understand attainment trends in Northern Ireland is that it accounts for economic, social, political and historical influences in identity creation. When considering the interaction between gender and FSME, it has been popularly discussed through descriptive statistics, with one study (Borooah and Knox, 2017) statistically testing the effects of FSME on each gender separately. The interaction between gender and FSME has therefore not been tested in one interaction term that allows between gender differences and between FSME status differences to be statistically examined. Moreover, the interaction between gender and maternal qualifications has not been statistically examined in Northern Ireland. Similarly, when considering the interaction between gender and religion, and gender, religion and FSME, no study within the Northern Ireland context has statistically tested the interaction between these factors that allows between gender differences and between FSME status differences in GCSE attainment to be considered. This highlights a current gap within educational research in Northern Ireland which this thesis aims to fulfil. These are important interaction effects to examine to determine if the attainment gaps between social groups in Northern Ireland are of statistical significance. Whilst aligning with the education focus of the restored Northern Ireland Executive under the New Decade New Approach deal, the results of these interaction effects would also help to better inform discourse in the field.

2.8 School Level Factors

2.8.1 School Type (Grammar/Non-Grammar): The Northern Ireland Context

Northern Ireland reflects a different context to the rest of the UK due to an almost exclusive emphasis on academic selection when transitioning to post-primary school. The selective system in Northern Ireland is characterised by a pupil's ability at age 11 determining the post-primary school they will attend (Machin, McNally and Wyness, 2013; Guyon, Maurin and McNally, 2010). In the past, one transfer test (also known as the 11+) was taken in Northern Ireland to determine entrance to grammar schools. Those pupils receiving the higher grades were allocated a place in a grammar school, whilst those who received lower grades or those who did not sit the transfer test attended non-grammar schools (Kelleher, Smyth and McEldowney, 2016).

In 2000, an independent post-primary review body was established to identify key issues of the selective education system and develop recommendations for new post-primary arrangements. This was partly due to the results of research conducted by Gallagher and Smith (2000) that examined the effects of the selective education system in Northern Ireland. The output of the review body was the Burns Report (2001) which recommended that the transfer test conducted in Primary 7 (aged 10-11 years) should stop as soon as possible and no school should use academic assessments to decide which pupils gained a place. Instead, the Burns Report suggested the establishment of a 'pupil profile' that would encompass a formative assessment structure including information on: a pupil's performance in all subjects, their concentration and drive, their social skills and academic interests. It was suggested this profile would help parents decide which post-primary school may be most suitable for their child based on their overall profile, thus emphasising the importance of parental choice. It was recommended however that schools would not be provided with the pupil's profile to determine the allocation of places. Shifting from academic selection based on assessments at the end of primary school, the Burns Report recommended that the allocation of school places should be dependent upon: those who listed the school as their first choice, if a sibling attends the school, if a parent works in the school, distance from the pupil's home and special circumstances. Recommendations also suggested that schools taught the same subjects in Years 8-10 (ages 11-14 years), with flexibility being provided at GCSE stage (Years 11-12) to provide pupils with greater subject choice.

Following the Burns Report (2001), a post-primary review working group was established in 2003 to consider the responses to the Burns Report to provide further advice on academic selection and future arrangements. The output of this working group was the Costello Report which recommended and reaffirmed the Burns Report (2001) that the transfer test should end no later than 2008, with the pupil profile and parental and pupil choice being forefront to the transition to post-primary school. In addition, the Costello Report (2003) recommended a broader curriculum that allowed pupils to choose from a range of traditional and vocational courses to meet their educational needs and interests.

Gallagher and Smith (2000) provided a comprehensive overview of the strengths and weaknesses of the selective education system in Northern Ireland. The authors highlighted a strength is the high standards of attainment across grammar schools, whilst non-grammar schools provide supportive environments for pupils who may not achieve as highly in grammar schools. However, there are also weaknesses associated with the transfer test and selective education system. Gallagher and Smith (2000) discussed how assessments at the end of primary school impact upon the teaching and learning of pupils as the focus is placed upon the assessment criteria, rather than further development and engagement with the wider curriculum. The transfer test therefore placed unnecessary pressures on pupils, teachers and parents which negatively affected teaching and learning in the final stages of primary school (Burns Report, 2001; Gallagher and Smith, 2000). This is also reflected in the opinions of young people in Northern Ireland, as evidenced in the annual Young Life and Times Survey. In 2003, the survey found that 70% of young people aged between 12 and 17 years old agreed that the transfer test placed too much pressure on Primary 7 pupils (ARK, 2003a). The Burns Report (2001) also emphasised the transfer test system was socially divisive and made it difficult to ensure all pupils received equal opportunities in their transition to post-primary education.

There was variation in the support for the transfer test amongst political parties in Northern Ireland. Unionist political parties, the Democratic Unionist Party (DUP) and Ulster Unionist Party (UUP), both supported academic selection through the transfer test, whilst Sinn Fein, the Social Democratic and Labour Party (SDLP) and Alliance were opposed to academic selection. Despite political divisions, the transfer test ended in 2009, with the justification that post-primary schools should not admit pupils based on their perceived ability (Department of Education, 2015c). The discontinuation of the transfer test in Northern Ireland was met with opposition from grammar schools and parents (Northern Ireland Assembly Committee for Education, 2001). Such opposition was against grammar schools losing their privileged position and academic ethos, which some viewed as a positive feature of the education system. This opposition was further explained by the Northern Ireland Assembly Committee for Education (2001) which noted that some parents of higher social classes did not believe academic selection through the transfer test benefitted certain social groups of pupils but instead provided all with an opportunity to receive a free grammar school

education that was not privatised or subject to substantial monetary fees. However, as the transfer test is not compulsory for pupils, parents are given a choice of whether to enter their child for the test. Some pupils are not entered for the transfer test as parents may not believe their children will achieve a grade needed to obtain a place in a grammar school. This may be more evident amongst lower social class families, whose parents are more likely to have lower academic expectations of their children (Lee and Bowen, 2006). This means that some pupils, for example those from lower socio-economic backgrounds are not provided an opportunity to sit the transfer test or gain entrance to a grammar school.

The Northern Ireland Assembly Committee for Education (2001) found that the majority of parents believed some form of assessment that was not based on a teacher's decision would continue to be necessary if the selective education system remained. In addition, the Young Life and Times Survey, conducted in 2003 in Northern Ireland, found that 75% of young people aged between 12 and 17 years old believed academic selection must happen at some point in the education system (ARK, 2003b). This also aligns with the Kids Life and Time Survey in 2010 which found that 40% of Primary 7 pupils (aged 10-11 years) in Northern Ireland believed that the transfer test should remain in place (ARK, 2010). In 2016, DUP politician Peter Weir was appointed as Education Minister in Northern Ireland. In line with the DUP support for academic selection, Weir highlighted his support for schools to have the choice to continue to use entrance tests (Northern Ireland Assembly Committee for Education, 2016). Following the dissolvent of the single transfer test and the opposition from grammar schools and parents, two tests have been implemented in Northern Ireland from 2010. The Association for Quality Education (AQE) and GL Assessment tests continue academic selection in grammar schools, despite the abolishment of the official state supported transfer test. The AQE is comprised of three tests, with their structure resembling the previous transfer test. A pupil's best two scores of the AQE papers are aggregated and a numerical scoring system is used (Rahman, 2016). The GL test consists of two multiple choice papers and uses an alphabetical grading system like that used in the previous transfer test (11+) (Rahman, 2016). These tests are viewed as unregulated assessments as they are not supported by the government, lack regulation and differ in structure (Shewbridge et al., 2014). The AQE is used predominantly by controlled grammar schools and GL Assessment is used predominantly by Catholic

maintained grammar schools. Therefore, although the state supported transfer test was discontinued, a new selective process has been established that is not executed by the Department of Education (Perry, 2016). Subsequently, Elwood (2013) notes that the experience of most Primary 7 (aged 10-11 years) pupils in Northern Ireland is the completion of different selection assessments that may have varying comparable rates of quality, validity and difficulty, despite being used for the same outcome of grammar school entrance. Consequently, a concern of both tests is that no performance data or quality assessments of the test items are publicly available, which raises issues of ethical and professional assessment practices (Elwood, 2013). In addition, Elwood (2013) outlines previous research has shown boys tend to perform better than girls in multiple choice questions (Beller and Gafni, 1996), meaning they may have an advantage in gaining higher scores in the GL Assessment test. However, girls may have an advantage in the AQE test as they tend to perform better than boys in tests requiring open responses (Beller and Gafni, 1996). Moreover, there may be divisions according to socio-economic status as the AQE test incurs a cost of £42 but is free to pupils entitled to FSM, whilst the GL test is free to all pupils (Elwood, 2013). In addition, parents from lower socio-economic backgrounds are less likely to be able to afford private tutoring out of school to help their child succeed in the AQE or GL Assessment test to gain entrance to a grammar school (Gallagher and Smith, 2000). Instead, parents from lower socio-economic backgrounds expect primary schools to provide pupils with adequate preparations for the transfer test (Gallagher and Smith, 2000).

In 2015/2016, of the pupils transferring to post-primary, 60% attended non-grammar schools, whilst 40% attended grammar schools (Perry, 2016). The grammar school rationale argues that selecting pupils based on the outcome of the transfer test ensures pupils are capable of learning in the highly academic environment with peers of a similar standard (Kelleher, Smyth and McEldowney, 2016). In 2018/2019, the number of non-grammar schools (130) was double that of grammar schools (66) in Northern Ireland (Department of Education, 2018a). The smaller proportion of grammar schools portrays the potential issue of access inequality, with fewer pupils enrolled in grammar schools (62,862) compared to non-grammar schools (79,377) in 2015/2016 (includes those enrolled in sixth form) (Department of Education, 2019b). Many are critical of the education system in Northern Ireland, with some arguing it results in different pupil

compositions according to socio-demographics such as SES in grammar and non-grammar schools, which alters the learning environment and school ethos (Machin, McNally and Wyness, 2013; Guyon, Maurin and McNally, 2010). Gallagher and Smith (2000) highlighted that when all factors are held equal between pupils, the most important factor in achieving a high GCSE score is attending a grammar school; thus suggesting there is a grammar school effect. However, the authors note that despite trends suggesting a grammar school effect, it should be acknowledged that higher entrance grades are the most important factor for attending a grammar school, meaning caution should be taken when separating the effects of the transfer test and the school type attended. The dilution of deprivation evident within grammar schools (Shuttleworth, 1995), as discussed in Section 2.4.2.1, along with an academic ethos and high expectations of pupils may help explain attainment differences by school type. However, the performance gap between grammar and non-grammar schools is decreasing as the rate of non-grammar school pupils achieving 5 or more GCSEs A*-C, including English and maths is increasing at a greater rate than that of grammar schools. This is illustrated by a 13.9% increase in non-grammar pupils achieving the outlined benchmark from 2008/2009 to 2014/2015, in comparison to a 1.2% increase in grammar schools (Department of Education, 2015c). However, the greater increase of attainment rates in non-grammar schools is to be expected given that grammar schools have a higher rate of pupils already achieving this standard. More recently, this upward trend continued to be reflected, albeit with an admittedly small increase of 1.4% of non-grammar school pupils achieving 5 or more GCSEs A*-C, including English and maths from 2016/2017 (49.6%) to 2017/2018 (51%). The proportion of grammar school pupils achieving the same standard remained consistent between 2016/2017 (94.7%) to 2017/2018 (94.3%) (Department of Education, 2019d). The consistently higher performance of grammar school pupils may reflect their higher levels of economic, cultural and social capital that assist with their success in the education system.

More specifically, when considering gender and school type collectively, in Northern Ireland, female pupils reflected higher GCSE attainment across school types. In the controlled sector in 2017/2018, females outperformed their male peers in both grammar (95.6% and 91.6%, respectively) and non-grammar schools (54.3% and 41.8%, respectively) in achieving 5 or more GCSEs A*-C, including English and

maths (Department of Education, 2019a). Similar patterns were evident in Catholic maintained non-grammar schools, with a higher proportion of female pupils also achieving 5 or more GCSEs A*-C, including English and maths (64.4% and 49.9%, respectively) (Department of Education, 2019a). Voluntary schools (grammar) that were Catholic managed also reflected the same trend with a higher proportion of female pupils than male pupils achieving the above standard (96.5% and 89.7%, respectively) (Department of Education, 2019a). Across management structures, the gender attainment difference is smaller in grammar schools than non-grammar schools.

Focusing upon male attainment in Northern Ireland, Ingram (2011) suggests that an individual's habitus can be influenced by two incompatible fields: the field of origin (family background and socio-demographic profile) and the social field (grammar/non-grammar school attendance and peer group). If the two fields conflict, for example, being from a deprived background and attending a grammar school, it may create a tug for individuals, leaving the influence of one field to outweigh the other. However, this balance can change across time and context. For some, it may lead to a greater emphasis placed upon attending a grammar school than their lower socio-economic background. This suggests that for pupils with restricted access to high levels of cultural capital, if they hold pro-education values, school can become an institution that alters their dispositions to develop or enhance their cultural capital (Goldthorpe, 2007). This reflects a shift from Bourdieu's (1986) argument that the family is the sole creator and transmitter of cultural capital to children. Ingram (2011) illustrates such argument in her Northern Ireland study of a Catholic post-primary school for boys in a working-class Belfast neighbourhood. Ingram (2011) found boys expressed the complexity of their identity, as at times, their habitus aligned with both the field of school and the field of their socio-economic background, whilst at other times, their habitus failed to align with either. Ingram (2011) highlights that an individual's habitus is likely to be influenced by multiple fields which differ for each individual, explaining why there are differences in education outcomes amongst those identifying with the same social group (Reay, 2004). The habitus of males attending grammar schools is likely to differ from their male peers from the same background attending non-grammar schools. Despite these pupils sharing similar habitus structures according to their gender and socio-economic background, the difference in school

attended may have a greater influence on those attending grammar school. This can help explain why male pupils attending grammar schools have higher GCSE attainment rates than those attending non-grammar schools, whilst also highlighting the fluidity of habitus based upon the social contexts an individual is placed within.

2.8.2 School Management Structure

Attainment disparities are also evident across school management structures (controlled, Catholic maintained, voluntary and integrated). In Northern Ireland, 47.8% of pupils attending controlled non-grammar schools achieved 5 or more GCSEs A*-C, including English and maths, compared to 93.9% attending controlled grammar schools in 2017/2018. Overall, in controlled schools (accounting for grammar and non-grammar), 65% of pupils achieved 5 or more GCSEs A*-C, including English and maths (Department of Education, 2019a). In addition, 57.6% of pupils attending Catholic maintained non-grammar schools achieved 5 or more GCSEs A*-C, including English and maths, compared to 93% of pupils attending voluntary Catholic managed grammar schools (Department of Education, 2019a). In controlled integrated schools, 35.8% of pupils achieved 5 or more GCSEs A*-C, including English and maths, whilst 50.9% of pupils attending grant maintained integrated schools achieved the same standard (Department of Education, 2019a). Combined figures in this Department of Education (2019a) report for integrated, voluntary and Catholic maintained schools regardless of school type (grammar/non-grammar) are not provided like those reflected for controlled schools. Despite differences in attainment rates across school management structures, Daly (1991) found that once school type (grammar/non-grammar) was accounted for, school management structure had no significant impact on GCSE attainment. Within the Northern Ireland education system, key structural issues are focused upon such as academic selection and religious divisions within school. This can help explain why integrated schools account for a lower proportion of schools in Northern Ireland (as discussed in Section 2.5.2) as they shift the focus from academic and religious divisions to provide an inclusive education system regardless of ability and background (Hansson, O'Connor-Bones and McCord, 2017).

Across different school management structures, the higher performance of females is consistently reflected. In state funded mainstream schools in England, a higher proportion of female pupils achieved A*-C grades (score 9-4) in GCSE English and maths compared to boys in 2017/2018 (68.6% and 61.9%, respectively) (Department for Education, 2018f). In Northern Ireland, as discussed in the above section (2.8.1), the gender gap was slightly greater and male attainment was marginally higher in Catholic Maintained/managed schools when compared to the controlled sector in Northern Ireland. In contrast to the trends found in the England and Northern Ireland, Tinklin (2003) focused upon gender differences in GCSE and A-Level attainment in Scotland. Using the School Leavers Survey from 1994, Tinklin (2003) found no evidence of variation in the gender attainment gap between schools. Instead, the gender differences in attainment were relatively equal regardless of school structure. However, these statistics may be outdated in the trends they reflect due to the period in which this data was collected.

2.8.3 Summary

Overall, this section has explored the influence of school type and school management structure on attainment trends. It is clear grammar school pupils have higher GCSE attainment than non-grammar school pupils, regardless of socio-economic status. This can be explained through the dilution of deprivation evident within grammar schools. In addition, Bourdieu's (1986, 1984) concepts of capital and habitus can help explain attainment differences between school types as there is likely to be higher levels of cultural and economic capital amongst grammar school pupils that positively influence their attainment. In addition, social identity theory provides an explanatory avenue as the school type attended can provide a more powerful identity source than socio-demographic factors such as FSME, depending upon the context. Across school management structures, it is clear there are varying attainment rates amongst genders. As discussed previously (Section 2.5.2), there is the argument that schools are often divided along religious lines depending on their management structure in Northern Ireland. However, as different management structures are not exclusively attended by pupils of one religion, it means school management structure cannot be used as a school level proxy for religion.

2.9 Overall Summary and Conclusion

This chapter has discussed attainment trends across the UK according to socio-economic status, religion, gender and school type. The interactions of these factors were also considered. Explanations for the attainment trends discussed were predominantly situated in social identity theory and Bourdieu's (1986, 1984) concepts of capital and habitus. Overall, socio-economic status reflects complexity due to the variation of indicators used to measure its influence on attainment. The most commonly used measures are FSME, housing tenure, parental education and parental occupation. Across indicators, it was found that throughout compulsory education, pupils from lower socio-economic backgrounds have poorer attainment than their less deprived peers. In relation to religion, there is a lack of existing research that examines its relationship with attainment. At post-primary, Catholic pupils marginally outperformed their Protestant peers in achieving 5 or more GCSEs A*-C, including English and maths. However, these current differences need to be tested to examine whether the differences are statistically meaningful, to better inform discourse within the field. In addition, existing studies reported that females had higher attainment in English assessments throughout compulsory education. However, the attainment gap in mathematics and science was not as prominent. Male pupils made slightly greater progress in mathematics and science in primary school, yet by post-primary, a higher proportion of females achieved an A*-C grade in GCSE mathematics and science throughout the UK. The statistical significance of the relationship between gender and attainment has been contested in different subjects by different studies. Despite this, there is a consensus that gender is an important factor to consider, both individually and collectively, in attainment analysis. Finally, existing studies found attending a grammar school had a large influence on GCSE attainment in Northern Ireland. However, this relationship has not recently been statistically tested.

Despite being a post-conflict society, Northern Ireland had higher post-primary attainment than the rest of the UK. Overall, 70.3% of pupils in Northern Ireland achieved 5 or more GCSEs A*-C, including English and maths in 2016/2017, compared to Scotland (one or more qualification at SCQF Level 6 or better) (61.2%) and Wales (54.6%) (Department for Education, 2018b). Due to the Attainment 8 score provided in England in recent years, it is not comparable to the above figures. Despite the highest GCSE attainment rates in the UK, Northern Ireland is comprised of a high

level of low achieving schools. This is likely to be a result of the selective system combining a disproportionate number of low ability and deprived pupils in particular schools, leaving pupils from lower socio-economic backgrounds negatively affected by pupil segregation and unequal access to high performing schools (Borooah and Knox, 2015; Connolly et al., 2013).

Although each outlined factor has an independent influence on attainment, they also interact to have a collective effect on attainment. When gender and SES are considered collectively through the interaction of gender and FSME, the relative underperformance of both genders entitled to FSM is evident. Despite this, there is a current gap in the literature statistically examining the relationship between this interaction and GCSE attainment in Northern Ireland. Moreover, in Northern Ireland, SES interacts with religion, however, there is also a lack of studies statistically testing this interaction on GCSE attainment. In addition, socio-economic status (FSME) interacts with gender and religion. However, what is not commonly discussed is the GCSE attainment of both genders affiliating as either Catholic or Protestant declining when entitled to FSM. Such interaction has not been statistically tested in Northern Ireland to examine between gender differences and between FSME status differences, reflecting an apparent gap in the field. Lastly, cross-level interactions and their influence on GCSE attainment have not been previously considered in the Northern Ireland context. Such analysis would provide an opportunity to examine whether attending a grammar school effects the GCSE attainment of pupils differently based on their socio-economic status, religion and gender.

To conclude, this chapter has provided an overview of the existing literature and has established there are five main gaps that this thesis aims to fulfil. Firstly, few studies provide a comparative evaluation of the most effective SES measures to use when studying educational attainment in the UK. In the Northern Ireland context, there is an evident gap in the literature as no studies examine various SES measures in one statistical model to determine which has the greatest influence on GCSE attainment. This is likely to be the result of several SES factors not being available for analysis within one dataset. In the UK, although some studies provide evaluations of the various SES measures, no study to the author's knowledge examined FSME, maternal and paternal status (education and occupation), property factors (tenure and property

value) and spatial deprivation in one model. Such analysis would prove effective for informing discourse and policies in the Northern Irish and wider UK context as it would provide a complete evaluation of available SES measures in educational research, rather than using measures in isolation. More specifically, such analysis would align with the aim of the restored Northern Ireland Assembly to examine the links between socio-economic background and educational underachievement (Northern Ireland Office, 2020).

Secondly, no studies in the UK have examined the relationship between property value in which a pupil resides and GCSE attainment. This is likely to be the result of no data providing an opportunity to examine this. This is a gap this study aims to fill.

Thirdly, there remains limited data to examine the influence of religious affiliation on GCSE attainment in Northern Ireland. As religious identity remains central to understanding differences between social groups in Northern Ireland, further analysis into this relationship is needed.

Fourthly, few studies examine the varying influences of socio-demographics on male and female pupils. As previously highlighted, it is important pupils are not viewed as homogeneous groups, as male and female pupils experience socio-demographics differently. The different influences of SES and religious affiliation on male and female pupils should therefore be considered. In relation to this, interaction effects between gender and religion; religion and FSME; gender and maternal qualifications, and gender and paternal qualifications have not been statistically tested in the Northern Ireland context. In addition, interactions between gender and FSME, and gender, religion and FSME have not been statistically tested in a way that provides an opportunity to examine between gender differences and between FSME status differences in GCSE attainment in Northern Ireland. Finally, the cross-level interactions of individual socio-demographics and school level factors are not commonly examined in Northern Ireland. It would therefore be a valuable addition to the literature if these interactions were examined, especially within the Northern Ireland context that reflects a selective education system (academically and religiously). This thesis is the first opportunity to do so given the newly linked dataset that is being analysed in this way for the first time.

When considering these identified gaps within the literature, by examining the individual and collective influences of socio-economic status, religion, gender and school type on GCSE attainment in Northern Ireland, this thesis aims to inform practical knowledge in the field, whilst providing an original empirical contribution to the literature. This thesis will focus upon post-primary attainment in Northern Ireland using multilevel modelling on the first dataset in Northern Ireland to combine the Census (2011), School Leavers Survey and School Census for three whole population Year 12 cohorts.

Chapter Three: Methodology

3.1 Introduction

This chapter outlines the methodological approach used to examine post-primary attainment trends in Northern Ireland. The overall purpose of this thesis was to study educational attainment disparities in Northern Ireland through a population wide, cross-sectional dataset. This purpose was fulfilled through the data used for analysis which was the first in Northern Ireland to combine the Census (2011), School Leavers Survey and School Census. The data used in this study provided an opportunity to examine the influence of pupil level socio-demographics and school level factors on GCSE attainment for three whole population Year 12 cohorts from the academic years of 2010/2011, 2011/2012 and 2012/2013 in Northern Ireland (n=61,373). This chapter begins with the research aims, questions and hypotheses of which this thesis aimed to examine and fulfil. An evaluation of secondary data analysis as a methodological approach is then provided. A discussion of the dataset used for analysis follows with the following factors considered in detail: sample, constructed dependent variables, independent variables and collinearity testing. An extensive overview of the hierarchical linear modelling (multilevel modelling) method used to execute the analytical strategy of this research is also provided. In addition, the structures of the executed multilevel models are discussed and justified. The rationale for calculating effect sizes, rather than relying on unstandardized coefficients and statistical significance (p values) is also highlighted, followed by the ethical considerations associated with this study.

3.2 Research Aims and Questions

The overall aim of this thesis was to examine educational attainment disparities in Northern Ireland through the individual and collective influences of socio-economic status, religion, gender and school type. To achieve this overall aim, three sub research aims (RA) are listed below with their related research questions (RQ) and hypotheses (H). It is important to highlight that the research aims, questions and hypotheses refer to within model effects.

Research Aim 1: Examine the influences of socio-economic status, religion, gender and school type on post-primary attainment in Northern Ireland.

RQ1: Which socio-economic status factor has the greatest effect on GCSE attainment?
*H1**:** Free school meal entitlement will have the greatest effect on GCSE attainment.*

RQ2: How does a pupil's socio-economic status, religion, gender and school type affect their GCSE attainment?

H2: Pupils from lower socio-economic backgrounds will have lower GCSE attainment than their less economically deprived peers. Free school meal entitlement, a mother's education qualifications and a father's education qualifications will have the greatest SES effects on GCSE attainment, respectively.

H3: Catholic pupils will have higher GCSE attainment than their Protestant, other religion and no religion peers.

H4: Girls will have higher GCSE attainment than their male peers.

Research Aim 2: Examine how interactions between socio-economic status, religion, gender and school type influence GCSE attainment.

RQ3: How do possible interactions between independent variables influence GCSE attainment?

> **RQ3a:** Are Protestant working class boys underachieving when compared to other groups?

H5: Gender and Religion interaction - Catholic girls will have the highest GCSE attainment, followed by Catholic boys. Protestant girls followed by Protestant boys will have the lowest relative attainment.

H6: Gender and FSME interaction - Girls not entitled to free school meals will have the highest GCSE attainment, followed by non-entitled boys. Boys entitled to free school meals will have the lowest GCSE attainment.

H7: Religion and FSME interaction - Catholic pupils not entitled to free school meals will have the highest GCSE attainment. Protestant pupils entitled to free school meals will have the lowest GCSE attainment.

H8: Gender, Religion and FSME interaction - Catholic girls not entitled to free school meals will have the highest GCSE attainment, followed by Catholic boys not entitled to free school meals. Protestant boys entitled to free school meals will have the lowest GCSE attainment.

H9: Gender and School Type interaction - Girls attending grammar schools will have the highest GCSE attainment, followed by boys attending grammar schools. Boys attending non-grammar schools will have the lowest attainment.

H10: Religion and School Type interactions (Catholic and grammar, and other religion and grammar) – in the Catholic and grammar school interaction, Catholic pupils attending grammar schools will have the highest attainment, followed by Protestant pupils attending grammar schools. Protestant pupils attending non-grammar schools will have the lowest attainment in this interaction term. In the other religion and grammar school interaction, all other pupils (affiliating with Catholicism, Protestantism, no religion and no stated religion) attending grammar schools will have the highest attainment, followed by pupils affiliating with other religions attending grammar schools.

H11: FSME and School Type interaction – pupils not entitled to free school meals attending grammar schools will have the highest GCSE attainment, whilst pupils entitled to free school meals attending non-grammar schools will have the lowest GCSE attainment. Pupils entitled to free school meals attending grammar schools will have higher GCSE attainment than their entitled peers attending non-grammar schools.

H12: Gender and Mother's Education interaction – Mother's education will have a consistent effect on male and female pupils' GCSE attainment.

H13: Gender and Father's Education interaction – Female pupils with a father who had some qualification will have the highest GCSE attainment, followed by male pupils. Male pupils with a father who had no qualifications will have the lowest attainment.

Research Aim 3: Explore the unexplained variation in the full multilevel model at the pupil and school level.

RQ4: What is the unexplained variation in GCSE attainment in the full multilevel model at the pupil and school level?

H14: The unexplained variance in GCSE attainment will be greater at the pupil level than the school level.

The outlined research aims, questions and hypotheses of this thesis were addressed through secondary data analysis of a linked dataset that combined the Census (2011), School Leavers Survey and School Census for Northern Ireland.

3.3 Evaluation of secondary data analysis

Secondary data analysis refers to the analysis of data conducted by individuals who were not involved in its collection and is often used for data that are available in large volumes (Bryman, 2016). Like all methods, there are strengths and limitations associated with using secondary data for analysis. When considering its strengths, it firstly provides researchers with high quality data through its larger geographical range and sample size than would be possible through primary data collection (Bryman, 2016). In addition, secondary data is often high quality due to the executed procedures in place to deal with non-responses, along with the implemented quality checks data undergoes before it becomes available (Bryman, 2016). Thirdly, an opportunity for representative subgroup analysis is provided through secondary data with a large sample, which allows for an in-depth exploration into certain social groups (Bryman, 2016; Connelly et al., 2016). Fourthly, secondary data analysis reflects fewer costs and time constraints than primary data collection and analysis, subsequently increasing the time available to conduct analysis (Bryman, 2016; Connelly et al., 2016). However, if there are delays in secondary data becoming available for analysis within a research project timeline, it can mitigate this strength.

There are also limitations to secondary data analysis. Despite secondary data analysis potentially providing more time for analysis, a researcher's lack of familiarity with the data structure, variable availability and variable coding can lead to data cleaning being

a time-consuming activity (Bryman, 2016; Connelly et al., 2016). In relation to this is the overarching limitation that secondary data is not created to align with a specific research project (Connelly et al., 2016). As a result, key variables of interest may not be provided or may not reflect the preferred structure (Connelly et al., 2016), which can alter the analysis and the perceived data quality in relation to a specific project (Bryman, 2016).

When considering secondary data analysis in relation to this thesis, the strengths exceed the limitations. By using secondary data analysis in this study, it provided an opportunity to use the largest, most comprehensive and inclusive dataset to examine the influence of individual and school level factors on GCSE attainment in Northern Ireland. The dataset also reflects the first linkage of the Census (2011), School Leavers Survey and School Census to study these relationships in Northern Ireland, thus providing a unique opportunity to examine GCSE attainment trends. As a result, secondary data analysis was the most appropriate method for analysis in this thesis.

3.4 Data

Educational attainment is a key contributing factor to an individual's later trajectory. However, in the context of Northern Ireland, few studies have had the opportunity to examine post-primary attainment according to a wide range of pupil and school level factors. The dataset used in this study addresses the shortage of in-depth statistical analysis into post-primary attainment trends in Northern Ireland as it combines the Census (2011), School Leavers Survey and School Census. Background to these data sources and the dataset used for analysis are discussed in this section. Details on data access, sample and variables are also provided.

3.4.1 Background

The three data sources used to create the linked dataset for this thesis are termed administrative data. Woollard (2014) defines administrative data as information collected for registration and record keeping purposes that assist with the delivery of services in agencies such as the government. Administrative data provides a large and complex quantity of quantitative information that is often gathered for reasons other than research (Connelly et al., 2016). To provide all necessary information for

analysis, administrative datasets often reflect a multidimensional structure as they are comprised of more than one data source through a data linkage process (Connelly et al., 2016). The multidimensional structure of the administrative dataset used for analysis in this study is reflected through the linkage of the Census (2011), School Leavers Survey and School Census. These three data sources are discussed below.

3.4.2 Census

The Census is a national household survey conducted every ten years in the UK. The last Census to be conducted was in 2011 and its core objective was to gain information on all individuals and households within the UK. The information collected by the Census enables government to target their resources more effectively for future housing, education, health and transport initiatives (Office for National Statistics (ONS), 2018). Household completion of the Census is a legal requirement and its dissemination is the responsibility of different organisations across the UK. The ONS has the responsibility in England and Wales, National Records of Scotland has the responsibility of dissemination in Scotland and NISRA have the responsibility in Northern Ireland. The Census collects a range of socio-demographic information which includes: gender, age, residential address, ethnicity, religion, first language spoken, housing tenure, housing characteristics (number of rooms), family structure, occupation and educational qualifications (ONS, 2015). The information collected in the Census (2011) provides a range of socio-demographic factors, especially based on SES, that are not collected in the School Leavers Survey or School Census. The inclusion of the Census (2011) in the dataset used for analysis in this thesis therefore provides an opportunity to examine factors that have not been commonly studied within the field of education in Northern Ireland.

3.4.3 School Leavers Survey

The Department of Education are responsible for the School Leavers Survey which annually collects data on the GCSE qualifications and destinations of pupils leaving post-primary education in Northern Ireland. The survey also gathers socio-demographic information on pupils such as: gender, religion, FSME and home postcode. School level factors of school type (grammar/non-grammar) and school management structure are also collected in the survey (Department of Education,

2018b). Each year, schools are required to complete the School Leavers Survey between November and March. Completion of the survey is a legal requirement under the Education and Libraries NI Order 2003 as it assists the Department in conducting its statutory functions. In total, the School Leavers Survey annually receives information about approximately 20,000 pupils across Northern Ireland from grant-aided post-primary schools (Administrative Data Liaison Service, 2018a). The inclusion of the School Leavers Survey within the dataset used in this thesis is key as it provides GCSE attainment data that is central to analysis.

3.4.4 School Census

Through the School Census, the Department of Education annually collects information about enrolled pupils across year groups in all schools. The School Census collects information on: pupils' attendance rates, pupil-teacher ratio, a pupil's FSME, a pupil's SEN, school location, school type and school management structure. Data is collected annually in October and similarly to the School Leavers Survey, is a legal requirement for schools to complete under the Education and Libraries NI Order 2003 (Administrative Data Liaison Service, 2018b).

3.4.5 Timeline of Data Access

A proposal for the data linkage of the Census (2011), School Leavers Survey and School Census was submitted to the Administrative Data Research Network (ADRN) through the Administrative Data Research Centre Northern Ireland (ADRC-NI) in January 2016. The proposal was approved by the ADRN Approvals Panel, with this PhD project scheduled to begin in September 2016. Ethical approval for the data linkage was gained from the School of Medicine, Dentistry and Biomedical Sciences at Queen's University Belfast in March 2016. Later ethical approval was also sought from the School of Social Sciences, Education and Social Work at Queen's University Belfast for this specific PhD project (see Appendix B). In April 2016, the Census (2011) variable list was drafted and was later confirmed in May 2016, with the Census office signing the Data Sharing Agreement (DSA) in the same month (May 2016). It should be noted that the Census (2011) variable list was later revised in June 2017 due to policy changes regarding data release for projects. In June 2016, the variable list from the School Leavers Survey and School Census was created. The Department of

Education signed the DSA in October 2017, with the data linkage of the three sources completed in April 2018. However, once data became available, preliminary exploration highlighted that the youngest pupils in Cohort 3, who completed their GCSEs in the academic year of 2012/2013 were not included in the linked dataset. A re-linkage of the data subsequently took place in June 2018 and was available for analysis in August 2018.

3.4.6 Impact of Issues Encountered

Relating to the above section (3.4.5), the most significant issue encountered during this PhD project was the length of time the researcher waited for the linked dataset to become available for analysis. This had direct and indirect negative consequences on the timeline and progress of the thesis. As the final structure of the variables were unknown before the data was released, it resulted in most of the writing and analysis taking place from mid 2018, despite the PhD project beginning in September 2016. Connelly et al., (2016) note that this is a common issue experienced when using administrative data for analysis, with many projects beginning without full knowledge of the data being used. Once available, the data cleaning process was lengthy as it involved gaining clarification on variable meanings and coding from both NISRA and the Department of Education. However, as this was the first dataset in Northern Ireland to combine the Census (2011), School Leavers Survey and School Census, such clarification during the data cleaning process was to be somewhat expected. The researcher also consulted the original surveys to understand the structure of the questions that variables were derived from. A substantial amount of data preparation was therefore completed before statistical analysis was executed.

3.4.7 Structure of the linked dataset

Using the three data sources outlined above, a linked dataset was provided for this thesis to examine post-primary attainment in Northern Ireland. The linked data sources were the: Census (2011), School Leavers Survey (2010-2014) and School Census (2010-2014). Unique pupil identification (ID) and school ID numbers allowed records to be matched across the different data sources. These ID numbers were anonymised before the data were received for analysis. The linked dataset was cross-sectional, providing three whole-population Year 12 cohorts who completed their GCSEs in the

consecutive academic years of: 2010/2011 (Cohort 1), 2011/2012 (Cohort 2) and 2012/2013 (Cohort 3). As the academic year was provided, it allowed between-cohort attainment differences to be controlled for in analysis. Without such information, it would lead to the assumption that all pupils sat the same GCSE examinations, which may lead to an inaccurate estimation of the effects of pupil level and school level factors on GCSE attainment. The multilevel, cross-sectional and whole-population data structure is not reflected in any other available education datasets in Northern Ireland, highlighting the contribution of this thesis to the field.

In this section and those following, the terms cohort members and non-cohort members are used. 'Cohort members' refer to the Year 12 pupils included in analysis. For cohort members, data were provided from the Census (2011), School Leavers Survey and School Census. 'Non-cohort members' refer to individuals living in the same household as a cohort member (pupil) but who are not a Year 12 pupil (cohort member). Non-cohort members may be (but are not limited to): a mother, father, step-parent, sibling or grandparent. Data on non-cohort members were provided from the Census (2011). For the purposes of this study, the non-cohort members included in analysis were mothers and fathers. However, this does not disregard the important influence other non-cohort members may have on a pupil's GCSE attainment. Before conducting analysis, it was important to understand the distinction between cohort and non-cohort members. The distinction between these two groups was necessary to ensure analysis was accurately executed and interpreted. It was also important for understanding the structure of Census (2011) variables which were provided for both cohort and non-cohort members. In this study, the distinction between cohort and non-cohort members was particularly important for the Census (2011) variables of highest education qualification and occupational status, which were not applicable to Year 12 pupils (cohort members). By understanding the distinction, Census (2011) variables were linked to non-cohort members (mothers and fathers) to provide variables such as mothers' and fathers' highest education qualification and occupational status. This distinction was also important for other Census (2011) variables of interest such as religion to ensure a pupil's religion was included in analysis and not their mothers' or fathers'. The distinction between cohort and non-cohort members was therefore necessary for analysis to be accurate and aligned with the research aims of this study.

For the distinction to be made between cohort and non-cohort members in analysis, three data files were created: one that included both cohort and non-cohort members (the original dataset), one for pupil cohort members and one for non-cohort members. To examine the influence of parental status on a pupil's GCSE attainment, mothers' and fathers' data was merged with the pupil cohort data. When the process of merging begun, it was apparent that a small number of pupils across the cohorts had two mothers or two fathers, which led to errors when attempting to merge the parental data with the pupil cohort data. As this error accounted for only a small number of pupils, it was agreed the most logical approach for mothers' and fathers' data to be successfully merged to the pupil data was to keep the data of the mother/father with the higher occupational status based on the NS-SEC. This approach was based upon the assumption that the parent with the higher occupational status would have a greater effect on pupil attainment. The number of pupils with same sex parents cannot be provided due to the potential risk of disclosure. As a result, the following discussion highlights the final number of maternal and paternal records matched to cohort members (pupils) in the dataset used for analysis. When the lower occupation status mother was dropped for those pupils with two mothers, the final number of maternal records matched to pupils in the dataset was 57,778. This means 57,778 pupils out of 61,373 pupils lived in the same household as their mother (this is discussed further in the upcoming Section 3.7.1.5). For fathers, when the lower occupation status father was dropped for those pupils with two fathers, the final number of paternal records matched to pupils in the dataset was 42,297. This means 42,297 pupils out of 61,373 pupils lived in the same household as their father (this is discussed further in Section 3.7.1.5). As only a small number of mother and father records were dropped to allow for the successful merging with pupil data, it was unlikely to have a substantial impact on the conducted analysis. In sum, the non-members data was cleaned to separate the maternal and paternal Census data. Mothers data was then merged with the pupil cohort data and the variable measuring occupation according to the NS-SEC was ranked, meaning in families with two mothers, the mother with the lowest occupation status was dropped from the dataset. This allowed fathers data to be merged and the same ranking process was followed. Connelly et al. (2016) note that this process of data management is common with administrative datasets, as they often require data preparation for analysis such as re-structuring the dataset and recoding variables.

3.5 Sample

The dataset provided cross-sectional data on three whole-population Year 12 cohorts, who completed their GCSEs in the consecutive academic years of: 2010/2011 (Cohort 1), 2011/2012 (Cohort 2) and 2012/2013 (Cohort 3). As the whole population cohorts of Year 12 pupils were provided for analysis, missing values were not a substantial issue. A breakdown of the number of pupils in each cohort is provided in Table 1. Across academic years, pupils are unique to each cohort year. In total, across the three cohorts, there were 61,373 pupils included in the dataset. The total number of schools included in the dataset was 217. In analysis, all three pupil cohorts were included in the same statistical models for efficiency of data analysis and to minimise result repetition across the three cohorts. This meant the effect of the cohort a pupil belonged to was controlled for in analysis (see Section 3.11.2 for more details). In the statistical models, Cohort 1 was the reference category.

Table 1: Pupil level frequencies across cohorts

Cohort	Frequency of pupils (N)
Cohort 1 (2010/2011)	21,048
Cohort 2 (2011/2012)	20,551
Cohort 3 (2012/2013)	19,774
Total	61,373

3.6 Dependent variables

3.6.1 GCSE attainment

In Northern Ireland, GCSE grades A*-G are considered a pass and grade U means "ungraded" as the minimum standard to achieve a grade was not met. Several measures of GCSE attainment were constructed for analysis in this thesis. The data provided separate grade variables indicating the number of GCSEs obtained at grades A*-U. In total, four attainment measures were constructed: overall GCSE score, GCSE English score, GCSE mathematics score and the total number of GCSEs or equivalents achieved at grades A*-G. The creation of each attainment measure is discussed below.

3.6.2 Measure One: Overall GCSE score

This attainment measure examined the quantity and quality of GCSEs achieved. In the dataset, the number of GCSEs achieved at each grade (A*-U) were originally provided as separate variables. These separate variables were used and manipulated to compute the attainment measure of GCSE score by allocating a numeric value to each grade variable. To execute this, the highest grade (A*) was given the highest score (9), whilst the lowest grade (U) was given the lowest score (1). To compute the attainment measure, the individual grade variables were multiplied with their corresponding score (Table 2). This resulted in the creation of a total GCSE score achieved by pupils, which reflected the quantity and quality of GCSEs on a continuous scale. In summary, the higher the overall score, the higher the quality of GCSEs achieved. In 2017 in England, the grading of GCSE English and mathematics transitioned from an alphabetical to a numeric scale, with further subjects in 2018 and 2019 moving towards this numeric grading system. Numeric grades are now provided in England, with nine being the highest (equivalent to A*) and one being the lowest (equivalent to G) (Department for Education, 2016). Northern Ireland has also begun to implement this numeric grading scale from 2019 (CCEA, 2019). The attainment measure of this thesis therefore aligns with the shift in the grading system in England and Northern Ireland, highlighting its appropriateness as the main attainment measure in analysis. In addition, existing studies within the UK have also used similar constructions of GCSE score as the attainment measure in their respective analyses (Sammons et al., 2014; Shuttleworth and Daly, 2000). To compute this attainment measure, the following formula was executed:

Number of GCSEs achieved at specified grade **X** *numerical ranking/score* = overall GCSE score

For example, if a pupil achieved 1x A*, 2x A, 2x B, 2x C, 1x E, 2x G, the overall GCSE score would be calculated as follows:

A*: 1 x 9 = 9
A: 2 x 8 = 16
B: 2 x 7 = 14
C: 2 x 6 = 12
E: 1 x 4 = 4
G: 2 x 2 = 4

Total score: 9+16+14+12+4+4= 59

Table 2: Grades and corresponding scores for the creation of overall GCSE score

Grade	Score
A*	9
A	8
B	7
C	6
D	5
E	4
F	3
G	2
U	1

3.6.3 Measure Two and Three: GCSE English and GCSE Mathematics score

The grade a pupil achieved in GCSE English and GCSE mathematics were also provided in separate variables like those described above. The same process outlined for attainment measure one was conducted to compute a GCSE English score and GCSE mathematics score, encompassing grades A*-U. By examining GCSE English and mathematics separately, it allowed a comparison of effects to determine if certain factors had a greater effect on different subject attainment.

During the creation of these variables, frequencies were executed which highlighted that several pupils across the three cohorts had a score greater than nine in English and/or mathematics. In theory, nine was the highest score a pupil could achieve within these constructed score variables as it was the equivalent to the highest grade (A*). When this issue was explored further, it was clear pupils with a score higher than nine had two recorded English/mathematics grades (depending on which variable was in focus). This issue was greater for GCSE English than GCSE mathematics. Primarily, it was unclear whether this issue was the result of an input error when the dataset was created, or whether it was due to a resit/remark of the examination. The Department of Education were contacted for clarification on this issue, who highlighted that pupils

with two grades had repeated their GCSE and got a higher grade. It was recommended by the Department of Education that in all cases, the highest grade should be used. Following this clarification, data cleaning took place to remove the duplicate grade values for the pupil ID numbers affected, with the lower grade against the pupil ID numbers being removed. Following on from this query, the Department of Education highlighted that the double grade issue did not affect the individual grade variables of the 'number of GCSEs achieved' used to compute the first attainment measure (overall GCSE score), as only the highest grade would have been used for the computation of these variables.

3.6.4 Measure Four: Total number of GCSEs or equivalents A*-G

This attainment measure was provided within the dataset and no manipulation was necessary. This measure indicated the total number of GCSEs or equivalent examinations achieved at grades A*-G. This measure is an inclusive indicator of vocational qualifications obtained as well as traditionally academic subjects. As it includes equivalent examinations to GCSEs, it varies slightly from the other attainment measures of this thesis.

Overall, four attainment measures were created as part of this thesis. However, the attainment measure (one) indicating the overall GCSE score is focused upon throughout Chapter Four and Chapter Five, with the analysis for the remaining attainment measures (two to four) located in Appendix C (Tables 17-19) and referred to throughout Chapter Four when appropriate.

3.7 Independent Variables - Individual Level

3.7.1 Socio-Economic Status

Socio-economic status is the widest ranging concept in this thesis. In total, eight measures of socio-economic status are included in analysis which provide an in-depth insight into a pupil's socio-economic position according to their: free school meal entitlement, housing tenure, property value, mother's education qualifications, father's education qualifications, mother's occupational status, father's occupational status and the NI-MDM (2010) based on income.

3.7.1.2 Free School Meal Entitlement

This variable examined a pupil's FSME at the point in time the School Census data was collected. As this measure was provided by the School Census, it refers to the registrations of FSM at the school level. As a result, it may under report the actual rate of free school meal entitlement amongst pupils. However, in the dataset, this measure is broadly defined as free school meal entitlement and is referred to as such throughout the thesis. Despite this variable not measuring whether a pupil uptakes their free school meals, such uptake is not as important as a pupil's entitlement. As entitlement for free school meals is means tested (see Section 2.4.1), it allows FSME to be used as a proxy indicator of SES in analysis. This binary variable was coded as entitled to free school meals (1) and not entitled to free school meals (0) to determine the influence of entitlement on GCSE attainment.

3.7.1.3 Housing Tenure

Housing tenure refers to whether a family owns their own home and provided an indicator of family resources and socio-economic status. This variable was comprised of two questions from the Census (2011):

> *H12: Does your household own or rent this accommodation? H13: Who is your landlord? (If the household is not owned outright or with mortgage).*

The original variable had ten answer categories, however this was conflated into four categories for analysis: privately owned, private rental, rented from the Northern Ireland Housing Association or Housing Executive and other. From the original variable, the categories of owned outright and owned with a mortgage were combined to create 'privately owned'. For the category of private rental, three categories were combined: privately rented through landlord or letting agency, privately rented through employer of a household member and privately rented (other landlord). The category of renting from the Northern Ireland Housing Association/Housing Executive was comprised of two categories from the original variable: rented from Northern Ireland Housing Association and rented from Northern Ireland Housing Executive. The categories of living rent free, shared ownership and living in a communal establishment were coded as 'other' due to their lower frequencies and were controlled

for within analysis. For statistical analysis, renting from the Northern Ireland Housing Association/Housing Executive was made the reference category to determine whether owning property or privately renting had positive effects on GCSE attainment within the model.

3.7.1.4 Property Value

This variable refers to the value of the property an individual resides in. This information is derived from the Land and Property Service (LPS) that provided permission for the Census to link property value to individual cases. Property value was collected by the LPS in 2005. This variable focuses upon the address of the property, meaning housing tenure does not affect its output. A limitation of this variable is that the value of a property in 2005 may not accurately reflect its current value. This variable should therefore be viewed as an indicator that may have disparities between property value in 2005 and present day.

This variable provided decile bands of property value. The bands of this variable originally began with 0-£75,000 and increased in £25,000 intervals thereafter until the value of £200,000, of which decile bands increased by £50,000 as fewer cases lay within these bands. The original variable had ten categories with the highest category being £400,000 or more. With high differentiation of property value within the original variable, there were low cell counts in some categories. This provided a rationale to recode the variable into larger deciles. Based upon the cell counts of the originally coded categories, this variable was recoded into five categories: less than or equal to £100,000; £101,000-£150,000; £151,000-£200,000, more than £200,000 and no property value was provided. The recode merged existing categories together and coded cases where no property value was provided and those living in communal establishments as 'no value provided'. This category (no value provided) was controlled for within analysis. It was queried with NISRA RSU staff why there were missing property values (in addition to those living in communal establishments) for this variable. The RSU responded that the LPS may not have had Unique Property Reference Number values for some properties (UPRN code) as some may have only been developed or re-developed (for example, into apartments or rebuilt) after the LPS collection of values was completed. For statistical analysis, 'more than £200,000' was made the reference category to examine whether property value held a positive relationship with GCSE attainment as it was an indicator of family wealth.

3.7.1.5 Parental Data

The variables of mother's highest education qualification, father's highest education qualification, mother's occupational status and father's occupational status were created and included in analysis. However, maternal and/or paternal data was not available for all pupils but only those who lived with their mother/father. This can be explained through the structure of the Census, which only collects information on those living in the same household and not family members who reside at another address. Therefore, if a pupil does not live in the same household as their mother/father, parental data for this pupil will not have been provided in the dataset. To deal with the missing cases within these parental variables, control variables were created for mothers' and fathers' data. These control variables were a binary structure coded as 'mother data provided' (0) and 'no mother data provided' (1). The same structure was apparent for the variable controlling for missing father data. These control variables ensured that pupils for whom there was individual level data but no or limited parental data (for example, data for only one parent) were not excluded from analysis. In addition, it meant the parental variables could be accurately interpreted as the within model effects of a mother's/father's education/occupation on pupils who lived in the same household. The missing cases in the variables of mother's highest education qualification and mother's occupational status were the same cases, meaning only one control variable for 'no maternal data' was necessary in analysis. The same process relates to fathers' data. The same cases were missing in father's highest education qualification and father's occupational status, meaning only one control variable for 'no paternal data' was needed in analysis.

3.7.1.6 Parental Education

Mothers' and fathers' highest education qualification were examined separately within analysis and were derived from the following Census (2011) question:

Q27: Which of these qualifications do you have?

The Census originally had 13 answer categories for this question which were provided as eight categories in the dataset to avoid potential disclosure issues. This variable was recoded into four categories to ensure the variable was effectively structured for analysis and later interpretation. Table 3 outlines the recoding structure which was

applied to both the mother and father variables. By examining the separate influences of mothers' and fathers' highest education qualification, it provided an opportunity to examine if one parent's education level had a greater effect on their child's GCSE attainment within the executed models. For statistical analysis, the category of 'degree (all levels)' was made the reference category to examine whether a mother's/father's higher education qualifications held a positive relationship with their child's GCSE attainment.

Table 3: Recoded categories for mothers'/fathers' highest education qualification

Original Answer Categories	Recoded Answer Categories
No academic/professional qualifications	No professional/academic qualifications
1-4 O Levels/CSE/GCSEs (any grades), Foundation Diploma, NVQ level 1, Foundation GNVQ, Basic/Essential Skills 5+ O Level (Passes)/CSEs(Grade 1)/GCSEs (Grades A*-C), School Certificate, 1 A Level/2-3 AS Levels/VCEs, Intermediate/Higher Diploma, Welsh Baccalaureate Intermediate Diploma, NVQ level 2, Intermediate GNVQ, City and Guilds) 2+ A Levels/VCEs, 4+ AS Levels, Higher School Certificate, Progression/Advanced Diploma, Welsh Baccalaureate Advanced Diploma, NVQ Level 3; Advanced GNVQ, City and Guilds Advanced Craft, ONC, OND, BTEC National, RSA Advanced Diploma	School level qualifications: GCSEs/AS level/A Level or equivalent
Apprenticeship Vocational/Work-related Qualifications, Foreign Qualifications/Qualifications gained outside the UK	Apprenticeship/vocational/work-related qualifications *(labelled as other qualifications throughout)*
Degree, Higher Degree, NVQ Level 4-5, HNC, HND, RSA Higher Diploma, BTEC Higher level, Foundation degree (NI), Professional qualifications	Degree (all levels) or equivalent

3.7.1.7 Parental Occupation

Mothers' and fathers' occupational status were also examined separately and were derived from the NS-SEC of occupations from the following Census (2011) question:

Q38: Briefly describe what you do (did) in your main job.

The original variable consisted of 39 occupation categories ranging from routine occupations to higher professional occupations. The high levels of refinement in each occupational category resulted in low cell counts across the variable. Subsequently, a recode was conducted to compute NS-SEC into eight categories, five categories (six including unemployed) and three categories (four including unemployed), following the analytical classes provided by the ONS (2010). The three category classification (four including unemployed) was used for analysis in this thesis. Table 4 outlines the process of collapsing occupational classes from eight to four categories to create the larger classifications. This process was followed for both mothers' and fathers' occupational status. For statistical analysis, 'professional occupations' was made the reference category to examine whether a mother's/father's higher occupational status held a positive relationship with their child's GCSE attainment, whilst also comparing the effects of mothers and fathers to determine which had the greatest influence within the executed models.

Table 4: Recoded categories for mothers' and fathers' NS-SEC

Original Categories	Eight categories	Six categories	Four categories
Employers in large establishments Higher managerial and administrative Higher professional traditional employees Higher professional new employees Higher professional traditional self-employed Higher professional new self-employed	Higher professional occupations/employers in large establishments	Higher managerial, administrative and professional occupations	Higher managerial, administrative and professional occupations *(labelled as professional occupations throughout)*
Lower professional and higher technical traditional employees Lower professional and higher technical new employees Lower professional and higher technical traditional self-employed Lower professional and higher technical new self-employed Lower managerial and administrative Higher supervisory	Lower professional and higher technical occupations		
Intermediate clerical and administrative Intermediate sales and service Intermediate technical and auxiliary Intermediate engineering	Intermediate occupations	Intermediate occupations	Intermediate occupations *(labelled as intermediate occupations throughout)*

Table 4 continued

Original Categories	Eight categories	Six categories	Four categories
Employers in small establishments in industry, commerce, services etc. Employers in small establishments in agriculture Own account workers (non-professional) Own account workers (agriculture)	Employers in small organisation/own account workers	Small employers and own account workers	Intermediate occupations
Lower supervisory Lower technical craft Lower technical process operative	Lower supervisory/technical occupations	Lower supervisory and technical occupations	Routine and manual occupations *(labelled as routine occupations throughout)*
Semi-routine sales Semi-routine service Semi-routine technical Semi-routine operative Semi-routine agricultural Semi-routine clerical Semi-routine childcare	Semi-routine occupations	Semi-routine and routine occupations	
Routine sales and service Routine production Routine technical Routine operative Routine agricultural	Routine occupations		

Table 4 continued

Original Categories	Eight categories	Six categories	Four categories
Never worked Long-term unemployed Full-time students	Never worked/long term unemployed/full time students	Never worked/long term unemployed/full time students	Never worked/long term unemployed/full time students *(labelled as unemployed throughout)*
No code required	Missing	Missing	Missing

3.7.1.8 Northern Ireland Multiple Deprivation Measure (2010) - Income

The NI-MDM 2010 replaced the NI-MDM 2005 as the official measure of spatial deprivation in Northern Ireland in the 2011 Census. The income domain identifies the proportion of the population experiencing income deprivation. This is calculated by obtaining the number of individuals living in households in receipt of the following income related benefits and tax: income support, state pension credit, income based jobseeker's allowance, income based employment and support allowance, housing benefit, working tax credit or child tax credit (NISRA, 2010). In the NI-MDM, Super Output Areas are ranked according to their level of deprivation. The scale begins at 1 for the most deprived Super Output Area (SOA) and finishes at 890, referring to the least deprived SOA. In the dataset, the NI-MDM for income was provided in 10 decile categories. The decile categories are structured according to SOAs and the level of deprivation (Table 5). This variable retained its original structure for analysis and no manipulation was conducted before analysis.

Table 5: Northern Ireland Multiple Deprivation Measure for income (2010) decile categories according to Super Output Areas

Decile	Super Output Areas included within the decile category
1 (most deprived)	1-89
2	90-178
3	179-267
4	268-356
5	357-445
6	446-534
7	535-623
8	624-712
9	713-801
10 (least deprived)	802-890

3.7.2 Religion

This variable was computed from the Census (2011) question:

Q17: What religion, religious denomination or body do you belong?

The Census question had four categorical answers (Roman Catholic, Presbyterian Church in Ireland, Church of Ireland and Methodist Church in Ireland) and an open-ended option for 'other'. The variable was recoded into five categories for analysis: Protestant, Catholic, other religion, no religion and not stated. For this recode, values labelled 'Catholic' from the original variable remained the same, whilst the categories of Presbyterian Church, Church of Ireland and Methodist Church were combined to create the category of 'Protestant'. The categories of other Christian and other religion were combined into 'other religion', whilst the category of no religion remained the same as the original variable. This question was not compulsory to answer in the Census. As a result, a category of 'not stated' referred to those who did not provide a valid answer to the question. This category was controlled for within analysis. For statistical analysis, Catholic was the reference category and compared to the remaining categories of Protestant, other religion and no religion. This variable provided an opportunity to examine whether religious affiliation had a positive impact on attainment within the executed models.

3.7.3 Gender

A pupil's gender was provided with the categories of male and female. For analysis, this variable was coded as male (0) and female (1).

3.8 Independent Variables - School Level

Two school level factors were included in analysis to examine the influence of the selective education system and school management structure on GCSE attainment in Northern Ireland. School type (grammar/non-grammar) and school management structure were the only school level variables included in the dataset that provided an insight into the structure of the education system in Northern Ireland. No measures of whether a school was single sex or co-educational were provided. As a result, this aspect of school structure was not included in analysis.

3.8.1 School Type

The binary variable of school type indicated whether a post-primary school was non-grammar or grammar. This variable was coded as non-grammar (0) and grammar (1) for analysis.

3.8.2 School Management Structure

This variable referred to the management structure of a school and originally had six categories: controlled, Catholic maintained, other maintained, controlled integrated, grant maintained integrated and voluntary. For analytical purposes, this variable was recoded into five categories; controlled, Catholic maintained, other maintained, integrated and voluntary. The two categories of controlled integrated and grant maintained integrated were collapsed into one category named 'integrated'. Despite controlled integrated and grant maintained integrated being combined, it is acknowledged that these are two distinct structures of integrated schools that are established in different ways. Controlled integrated schools refer to schools that were originally comprised of a controlled management structure but through a parental ballot, the school transitioned to become an integrated structure. On the other hand, grant maintained integrated schools are established by a parental body and have an integrated status from their establishment (Northern Ireland Council for Integrated Education, 2020). All other school management categories reflected the same structure as the original variable. For statistical analysis, the category of other maintained was controlled for within analysis, whilst the category of voluntary was made the reference category.

3.9 Summary of variables

The variables used for analysis in this thesis are derived from a linked administrative dataset of three sources: Census (2011), School Leavers Survey and School Census. The variables used in analysis are outlined above, along with details of the data manipulation executed. Overall, there were a total of seven control categories from the variables included in all executed models, these were as followed: cohort, no mother data, no father data, other housing tenure, no property value, no stated religion and other maintained school management structure. Table 6 outlines the source of each variable included in analysis from the linked dataset. Most variables are derived from

the Census (2011), followed by the School Census. The School Leavers Survey provided the variables used to create the dependent variables of GCSE attainment. Table 6 illustrates the benefits of using linked administrative data for analysis, as without such linkage, the predominant focus of SES factors in this study would not be possible, nor would the overall thesis.

Table 6: Sources of variables from linked dataset

Variable	Source
GCSE attainment (all measures)	School Leavers Survey
Free School Meal Entitlement	School Census
Housing Tenure	Census
Property Value	Land and Property Service (Census)
Mother's/Father's Education	Census
Mother's/Father's Occupational Status	Census
NI-MDM (2010) for Income	Census
Religion	Census
Gender	Census
School Type	School Census
School Management Structure	School Census

3.10 Correlation tests

Following the data cleaning process, tests were conducted on all independent variables to ensure correlation between factors was at an acceptable level before analysis was executed. The validity of the analysis reported in Chapter Four is dependent upon several assumptions. Firstly, that the nested structure of the data is accounted for in analysis through the chosen statistical method. Secondly, that there is an absence of multicollinearity which ensures independent variables are measuring different factors in analysis.

Collinearity was examined through several tests executed in Stata 15: Pearson's correlation and a correlation matrix. These tests differ slightly as Pearson's correlation

computes each correlation for the given pair of variables that have no missing data, whilst the correlation matrix is computed for cases that have no missing values in all listed variables. Neither test indicated a strong correlation between the independent variables. The results of the Pearson's correlation are provided in Appendix B (Table 1). The highest correlations were between; privately owned and privately rented housing tenure (-0.60); Protestant and controlled school management structure (0.51); grammar school and Catholic maintained school structure (-0.50), and Cohort 2 and Cohort 3 (-0.50). In summary, having conducted collinearity tests amongst the independent variables, there were no apparent issues that needed to be amended before analysis was conducted.

Pearson's correlation tests were also conducted to compare the different attainment measures. Although different attainment measures were not included in the same model, correlation tests were conducted to examine whether the different measures were distinctly separate from one another. As the central attainment measure, overall GCSE score was used in each test. When Pearson's correlation was conducted on overall GCSE score and GCSE English score, the correlation was high (0.85). This was also evident between overall GCSE score and GCSE maths (0.87). Similarly, there was high correlation between overall GCSE score and GCSE/Equivalents A*-G (0.72). This suggests the various attainment measures are not distinctly separate which is to be somewhat expected.

3.11 Data Analysis

This section outlines: the method used to examine the influence of pupil level socio-demographics and school level factors on GCSE attainment, the structure of the executed models and why effect sizes were calculated as part of analysis.

3.11.1 Method – Multilevel Modelling

To answer the research questions, test the hypotheses and fulfil the research aims of this study, regression analysis was conducted using hierarchical linear modelling (also known as multilevel modelling) in Stata 15. Multilevel modelling is a statistical approach that accounts for the nested structure of data to predict outcomes based on the independent variables at more than one level (Luke, 2004; Allison, 1999). As

highlighted, the dataset used for analysis reflected a hierarchical structure, with pupils (level 1) being nested within schools (level 2). Consequently, in naturally clustered settings such as schools, the assumption that cases are independently selected is violated. An acknowledgement that pupil level factors are influenced by the school level should therefore be provided through a method such as multilevel modelling (Menard, 2010; Twisk, 2006). In addition, as pupils in the same school are likely to be similar and achieve comparable attainment scores, multilevel modelling is an appropriate method to account for individual pupil outcomes adjusted for group differences, as well as group scores adjusted for individual differences (Tabachnick and Fidell, 2007).

The use of multilevel modelling for this study was therefore justified in three ways; empirically, statistically and theoretically. Empirically, studies have shown that educational attainment varies according to socio-demographic background (level 1) and the school attended (level 2) (see Chapter Two). The statistical justification recognises that cases in the data were not independent but were clustered by school which was important to acknowledge for the accurate calculations of effects and standard errors. Without multilevel modelling, the standard errors are underestimated and subsequently smaller than they should be. This leads to smaller p values which may indicate statistical significance between factors were no real relationship is evident. Theoretically, this study examined how socio-demographics and school factors influenced educational attainment. For this, multilevel modelling was needed to account for the clustering in the data to ensure accurate arguments were reflected.

In addition, according to Raudenbush and Bryk (2002), there are three general uses for multilevel modelling; improved estimation of individual effects, modelling cross-level effects and partitioning variance-covariance components. This study includes all three of these general uses, highlighting the appropriateness to use this method in analysis. Multilevel modelling can also examine interactions across different levels of the data to understand how these affect outcomes (Tabachnick and Fidell, 2007). In addition, it ensures that random variation is not reported as real effects (Snijders and Bosker, 2012). This means that the method allows the relationships between variables at one level to be considered but does not ignore the variability they are associated with at other levels of the data (Raudenbush and Byrk, 2002). In summary, multilevel

modelling was an appropriate method for this thesis as it produced more accurate effects, standard errors and confidence intervals, had the capacity to illustrate how processes at the pupil level are affected by the group (school) level and allowed interaction effects to be examined (Allison, 1999).

3.11.2 Descriptions of Multilevel Models

This section outlines the models executed to explore the effects of pupil level and school level factors on GCSE attainment. Overall, five model structures were executed: the null model, socio-economic status model, full model, full model split by gender and interaction models. The executed analysis of this thesis can be viewed as a building block approach as each model builds upon the previous model.

Before the multilevel models were executed, OLS regression models of individual level factors were conducted for each pupil cohort. The results of these OLS regression models highlighted consistency in the direction, magnitude and statistical significance of the within model effects across all three cohorts. As a result, when the multilevel models were conducted, a cohort control variable was included in the model for efficiency of data analysis and to minimise result repetition across the three cohorts. Using OLS regression models was a preliminary exploratory step that ensured the multilevel models were of the most effective structure. Having a cohort control variable within the multilevel models was the most appropriate structure as even if the results showed a statistically significant difference in GCSE attainment between cohorts, it was marginal and unlikely to reflect a meaningful difference.

When the multilevel models were executed, random intercept models were used for analysis as the aims of this thesis were to examine between group differences, rather than within group differences. Random intercept models therefore aligned more closely with the purposes of this study. Random slope models were conducted to examine whether they added explanatory power to the model. Although it was slightly higher, there were issues with the successful execution of these models, with error messages often evident due to the number of slopes that needed to be included in the models. This provided further justification for using random intercept models in analysis.

3.11.3 Null Model

A null model consisting of only the dependent variable and school level identifier was created to calculate the unexplained variance at the individual and school level through the Variance Partition Coefficient (VPC). The null model was an important starting point in multilevel modelling as it allowed a comparison of variance rates at the individual and school level as independent variables were added to the model. The VPC ranges from 0 to 1, with 0 suggesting there is no unexplained variation at the given level, and 1 suggesting all unexplained variation is at the given level. This model directly linked to RA3, RQ4 and H13 of the thesis.

Between-school (level 2) and within-school, between-pupil (level 1) unexplained variance were calculated through the VPC using the following formulae, respectively:

$$VPC_e = \sigma^2_e / \sigma^2_e + \sigma^2_u$$

$$VPC_u = \sigma^2_u / \sigma^2_e + \sigma^2_u$$

These formulae relate to the null model equation outlined below. The latter parts of the below equation ($u_j + e_{ij}$) provide random effects of the model and are used to calculate the VPC:

$$y_{ij} = b_{0j} + u_j + e_{ij}$$

y_{ij} (GCSE attainment of pupil in school) = b_{0j} (constant/intercept for each school) + u_j (school level residual error) + e_{ij} (pupil level residual error)

The suffix *i* relates to the individual level (pupil) of the dependent variable (*y*), whilst *j* indicates the school level (school) of the dependent variable (*y*). The suffix *j* against the constant b_0 indicates that each school has a different constant, as b_{0j} refers to the constant/intercept for each school. The term u_j refers to the residual error at the school level. Residual errors (also known as unexplained variance) are the estimated differences between the observed value and the predicted value from the regression equation. The final part of the equation (e_{ij}) refers to the residual error for the pupil level. This model equation indicates that the data being analysed was for the *i*th pupil within the *j*th school.

After the null model, the model building process begun, with independent variables at the pupil and school level being added to assess their effects within the models on

GCSE attainment in Northern Ireland. The above model equation was subsequently expanded as independent variables were added to the model.

3.11.4 Socio-Economic Status Model

A total of eight socio-economic indicators were included in this model, along with controls for: cohort, no mother data and no father data. Relating to RQ1 and H1, the relative within model effect of each SES factor was examined to provide an in-depth analysis into which socio-economic factor had the greatest effect on GCSE attainment in this study. This model was executed due to the lack of available education data in Northern Ireland with such a large variety of socio-economic factors. This model can also be viewed as a building block, before the multilevel model with all predictor variables was executed.

The equation for a multilevel model that accounts for only pupil level (level one) variables and the clustering within schools is as follows:

$$y_{ij} = b_{0j} + b_1x_{ij} + u_j + e_{ij}$$

y_{ij} (GCSE attainment of pupil in school) = b_{0j} (constant/intercept) + b_1x_{ij} (slope of independent variable for pupil within the school) + u_j (school level residual) + e_{ij} (pupil level residual error)

The suffix *i* relates to the individual level (pupil) of the dependent variable (*y*), whilst *j* indicates the school level (school) of the dependent variable (*y*). The second part of this equation (b_{0j}) refers to the constant/intercept which varies across schools. The next part (b_1x_{ij}) indicates the slope/gradient (b_1) of the independent variable for pupils within schools (x_{ij}). The suffix u_j refers to the school level residual error, whilst e_{ij} indicates the residual error at the pupil level. Multilevel models have two components: the fixed part ($b_0 + b_1x_{ij}$) and the random part ($u_j + e_{ij}$), with the random part being used to calculate the variation in the model through the VPC equation.

For the executed SES model, the equation is as follows:

$$y_{ij} = b_{0j} + b_1x_{ij} + b_2x_{ij} + b_3x_{ij} + b_4x_{ij} + b_5x_{ij} + b_6x_{ij} + b_7x_{ij} + b_8x_{ij} + b_9x_{ij} + b_{10}x_{ij} + b_{11}x_{ij} + u_j + e_{ij}$$

y_{ij} (GCSE attainment of pupil in school) = b_{0j} (constant/intercept) + b_1x_{ij} (FSME) + b_2x_{ij} (housing tenure) + b_3x_{ij} (property value) + b_4x_{ij} (mother's education) + b_5x_{ij} (father's education) + b_6x_{ij} (mother's occupation) + b_7x_{ij} (father's occupation) + b_8x_{ij} (NI-MDM income) + + b_9x_{ij} (cohort control) + $b_{10}x_{ij}$ (no mother data control) + $b_{11}x_{ij}$ (no father data control) + u_j (school level residual error) + e_{ij} (pupil level residual error)

Table 7: Socio-economic status multilevel model description

Dependent variable	Independent variable	Categories
GCSE score and quality	Free School Meal Entitlement	• Entitled to free school meals • Not entitled to free school meals **(reference category)**
	Housing Tenure	• Privately owned • Private rental • Rented from the Northern Ireland Housing Association/Housing Executive **(reference category)**
	Property Value	• Less than or equal to £100,000 • Between £101-£150,000 • Between £151-£200,000 • More than £200,000 **(reference category)**
	Mother's Education	• No qualifications • School level qualifications • Other qualifications • Degree level qualifications **(reference category)**
	Father's Education	• No qualifications • School level qualifications • Other qualifications • Degree level qualifications **(reference category)**
	Mother's Occupation	• Professional **(reference category)** • Intermediate • Routine • Not employed

Table 7 continued

Dependent variable	Independent variable	Categories
GCSE score and quality	Father's Occupation	• Professional **(reference category)** • Intermediate • Routine • Not employed
	NI-MDM (2010) for Income	• Scale: 1-10
	Controls	
	Cohort	• Cohort 1 **(reference category)** • Cohort 2 • Cohort 3
	Other housing tenure data	• Housing tenure **(reference category: rented from Northern Ireland Housing Association/Executive)**
	No property value data	• No property value provided **(reference: more than £200,000)**
	No mother data	• No mother data • Mother data provided **(reference category)**
	No father data	• No father data • Father data provided **(reference category)**

3.11.5 Full Model

The natural development of the socio-economic status model was to add the remaining factors of religion, gender, school type and school management structure to determine their within model effects on GCSE attainment. This model also examined whether the within model SES effects varied when other predictor variables were included in the model. This model provided an opportunity to answer RA1, RQ2 and hypotheses 2-4. The full multilevel model was also executed for the alternative attainment measures of: GCSE English score, GCSE mathematics score and GCSE or Equivalents A*-G. These alternative models can be found in Appendix C (Tables 17-19).

The equation for a multilevel model that accounts for pupil level (level one) variables, school level (level two) variables and the clustering within schools is as follows:

$$y_{ij} = b_{0j} + b_1x_{ij} + {}_+ b_2x_{2j} + u_j + e_{ij}$$

y_{ij} (GCSE attainment of pupil in school) = b_{0j} (constant/intercept) + b_1x_{ij} (slope of individual level independent variable for pupil within the school) + b_2x_{2j} (slope of school level independent variable) + u_j (school level residual error) + e_{ij} (pupil level residual error)

For the full model, the equation is as follows:

$$y_{ij} = b_{0j} + b_1x_{ij} + b_2x_{ij} + b_3x_{ij} + b_4x_{ij} + b_5x_{ij} + b_6x_{ij} + b_7x_{ij} + b_8x_{ij} + b_9x_{ij} + b_{10}x_{ij} + b_{11}x_{ij} + b_{12}x_{ij} + b_{13}x_{ij} + b_{14}x_{11j} + b_{15}x_{12j} + u_j + e_{ij}$$

y_{ij} (GCSE attainment of pupil in school) = b_{0j} (constant/intercept) + b_1x_{ij} (FSME) + b_2x_{ij} (housing tenure) + b_3x_{ij} (property value) + b_4x_{ij} (mother's education) + b_5x_{ij} (father's education) + b_6x_{ij} (mother's occupation) + b_7x_{ij} (father's occupation) + b_8x_{ij} (NI-MDM income) + b_9x_{ij} (religion) + $b_{10}x_{ij}$ (gender) +$b_{11}x_{ij}$ (cohort control) + $b_{12}x_{ij}$ (no mother data control) + $b_{13}x_{ij}$ (no father data control) + $b_{14}x_{14j}$ (school type) + $b_{15}x_{15j}$ (school management structure) + u_j (school level residual error) + e_{ij} (pupil level residual error)

Table 8: Full multilevel model description

Dependent variable	Independent variable	Categories
GCSE score and quality	Free School Meal Entitlement	• Entitled to free school meals • Not entitled to free school meals **(reference category)**
	Housing Tenure	• Privately owned • Private rental • Rented from the Northern Ireland Housing Association/Housing Executive **(reference category)**
	Property Value	• Less than or equal to £100,000 • Between £101-£150,000 • Between £151-£200,000 • More than £200,000 **(reference category)**
	Mother's Education	• No qualifications • School level qualifications • Other qualifications • Degree level qualifications **(reference category)**
	Father's Education	• No qualifications • School level qualifications • Other qualifications • Degree level qualifications **(reference category)**

Table 8 continued

Dependent variable	Independent variable	Categories
	Mother's Occupation	• Professional **(reference category)** • Intermediate • Routine • Not employed
	Father's Occupation	• Professional **(reference category)** • Intermediate • Routine • Not employed
	NI-MDM (2010) for Income	• Scale: 1-10
	Religion	• Catholic **(reference category)** • Protestant • Other religion • No religion
	Gender	• Female • Male **(reference category)**
	School Type	• Grammar • Non-grammar **(reference category)**
	School Management Structure	• Controlled • Catholic Maintained • Integrated • Voluntary **(reference category)**

Table 8 continued

Dependent variable	Independent variable	Categories
	Controls	
	Cohort	• Cohort 1 **(reference category)** • Cohort 2 • Cohort 3
	Other housing tenure data	• Other housing tenure **(reference category: rented from Northern Ireland Housing Association/Executive)**
	No property value data	• No property value provided **(reference: more than £200,000)**
	No mother data	• No mother data • Mother data provided **(reference category)**
	No father data	• No father data • Father data provided **(reference category)**
	No stated religion	• Religion not stated **(reference category: Catholic)**
	Other school management structure	• Other maintained management structure **(reference: voluntary)**

3.11.6 Full model split by gender

The full model was split by gender to determine if pupil level socio-demographics and school level factors had varying within model effects on male and female GCSE attainment. Despite only being able to discuss differences between models descriptively, the splitting of the full multilevel model acknowledged that male and female pupils cannot be viewed as a homogenous social group, as the within model effects of individual level socio-demographics and school level factors differed according to the gender of pupils. This model retained the same structure as the full model described above, however the variable of gender was removed as the analysis was conducted for males and females separately. Like above, the equation for the full multilevel model that examined GCSE attainment of male and female pupils separately is as follows:

$$y_{ij} = b_{0j} + b_1x_{ij} + {}_+ b_2x_{2j} + u_j + e_{ij}$$

y_{ij} (GCSE attainment of female/male pupil in school) = b_{0j} (constant/intercept) + b_1x_{ij} (slope of individual level independent variable for female/male pupil within the school) + b_2x_{2j} (slope of school level independent variable) + u_j (school level residual error) + e_{ij} (pupil level residual error)

For the full model split by gender, the equation is as follows:

$$y_{ij} = b_{0j} + b_1x_{ij} + b_2x_{ij} + b_3x_{ij} + b_4x_{ij} + b_5x_{ij} + b_6x_{ij} + b_7x_{ij} + b_8x_{ij} + b_9x_{ij} + b_{10}x_{ij} + b_{11}x_{ij} + b_{12}x_{ij} + b_{13}x_{13j} + b_{14}x_{14j} + u_j + e_{ij}$$

y_{ij} (GCSE attainment of either female/male pupils in school) = b_{0j} (constant/intercept) + b_1x_{ij} (female/male FSME) + b_2x_{ij} (female/male housing tenure) + b_3x_{ij} (female/male property value) + b_4x_{ij} (female/male mother's education) + b_5x_{ij} (female/male father's education) + b_6x_{ij} (female/male mother's occupation) + b_7x_{ij} (female/male father's occupation) + b_8x_{ij} (female/male NI-MDM income) + b_9x_{ij} (female/male religion) + $b_{10}x_{ij}$ (cohort control) + $b_{11}x_{ij}$ (no mother data) + $b_{12}x_{ij}$ (no father data) + $b_{13}x_{13j}$ (female/male school type) + $b_{14}x_{14j}$ (female/male school management structure) + u_j (school level residual error) + e_{ij} (pupil level residual error)

3.11.7 Interaction models

Interaction terms included in this analysis through incorporation into the full multilevel model were between the following factors: gender and religion; gender and FSME; religion and FSME; gender, religion and FSME; gender and mother's education; gender and father's education; gender and school type; religion and school type (two interaction terms: Catholic and grammar, and other religion and grammar), and FSME and school type. Interaction terms were essential to analysis as they provided an accurate account of whether factors had a statistically significant multiplicative effect within the model, rather than simply an additive effect on GCSE attainment. No study in Northern Ireland has fully examined the interactions between the above factors and their influence on GCSE attainment. This thesis therefore provided an insight into the statistically tested individual level and cross level interactions, subsequently filling a gap in the current literature in the Northern Ireland context. This analysis also answered RA2, RQ3 and RQ3a, and hypotheses 5-13 of the study.

For the interaction models, the predictor variables that were included in the interaction terms were recoded as binary variables for ease of interpreting the interaction effects in the given models. The variables of: FSME, gender and school type all retained their structure as previously outlined. Religion was recoded in two ways for the interaction terms. Firstly, for the interaction terms: gender and religion; religion and FSME; gender, religion and FSME, and Catholic and school type, religion was recoded as a binary variable with the categories of Catholic (1) and Protestant (0). The categories of other religion, no religion and religion not stated were coded as missing for the purposes of these interaction terms as they accounted for a lesser proportion of each cohort. Although this recode may be deemed deterministic in its approach to examine the influence of religious affiliation on attainment, as most pupils affiliated with either Catholicism (just below 50% of each cohort) or Protestantism (over 35% of each cohort), it included the majority of the pupil cohort in analysis. Secondly, for the interaction term between other religion and school type, the categories of Catholic, Protestant, no religion and no stated religion were combined to make the reference category (0), whilst the category of other religion (1) retained its original structure in this recode.

Mother's and father's highest education qualification were recoded into binary variables that reflected the same structure. For the purposes of the interaction terms

between gender and mother's education, and gender and father's education, the parental education categories of: degree level qualifications, school level qualifications and other qualifications were combined to make the category of 'obtained some level of education' (1), whilst the category of no qualifications (0) retained its original structure.

For the interaction models that had either individual level interactions, or cross-level interactions, the equation for the models is as follows:

$$y_{ij} = b_{0j} + b_1x_{ij} + b_2x_{ij} + b_3x_{ij} + b_4x_{ij} + b_5x_{ij} + b_6x_{ij} + b_7x_{ij} + b_8x_{ij} + b_9x_{ij} + b_{10}x_{ij} + b_{11}x_{ij} + b_{12}x_{ij} + b_{13}x_{ij} + b_{14}x_{14j} + b_{15}x_{15j} + b_{16}x_{ij} + u_j + e_{ij}$$

y_{ij} (GCSE attainment of pupil in school) = b_{0j} (constant/intercept) + b_1x_{ij} (FSME) + b_2x_{ij} (housing tenure) + b_3x_{ij} (property value) + b_4x_{ij} (mother's education) + b_5x_{ij} (father's education) + b_6x_{ij} (mother's occupation) + b_7x_{ij} (father's occupation) + b_8x_{ij} (NI-MDM income) + + b_9x_{ij} (religion) + $b_{10}x_{ij}$ (gender) + $b_{11}x_{ij}$ (cohort control) + $b_{12}x_{ij}$ (no mother data) + $b_{13}x_{ij}$ (no father data) + $b_{14}x_{14j}$ (school type) + $b_{15}x_{15j}$ (school management structure) + $b_{16}x_{ij}$ (interaction term) + u_j (school level residual error) + e_{ij} (pupil level residual error)

In summary, the interaction terms considered in separate models were between the following factors: gender and religion; gender and FSME; religion and FSME; gender, religion and FSME; gender and mother's education; gender and father's education; gender and school type; religion and school type (two interaction terms: Catholic and grammar, and other religion and grammar), and FSME and school type. Tables of these models are provided in Appendix B (Tables 2-6), but only for the interaction terms that were statistically significant in analysis (gender and religion; gender and father's education; gender and school type; other religion and school type, and FSME and school type).

3.12 Effect sizes

The output of the multilevel models included unstandardized beta coefficients and p values. The regression coefficients (unstandardized beta) in the models reflected the mean GCSE score difference between groups when all other variables in the model were held constant. However, effect sizes were calculated to standardise the effects

and to add a degree of interpretability to the models. Effect sizes ensured that readers could easily compare the effects observed in this thesis with effects reported across other studies. This process is supported by Coe (2002), who notes that effect sizes provide a method of quantifying the extent of the difference between two groups, with Field (2009) adding that it provides an objective and standardised measure of the effect magnitude.

The focus upon statistical significance (p value) has been criticised mainly for its dependence upon sample size and effect size (Sullivan and Feinn, 2012; Coe, 2002). As a result, it can lead to the potential issue of a large sample size reflecting statistically significant results, even when the relationship between variables may be weak or meaningless (Tabachnick and Fidell, 2013; Sullivan and Feinn, 2012; Coe, 2002). This is particularly relevant to this thesis which reflects a large sample size of 61,373 pupils. The focus upon statistical significance (p value) can also lead to the potential issue of a large coefficient being statistically significant despite being tested against a small sample size (Coe, 2002). In contrast, effect sizes are independent of sample size (Sullivan and Feinn, 2012). Coe (2002) subsequently emphasised the importance of focusing upon effect sizes rather than the statistical significance, as it provides a more robust and scientific approach to knowledge creation. Overall, statistical significance reflects an association between variables, but effect sizes reflect the strength and magnitude of such, whilst also allowing for comparisons amongst studies and other variables (Tabachnick and Fidell, 2013; Sullivan and Feinn, 2012). Although statistical significance allows inferences to be made from the sample to the wider population, when the sample are population data, it somewhat renders statistical significance testing as null. This is a result of the standard errors often being too small for the beta coefficient, meaning the p values are also small and often statistically significant. However, despite this study using population data of three Year 12 cohorts, the above was not an issue as multilevel modelling ensured the estimated effects were accurate and effect sizes (Cohen's *d*) could be calculated from the model output. Effect sizes present effects on a standardised scale that is understood regardless of how the dependent variable is measured (Lakens, 2013). Reporting only the p values of a study is therefore not enough to understand the extent of reported effects (Sullivan and Feinn, 2012). Lakens (2013) suggests that effect sizes therefore provide an opportunity

to highlight the practical significance of results for daily life, rather than only their significance within a study.

In education, Cohen's *d* is often used to report the standardised mean difference of an effect between groups, when controlling for the contribution of other variables included in the model. Cohen's *d* therefore allows studies to be compared even if the dependent variables of studies are measured differently (Lakens, 2013). Cohen's *d* is often interpreted according to the guidelines of Cohen (1988), which highlight effect sizes as small ($d = 0.2$), medium ($d = 0.5$) and large ($d = 0.8$). Von Secker and Lissitz (1999) suggest similar guidelines of small ($d = 0.1 – 0.3$), medium ($d = 0.3 – 0.5$) and large ($d = 0.5$ or above). Despite the guidelines used, there should be a level of fluidity in interpreting Cohen's *d*, as in practice, small effect sizes can have a large impact (Lakens, 2013). Hedges (2008) highlights the importance of reporting effect sizes such as Cohen's *d* with a level of detail that would allow their replication. Hedges (2008) suggests this as there are different ways Cohen's *d* can be calculated which do not lead to the same value. It is subsequently recommended that effect sizes are reported with a measure of its uncertainty such as confidence intervals, which provide a range of values that the true effect size is most likely to be placed within (Hedges, 2008). Coe (2002) adds that confidence intervals are a more effective reporting mechanism than p values as they maintain a focus on the effect size.

Building upon Hedges (2008) who highlighted there were different ways of calculating Cohen's *d*, the following paragraphs in this section outline the method used to calculate the effect sizes of Cohen's *d* in this study. Abadie et al., (2017) discuss when it is appropriate to adjust standard errors for clustering to calculate effect sizes (through the computation of the standard deviation (SD) for each variable from the standard error (SE) of the coefficient from the null model). Abadie et al., (2017) forward that clustering is important to consider when: data are sampled from a larger pool (population) of data and there might be missing clusters from the sample, and/or, clusters have been allocated to intervention or control conditions. In this thesis, neither of the above are relevant as data were provided for the whole pupil population through the Census, School Leavers Survey and School Census. From the discussions of Abadie et al., (2017), it can be concluded that in this study, it was not appropriate to adjust the standard errors to account for clustering. This affirms the use of standard

deviations from the raw data for effect size calculations. This may lead to the question: why use multilevel modelling if clustering was not an issue. However, multilevel modelling was still an important method to use in this thesis to ensure the coefficients were accurately estimated and to allow for an accurate examination of the partitioning of unexplained variance at the pupil and school level. It is important to emphasise that the effects discussed in the remaining chapters (four and five) refer to within model effects based on the executed analysis.

Within multilevel models, effect sizes are defined as the "standard deviation change in the dependent variable associated with one standard deviation change in an independent variable" (Von Secker and Lissitiz, 1999, p.1118). Cohen's *d* was calculated for the models using the following formulae:

1. $d = \frac{M_1 - M_2}{SD\ pooled}$

2. SD pooled = $\sqrt{\frac{SD^2_1 + SD^2_2}{2}}$

3.13 Ethical considerations

As this thesis used secondary data analysis as its source and method to examine the influence of pupil level socio-demographics and school factors on GCSE attainment in Northern Ireland, there were no major ethical issues associated with this study. In relation to using administrative data for analysis, the key concern is the privacy of those whose data is linked (Connelly et al., 2016). The dataset was anonymised to ensure individuals, households and schools could not be identified in analysis. This ensured individuals' privacy was not compromised through the researcher's use of the administrative data. To overcome the challenges faced in using administrative data, the researcher worked within a strict set of conditions when conducting analysis that are outlined below. For the matching of the three data sources (Census, School Leavers Survey and School Census), ethical approval was sought and gained from the School of Medicine, Dentistry and Biomedical Sciences Research Ethics Committee at Queen's University Belfast in March 2016, following the approval of the data matching proposal from the ADRN Approvals Panel in January 2016. Later ethical

approval was also sought from the School of Social Sciences, Education and Social Work at Queen's University Belfast for this specific PhD project (see Appendix B for ethical approval letters).

Although there are no major ethical issues associated with secondary data analysis when the data is anonymised, the rigorous procedures and standards put in place by the ADRN and NISRA minimised any concerns or issues. Before analysis begun, two sets of requirements were met, one from the ADRN and the other from NISRA. The ADRN required the researcher to gain an Accredited Researcher Status that was compulsory before data could be accessed in the secure environment within NISRA. This was to ensure the researcher had the experience, professionalism and adequate skills to use the data appropriately, whilst also ensuring they were affiliated with an academic institution, government or research body. Secondly, the ADRN required researchers to complete and pass an assessment during a one day Safe User of Research data Environment (SURE) training course that outlined the appropriate use of data within the secure environment, the legislation surrounding the use of administrative data for research purposes and how a researcher can handle data safely and responsibility in line with the legislation (ADRN, 2017). In addition, NISRA required the researcher to submit an Approved Researcher Status application for approval before access to the data was provided. Security clearance was also required by NISRA through an Access NI check. An institutional guarantor from Queen's University Belfast, the academic institution in which the researcher was affiliated with, was also a requirement from NISRA.

Once approval was granted to the researcher, all data cleaning, statistical tests and analysis were executed within the secure environment of NISRA. To minimise any potential issues of disclosure or data removal from the setting, personal computers, phones and note taking materials were prohibited in the secure environment. All personal items, including those outlined above were stored in a locker in the secure room and could only be used when outside the setting.

Relating to the content of the SURE training, when analysis had taken place and the researcher wished to take work out of the secure environment, cell values of less than 10 were not approved to leave the secure environment as they were below the acceptable threshold outlined by NISRA. As a result, no analyses included in this

thesis have cell values of less than 10. This was to minimise any potential issues of disclosure through low values in analysis. As a result, all data that was used in analysis was non-disclosive and no data which are identifiable to any pupil or school were shared. All output of analysis that the researcher wished to remove from the secure environment was approved by the RSU staff in NISRA. Analytical output was approved at two levels: intermediate (approved by one RSU staff member) and final (approved by two RSU staff members). Intermediate outputs were only approved to be shared with other approved researchers on the project (such as the researcher's supervisory team), whilst final outputs were approved to be shared with those external to the project (such as at conferences, seminars and publications). This process ensured the ethical requirements, anonymity and safe handling of the administrative data were all met, therefore reducing any ethical issues that may have been apparent in this study.

3.14 Overall Summary and Conclusion

This chapter has outlined the data and methods that were used to conduct statistical analysis into GCSE attainment trends in Northern Ireland. This chapter highlighted the structure of the linked administrative dataset that was the first in Northern Ireland to combine the Census (2011), School Leavers Survey and School Census. The structure of the data was a key strength to this study as it provided an opportunity for an in-depth exploration into post-primary attainment trends with factors that had not previously been available for analysis in Northern Ireland. This chapter discussed the research aims, questions and hypotheses of this thesis which were structured according to the hierarchal nature of the data. The aims, questions and hypotheses of this thesis also reflected its key focus of socio-economic status, religious affiliation, gender and school type effects on post-primary attainment. This study reflected no major ethical issues due to the anonymity of the data and the rigorous procedures in place from the ADRN and NISRA that the researcher adhered to throughout the execution of analysis and the write up of this study. As highlighted, the researcher undertook training, gained an Approved Researcher Status and conducted all analysis within the secure environment of NISRA. All analysis that is presented in this thesis has subsequently been approved by two staff members of the RSU at NISRA, ensuring the ethical requirements, anonymity and safe handling of the administrative data were met.

As the data used for analysis reflected a hierarchical structure of pupils being clustered within schools, multilevel modelling was the most appropriate method to use for analysis. Multilevel modelling is an advanced statistical technique which allows accurate inferences to be made at more than one level. It allows the differences in the dependent variable (GCSE attainment) to be separated according to individual (pupil level) and group (school level) effects. This method therefore provides a more accurate and in-depth understanding of GCSE attainment differences within one model, whilst also accounting for the interconnections of cases at different levels. The data analysis approach of this thesis reflected a building block structure with each model building upon the previous model to provide a more in-depth understanding of GCSE attainment trends in Northern Ireland. Interaction models were also a key component of analysis within this study, contributing to the originality of the research and its ability to effectively inform wider discourse in the field. To ensure the results of this thesis were interpretable in relation to other research, effect sizes were calculated as part of the analytical strategy. Cohen's *d* was calculated for all categorical variables within the executed models to increase the interpretability of the analysis and to standardise the results. All effect sizes discussed in Chapter Four and Chapter Five therefore refer to within model effects of variables. Throughout all analysis, the dependent variable used was a pupil's GCSE score that measured the quantity and quality of GCSEs achieved from grades A*-U. This attainment indicator provided a measure of attainment that reflected its natural continuum. The next chapter outlines how the methodology was executed in analysis through the presentation of results.

Chapter Four: Results

4.1 Introduction

This chapter outlines the analysis conducted to examine the influence of pupil level socio-demographics and school factors on GCSE attainment in Northern Ireland. The chapter begins with an overview of the descriptive analyses conducted on the dependent and independent variables. The descriptive statistics reported consist of frequencies (N and %), mean GCSE attainment, standard deviations and cross-tabulations. It should be re-emphasised that in line with the regulations outlined by NISRA, cell values of less than 10 in analysis were not approved to leave the secure environment and were subsequently not provided in this study. As a result, all data that were used in analysis was non-disclosive and no data which were identifiable to any pupil or school was shared. Following the descriptive analyses of the dependent and independent variables, this chapter presents the results of the multilevel models that examined the predictors of pupils' overall GCSE score. The executed multilevel models discussed in this chapter are: a null model, a SES model, a full model with pupil level and school level factors, a full model split by pupils' gender and interaction models. In the multilevel models, beta values (β), standard errors (SE), statistical significance, Cohen's *d* and 95% confidence intervals are presented. Cohen's *d* was not calculated in any model for the constant or the independent variable of NI-MDM 2010 (income). As these variables were continuous, it did not make conceptual sense to calculate Cohen's *d* which examined the comparison of two means within a variable. Based on the guidelines outlined by Von Secker and Lissitz (1999), Cohen's *d* is interpreted throughout as small ($d = 0.1 – 0.3$), medium ($d = 0.3 – 0.5$) and large ($d =$ 0.5 or above). It is important to highlight that when interpreting the results, the effects (Cohen's *d*) discussed in this chapter refer to within model effects. Multilevel models were executed using different constructions of the dependent variable: overall GCSE score, GCSE English score, GCSE mathematics score and GCSE/Equivalents A*-G. Across the attainment measures, the effect direction, magnitude and statistical significance of the independent variables were relatively consistent. For this reason, the current chapter focuses upon reporting overall GCSE score. The multilevel models executed for the remaining attainment measures are presented in Appendix C (Tables 17-19).

4.2 Descriptive analysis of predictor variables

The computation of the dependent and independent variables used in analysis were outlined in Chapter Three. This section provides the descriptive analyses of the dependent and independent variables used in the multilevel models.

4.2.1 Dependent variable: Overall GCSE Score

As highlighted in Chapter Three (Section 3.6.2), this attainment measure was computed by assigning each grade a number from 9 to 1. The highest grade (A*) received the highest score (9) and the lowest grade (U) received the lowest score (1). The individual grade variables were multiplied with their corresponding score to provide a total GCSE score achieved by pupils. This score also reflected the quantity and quality of GCSEs on a continuous scale. In this variable, there were no missing cases, however some pupils achieved a score of 0. When this was queried with the Department of Education, they responded to say that a potential explanation for a score of 0 was that pupils may not have sat any exams, meaning they achieved no grades.

Table 9 outlines the mean GCSE scores across cohorts. The mean score difference between cohorts was marginal. This is evident by Cohort 2 marginally having the highest mean score (mean= 52.19, SD=22.90), closely followed by Cohort 3 (mean=51.62, SD=23.75) and Cohort 1 (mean=51.45 SD=23.45). Large standard deviation values were evident across the three cohorts suggesting the differences in the mean attainment scores were unlikely to be of statistical significance. The large standard deviations also suggest a non-normal distribution. There was a slight variation in the range of GCSE scores across cohorts. However, to align with procedures outlined by NISRA, these values cannot be presented. To contextualise the mean GCSE scores gained in each cohort (Table 9), the mean number of GCSEs A*-U achieved by each is provided in Table 10. Similarly, in accordance with NISRA guidelines, the range of GCSEs A*-U achieved is not provided. Table 10 highlights that across the cohorts, the mean GCSE scores equate to just below eight GCSEs A*-U.

Table 9: Mean GCSE score in each cohort

	Frequency of pupils (N and %)	Mean score	Standard deviation
Cohort 1 (2010/2011)	21,048 100%	51.45	23.45
Cohort 2 (2011/2012)	20,551 100%	52.19	22.90
Cohort 3 (2012/2013)	19,774 100%	51.62	23.75

Table 10: Mean number of GCSEs (A*-U) achieved in each cohort

	Frequency of pupils (N and %)	Mean number of GCSEs (A*-U)	Standard deviation
Cohort 1 (2010/2011)	21,048 100%	7.83	2.52
Cohort 2 (2011/2012)	20,551 100%	7.95	2.50
Cohort 3 (2012/2013)	19,774 100%	7.76	2.60

4.2.2 Independent Variables

A total of twelve predictor variables were included in the multilevel models; ten at the individual (pupil) level and two at the school level. At the individual level, eight SES measures were included in analysis: FSME, housing tenure, property value, mothers' qualifications, fathers' qualifications, mothers' occupation, fathers' occupation and NI-MDM (2010) for income. Religious affiliation and gender were also included as predictor variables at the individual level. The school level variables consisted of school type (grammar/non-grammar) and school management structure. Control variables were also included in analysis for: cohort; other housing tenure; no property value; no mother data; no father data; no stated religion and other maintained school management structure. The computation of these variables was discussed in Chapter Three. The descriptive analyses of the independent variables are discussed below. In the following section, the number of GCSEs A*-C achieved is reported in-text. This is to provide interpretable attainment rates according to the predictor variables. The

mean GCSE scores of pupils according to each predictor variable are provided in Appendix C.

4.2.3 Socio-Economic Status

4.2.3.1 Free School Meal Entitlement

In each cohort, over 80% of pupils were not entitled to free school meals, whilst around 18% were entitled to free school meals (Appendix C, Table 1). Across cohorts, those entitled to free school meals had lower GCSE attainment than their non-entitled peers. The difference in attainment between those entitled and not entitled to free school meals was approximately three GCSEs A*-C. In each cohort, those not entitled to free school meals achieved just below 7 GCSEs A*-C (SD=3.44 in Cohort 1, SD=3.37 in Cohort 2 and SD=3.41 in Cohort 3), whilst those entitled to free school meals achieved just below 4 GCSEs A*-C (SD=3.60 in Cohort 1, SD=3.53 in Cohort 2 and SD=3.56 in Cohort 3).

4.2.3.2 Housing Tenure

Housing tenure was recoded into four categories for analysis: privately owned, private rental, rented from the Northern Ireland Housing Association/Executive and other (comprised of shared ownership, living rent free and living in a communal establishment). Most pupils resided in privately owned property in each cohort (76.8% in Cohort 1, 76.0% in Cohort 2 and 75.8% in Cohort 3). Around 12% of each cohort resided in property rented from the Northern Ireland Housing Association/Housing Executive, whilst around 10% of each cohort resided in privately rented property. The lowest proportion (over 1%) of pupils in each cohort were categorised into 'other'. Subsequently, this category was controlled for in analysis. Housing tenure held a positive relationship with GCSE attainment. Those living in privately owned households had the highest attainment mean of around 7 GCSEs (A*-C) in each cohort (SD=3.37 in Cohort 1, SD=3.28 in Cohort 2 and SD=3.34 in Cohort 3). Pupils residing in privately rented property had a mean of around 4.5 GCSEs in all three cohorts (SD=3.56 for Cohort 1, SD=3.59 in Cohort 2 and SD=3.68 in Cohort 3), whilst those living in property rented from the Northern Ireland Housing Association/Housing Executive had the lowest mean of over 3 GCSEs in all three cohorts (SD=3.44 in Cohort 1, SD=3.38 in Cohort 2 and SD=3.45 in Cohort 3) (Appendix C, Table 2).

4.2.3.3 Property Value

Property value was provided by the Land and Property Service who granted permission for the Census to link property value to individual cases. This variable was originally provided in ten decile bands, however, for analysis it was recoded into four larger bands (less than or equal to £100,000, £101-150,000, £151-200,000 and more than £200,000). In addition, a category of 'no value provided' was included in the variable to control for pupils that this information was not available for. This category accounted for the lowest proportion of pupils in each cohort (just below 4%). In all cohorts, the highest proportion of pupils (34% in each cohort) resided in property valued between £101,000 and £150,000. Around 18% in each cohort resided in property valued at £100,000 or less, whilst around 22% in each cohort resided in property valued between £151,000-£200,000 and over £200,000, respectively. Across all three cohorts, a positive relationship between property value and GCSE attainment was apparent. Pupils residing in higher valued property achieved a greater number of GCSEs A*-C. Those residing in property valued at over £200,000 had the highest mean of around 8 GCSEs A*-C (SD=2.86 in Cohort 1, SD=2.75 in Cohort 2 and SD=2.77 in Cohort 3), whilst pupils residing in property worth £100,000 or less had the lowest mean of over 4 GCSEs A*-C (SD=3.74 in Cohort 1, SD=3.73 in Cohort 2 and SD=3.78 in Cohort 3) (Appendix C, Table 3).

4.2.3.4 Parental Data (Mothers and Fathers)

The variables of mothers' highest education qualification, fathers' highest education qualification, mothers' occupational status and fathers' occupational status were created and included in analysis. However, maternal and/or paternal data was not available for all pupils. Parental data was only provided for those pupils who lived in the same household as their mother/father, respectively. This is due to the structure of the Census which only collects information on those living in the same household. Therefore, if a pupil does not live in the same household as their mother/father, data for this parent will not have been provided or linked to a pupil. To deal with missing cases in these parental variables, two control variables were computed: no maternal data and no paternal data. These variables ensured pupils with individual and school

level data were not excluded from analysis because their parents' data were not available.

The proportion of pupils with no maternal data were consistent across all three cohorts. In Cohort 1, no maternal data were provided for 6.1% of pupils (n=1,290 out of 21,048). In Cohort 2, no maternal data were provided for 6.0% of pupils (n=1,225 out of 20,551), whilst in Cohort 3, no maternal data were provided for 5.5% of pupils (n=1,080 out of 19,774) (Appendix C, Table 4). When comparing no maternal and no paternal data rates, higher proportions of pupils had no paternal data. In Cohort 1, no paternal data were provided for 30.8% of pupils (n=6,489 out of 21,048). In Cohort 2, a similar rate of 31.1% pupils had no paternal data (n=6,403 out of 20,551), whilst in Cohort 3, no paternal data were provided for 31.3% of pupils (n=6,184 out of 19,774) (Appendix C, Table 5). Across all three cohorts, 2.1% of pupils had no mother or father living in the same household as themselves (n=1,301 out of 61,373), and subsequently no maternal or paternal data were available for this proportion of pupils (Appendix C, Table 6).

4.2.3.5 Parental Education (Mothers and Fathers)

Mothers' and fathers' education qualifications were provided separately and were recoded into four categories from the original eight categories. The recoded categories were: degree (all levels) or equivalent (labelled as degree level qualifications in the executed multilevel models), apprenticeship/vocational/work related qualifications (labelled as other qualifications in the executed multilevel models), school level qualifications and no professional/academic qualifications (labelled as no qualifications in the executed multilevel models).

Across all cohorts, around one quarter of mothers held degree level qualifications, just below half of mothers had school level qualifications, around 3% held an apprenticeship/vocational (other) qualification and under one fifth had no qualifications. As outlined above (Section 4.2.3.4), for around 6% of pupils in each cohort, no maternal data were provided. A positive relationship was evident between higher maternal qualifications and GCSE attainment. In all cohorts, pupils with degree level qualified mothers had the highest attainment of just over 8 GCSEs A*-C

(SD=2.87 in Cohort 1, SD=2.72 in Cohort 2 and SD=2.78 in Cohort 3). Pupils with mothers who held school level qualifications achieved over 6 GCSEs A*-C (SD=3.44 in Cohort 1, SD=3.42 in Cohort 2 and SD=3.49 in Cohort 3), whilst those with mothers who held an apprenticeship/vocational qualification achieved over 5 GCSEs A*-C (SD=3.58 in Cohort 1, SD=3.52 in Cohort 2 and SD=3.71 in Cohort 3). Pupils with mothers who had no qualifications had the lowest attainment of around 4 GCSEs A*-C (SD=3.61 in Cohort 1, SD=3.56 in Cohort 2 and Cohort 3). (Appendix C, Table 7).

When considering fathers' education across cohorts, just below one fifth of fathers had degree level qualifications, around one quarter of fathers held school level qualifications, around 10% held apprenticeship/vocational (other) qualifications and 14-16% held no qualifications. As outlined in Section 4.2.3.4, for around 30% of pupils in each cohort, no paternal data were provided. A positive relationship was evident between higher paternal qualifications and GCSE attainment. In all three cohorts, those pupils with fathers holding degree level qualifications achieved the highest mean of 8.5 GCSEs A*-C (SD=2.58 in Cohort 1, SD=2.53 in Cohort 2 and Cohort 3). Pupils with a father who held school level qualifications achieved a mean of around 6.9 GCSEs A*-C in all three cohorts (SD=3.28 in Cohort 1, SD=3.20 in Cohort 2 and SD=3.30 in Cohort 3), whilst pupils whose fathers had apprenticeship/vocational qualifications had similar attainment rates of around 6.5 GCSEs A*-C (SD=3.38 in Cohort 1, SD=3.35 in Cohort 2 and SD=3.37 in Cohort 3). Pupils whose fathers had no qualifications achieved the lowest mean of over 5 GCSEs A*-C (SD=3.60 in Cohort 1 and Cohort 2, SD=3.63 in Cohort 3) (Appendix C, Table 8).

4.2.3.6 Parental Occupation (Mothers and Fathers)

Mothers' and fathers' occupation status were examined according to the NS-SEC. The original variables consisted of 39 values ranging from routine occupations to higher professional occupations. For analysis, the variables were recoded into four categories following the ONS (2010) guidelines of: professional occupations, intermediate occupations, routine occupations and unemployed.

In each cohort, around one quarter of mothers held professional occupations, over one quarter held intermediate occupations, around one third held routine occupations and just below 9% were unemployed. As outlined in Section 4.2.3.4, for around 6% of pupils in each cohort, no maternal data were provided. When considering GCSE attainment according to a mother's occupation, a positive relationship between higher occupational status and higher attainment was apparent. Across the cohorts, those pupils whose mothers held professional occupations achieved the highest mean of just below 8 GCSEs A*-C (SD=3.02 in Cohort 1, SD=2.92 in Cohort 2 and SD=3.01 in Cohort 3). Pupils with mothers in intermediate occupations achieved just over 7 GCSEs A*-C (SD=3.26 in Cohort 1, SD=3.18 in Cohort 2 and SD=3.24 in Cohort 3), whilst pupils with mothers in routine occupations achieved over 5 GCSEs A*-C (SD=3.61 in Cohort 1, SD=3.59 in Cohort 2 and SD=3.64 in Cohort 3). Those with mothers who were unemployed had the lowest mean of around 4 GCSEs A*-C (SD=3.73 in Cohort 1, SD=3.67 in Cohort 2 and SD=3.69 in Cohort 3). (Appendix C, Table 9).

When considering fathers' occupational status in each cohort, just below one fifth held professional occupations, around one quarter held intermediate occupations, 22% held routine occupations and around 3% were unemployed. As outlined above (Section 4.2.3.4), for around 30% of pupils in each cohort, no paternal data were provided. A positive relationship between higher paternal occupational status and GCSE attainment was apparent. Across the cohorts, pupils whose fathers held professional occupations achieved the highest mean of around 8 GCSEs A*-C (SD=2.85 in Cohort 1, SD=2.79 in Cohort 2 and SD=2.74 in Cohort 3). Pupils with fathers in intermediate occupations achieved just over 7 GCSEs A*-C (SD=3.23 in Cohort 1, SD=3.15 in Cohort 2 and SD=3.24 in Cohort 3), whilst pupils with fathers in routine occupations had a mean of below 6 GCSEs A*-C (SD=3.51 in Cohort 1, SD=3.50 in Cohort 2 and SD=3.57 in Cohort 3). Those with fathers who were unemployed had the lowest attainment of around 5 GCSEs A*-C (SD=3.74 in Cohort 1, SD=3.79 in Cohort 2 and SD=3.77 in Cohort 3) (Appendix C, Table 10). The descriptive analyses of maternal and paternal occupational status reflect similar trends in the GCSE attainment patterns of pupils accordingly.

4.2.3.7 Northern Ireland Multiple Deprivation Measure

The NI-MDM 2010 replaced the NI-MDM 2005 as the official measure of spatial deprivation in Northern Ireland. The income domain identified the proportion of the population experiencing income deprivation. Across all cohorts, there was a positive relationship between the mean number of GCSEs achieved at grades A*-C and residing in the least deprived deciles. In all cohorts, pupils residing in the most deprived decile (1) had the lowest attainment of over 4 GCSEs A*-C (SD=3.70 in Cohort 1, SD=3.63 in Cohort 2 and SD=3.69 in Cohort 3), whilst those in the least deprived decile (10) had the highest attainment of just below 8 GCSEs A*-C (SD=3.02 in Cohort 1, SD=2.96 in Cohort 2 and SD=2.97 in Cohort 3) (Appendix C, Table 11).

4.2.4 Religion

Religion was computed into five categories for analysis: Catholic, Protestant, other religion, no religion and not stated. As this question was not compulsory in the Census, the category of 'not stated' referred to respondents who did not provide a valid answer. This category accounted for the lowest proportion of pupils in each cohort (just below 6%) and was controlled for within analysis. The highest proportion of pupils in all three cohorts affiliated with Catholicism (45.1%, 45.6% and 44.1%, respectively), whilst affiliation with Protestantism was second highest (33.8%, 33.9% and 35.1%, respectively). Those affiliating with other religions accounted for just over 6% of each cohort, whilst those affiliating with no religion accounted for over 8% of each cohort. In Cohort 1, other religion and Catholic pupils had the highest attainment means of 6.64 GCSEs A*-C (SD=3.49) and 6.62 GCSEs A*-C (SD=3.57), respectively. In Cohort 2 and Cohort 3, those affiliating with other religions had the highest GCSE attainment means (mean=6.92, SD=3.34 and mean=6.73, SD=3.37, respectively). Protestant pupils had a mean of around 6 GCSEs A*-C in each cohort (SD=3.63 in Cohort 1 and SD=3.62 in Cohorts 2 and 3), whilst those affiliating with no religion had a mean of over 6 GCSEs A*-C in each cohort (SD=3.56 in Cohort 1, SD=3.60 in Cohort 2 and SD=3.61 in Cohort 3) (Appendix C, Table 12).

4.2.5 Gender

The distribution of pupils according to gender was evenly distributed across all three cohorts. Female pupils reflected a higher attainment mean of just below 7 GCSEs A*-

C in all three cohorts (SD=3.46 in Cohort 1, SD=3.40 in Cohort 2 and SD=3.48 in Cohort 3), compared to their male peers who achieved just below 6 GCSEs A*-C (SD=3.74 in Cohort 1, SD=3.67 in Cohort 2 and SD=3.72 in Cohort 3) (Appendix C, Table 13).

4.2.6 School Type

The binary variable of school type indicated whether a post-primary school was grammar or non-grammar. Overall, there were 217 post-primary schools included in the dataset. In the data, there was a consistently higher number of non-grammar schools in Northern Ireland. Non-grammar schools accounted for approximately 69% of post-primary schools in the data, whilst grammar schools accounted for around 31%. The difference in the proportion of grammar and non-grammar schools in Northern Ireland subsequently resulted in a higher number of pupils across all cohorts attending non-grammar schools. Around 60% of pupils in each cohort attended non-grammar schools, whilst approximately 40% attended grammar schools. Across cohorts, the difference in attainment was consistently in favour of grammar schools. Grammar school pupils reflected a mean of around 9 GCSEs A*-C (SD=1.89 in Cohort 1, SD=1.80 in Cohort 2 and SD=1.72 in Cohort 3), whilst non-grammar pupils achieved over 4 GCSEs A*-C (SD=3.38 in Cohort 1, SD=3.34 in Cohort 2 and SD=3.46 in Cohort 3) (Appendix C, Table 14).

4.2.7 School Management Structure

School management structure was recoded into five categories for analysis: controlled, Catholic maintained, integrated, voluntary and other maintained. Other maintained was controlled for in analysis as it was not of key interest to the study aims or focus. A school level frequency was not provided for this variable due to low cell counts under some management structures in the data. Consequently, a pupil level frequency was not provided for this variable due to the potential of identifying which school management structures had a small number of schools. However, it should be acknowledged that there were no missing cases in this variable at either the school or pupil level. Table 15 in Appendix C therefore only provides the mean GCSE attainment (A*-C and GCSE score) of pupils attending different school management structures.

In all three cohorts, voluntary schools had the highest mean attainment of 9 GCSEs A*-C (SD=1.86 in Cohort 1, SD=1.78 in Cohort 2 and SD=1.67 in Cohort 3). Controlled schools had a mean attainment rate of 5.28 GCSEs A*-C (SD=3.67) in Cohort 1, and 5.42 GCSEs A*-C (SD=3.68) in Cohort 2 and Cohort 3, respectively. In addition, those attending Catholic maintained schools achieved just below 5 GCSEs A*-C in each cohort (SD=3.46 in Cohort 1, SD=3.38 in Cohort 2 and SD=3.51 in Cohort 3), whilst pupils attending integrated schools also had a mean of below 5 GCSEs A*-C (SD=3.31 in Cohort 1, SD=3.20 in Cohort 2 and SD=3.36 in Cohort 3) (Appendix C, Table 15). The higher attainment of voluntary schools was likely to be a result of a higher proportion of grammar schools affiliating with this structure, compared to other management structures that encompass a greater number of non-grammar schools.

4.2.7.1 Does school management structure provide a school level proxy for religion?

As highlighted in Chapter Two, within the selective education system, schools in Northern Ireland are divided by religion according to their management structure. This raises the question of whether school management structure provides a school level proxy for a pupil's religion. To discuss this argument, the descriptive statistics for the school management structures of controlled and Catholic maintained, along with pupils' religious affiliation were examined (Appendix C, Table 16). Voluntary, integrated and other maintained school management structures were excluded from this discussion as they were not a key focus in answering the above question.

In each cohort, the highest proportion of pupils attending Catholic maintained schools affiliated with Catholicism (89.2%, 89.9% and 89.4%, respectively), whilst the highest proportion of pupils attending controlled schools affiliated with Protestantism (67.7%, 67.3% and 68.7%, respectively) (Appendix C, Table 16). With the highest proportion of pupils attending Catholic maintained schools affiliating with Catholicism and the highest proportion of pupils attending controlled schools affiliating with Protestantism, it is understood why school management structure is viewed as a school level proxy for religion. However, it is a deterministic argument to view school management structure as a proxy of a pupil's religion as religious affiliation and school management structure are not mutually exclusive (Appendix C, Table 16). The

descriptive statistics from the data used in this study would therefore suggest the school management structures of controlled and Catholic maintained cannot be used as an exclusive school level proxy for a pupil's religion as more than one religion attends each school structure.

4.3 Multilevel Models

Overall, five multilevel models were executed to determine the influence of pupil level socio-demographics and school level factors on GCSE attainment. These were: the null model, socio-economic status model, full model, full model split by gender and interaction models. The executed analysis of this thesis can be viewed as a building block approach as each model builds upon the previous model. The models for the main outcome measure of GCSE score are discussed in this chapter. The full models for the remaining attainment measures (GCSE English score, GCSE mathematics score and GCSE/Equivalents A*-G) can be found in Appendix C (Tables 17-19). The effects discussed in relation to each model refer to within model effects. Subsequently, causation is not inferred by the presented results. This should be acknowledged when interpreting the findings. It is important to highlight that the constant value for each model is not included in the tables of this thesis. This was a requirement to adhere to the procedures outlined by NISRA.

4.3.1 Socio-economic status model

The SES model included eight socio-economic measures and a cohort control variable (Table 11). This model aimed to answer RQ1 and H1 of the study. Based upon the calculated effect sizes (*d*), the greatest effect evident in this model was having a mother with no qualifications (compared to a mother with a degree level qualification). Pupils whose mothers had no qualifications had lower GCSE scores than their peers whose mothers had a degree level qualification (β=-5.54, SE=0.26, p≤0.001, d=-0.26, 95% CI: -0.29, -0.24). Based on the β value, the attainment difference equated to pupils whose mothers had no qualifications achieving one less GCSE at grade D than pupils whose mother had a degree level qualification. The second greatest effect in the model was having a father with no qualifications. Pupils whose fathers had no qualifications also had lower GCSE scores than their peers whose fathers had a degree level qualification (β=-4.05, SE=0.27, p≤0.001, d=-0.20, 95% CI: -0.23, -0.17). The joint

third highest effects in the model was pupils entitled to FSM having lower GCSE scores than their non-entitled peers (β=-4.00, SE=0.21, p≤0.001, d=-0.18, 95% CI: -0.20, -0.16), and pupils residing in privately owned property having higher GCSE attainment than their peers living in housing rented from the Northern Ireland Housing Association/Executive (β=3.69, SE=0.25, p≤0.001, d=-0.18, 95% CI: 0.15, 0.20). The attainment differences according to having a father with no qualifications and FSME equated to achieving one less GCSE at grade E. However, the attainment difference according to living in a privately owned property equated to one additional GCSE at grade F. According to the guidelines outlined by Von Secker and Lissitz (1999) on interpreting Cohen's *d*, the above effects were small. However, as highlighted by Lakens (2013), small effect sizes can have a large impact in practice. Overall, the highest effects within the SES model highlighted the importance of parental qualifications, FSME and housing tenure on GCSE attainment.

Continuing the focus on parental education, the SES model reflected a positive relationship between higher parental qualifications (maternal and paternal) and GCSE score. For the remaining parental qualification categories, maternal and paternal qualifications had similar within model effects on pupils' GCSE score which will be discussed below. Pupils whose mothers held other qualifications had lower GCSE scores than pupils with mothers who had a degree level qualification (β=-3.35, SE=0.39, p≤0.001, d=-0.17, 95% CI: -0.21, -0.12). This difference was the equivalent to pupils whose mothers had other qualifications achieving one less GCSE at grade F. A similar effect was reported for pupils whose father had other qualifications, with the attainment difference equating to one less GCSE at grade G (β=-2.90, SE=0.28, p≤0.001, d=-0.15, 95% CI: -0.18, -0.12). Moreover, pupils whose mothers held school level qualifications had lower GCSE scores than their peers whose mothers held degree level qualifications (β=-2.06, SE=0.19, p≤0.001, d=-0.10, 95% CI: -0.12, -0.08). A similar effect within the model was also evident for pupils whose fathers had school level qualifications (β=-2.22, SE=0.22, p≤0.001, d=-0.11, 95% CI: -0.14, -0.09). The within model effect of having either a mother or father with school level qualifications was the equivalent to pupils achieving one less GCSE at grade G, compared to those who had a mother/father with a degree level qualification, respectively. When examining the magnitude of these Cohen's *d* values, the guidelines outlined by Von Secker and Lissitz (1999) suggest the above effects were small.

When considering parental occupational status, the greatest within model effect was pupils with an unemployed mother achieving lower GCSE scores than pupils whose mothers had a professional occupation (β=-2.75, SE=0.29, p≤0.001, d=-0.13, 95% CI: -0.16, -0.10). This attainment difference equated to pupils with an unemployed mother achieving one less GCSE at grade G. The effect of an unemployed father on a pupil's GCSE score was not statistically significant. The second highest within model effect of parental occupation was having a mother in a routine occupation. Pupils with mothers in a routine occupation had marginally lower GCSE scores than pupils with mothers in a professional occupation (β=-1.16, SE=0.20, p≤0.001, d=-0.05, 95% CI: -0.07, -0.03). The attainment difference equated to pupils with mothers in a routine occupation achieving one less GCSE at grade U than their peers whose mothers were in a professional occupation. Having a father in a routine occupation also had a negative but negligible effect on a pupil's GCSE score (β=-0.93, SE=0.23, p≤0.001, d=-0.04, 95% CI: -0.07, -0.02). When considering the attainment difference between pupils whose mother had an intermediate occupation and those with a professional occupation, the difference was not statistically significant. This was also apparent with fathers' occupational status.

The SES model also examined the effects of property factors on GCSE attainment through housing tenure and property value. As highlighted, based on the effect sizes (*d*), the joint third highest effect (with FSME) in this model was residing in a privately owned property (compared to a property rented from the Northern Ireland Housing Association/Executive). A positive relationship was apparent between pupils residing in a privately owned property and higher GCSE scores (β=3.69, SE=0.25, p≤0.001, d=0.18, 95% CI: 0.15, 0.20). The attainment difference equated to those living in privately owned property achieving one additional GCSE at grade F than those residing in property rented from the Northern Ireland Housing Association/Executive. In addition, pupils residing in privately rented property had higher GCSE scores than those living in property rented from the Northern Ireland Housing Association/Executive (β=0.75, SE=0.29, p≤0.001, d=0.03, 95% CI: -0.00004, 0.07). However, the magnitude of this effect within the model was negligible. Property value also reflected a positive relationship with GCSE scores. The greater the value of the property a pupil resided in, the higher their GCSE score. Those residing in property

worth £100,000 or less had lower scores than pupils residing in property worth more than £200,000 (β=-2.66, SE=0.24, p≤0.001, d=-0.12, 95% CI: -0.15, -0.10). The score difference was the equivalent to pupils residing in property worth £100,000 or less achieving one less GCSE at grade G. The lower scores of pupils residing in property valued between £101-£150,000 (β=-1.91, SE=0.20, p≤0.001, d=-0.09, 95% CI: -0.11, -0.07) (equivalent to achieving one less GCSE at grade U) and between £151-200,000 (β=-0.55, SE=0.20, p≤0.01, d=-0.03, 95% CI: -0.05, -0.003) were also apparent but to a lesser extent. Based on the effect magnitude within the model, the GCSE score difference between pupils residing in property valued between £101-£150,000 and more than £200,000 was marginal, whilst the attainment difference between pupils residing in property worth between £151-200,000 and more than £200,000 was negligible. The SES model also examined the effects of the NI-MDM for income which reflected a positive relationship with GCSE attainment. With a one decile increase in a pupil residing in a less deprived area (according to income), their overall GCSE score increased (β=0.16, SE=0.03, p≤0.001).

4.3.1.1 Relating back to research question

The SES model aimed to answer RQ1: *which socio-economic status factor has the greatest effect on GCSE attainment?* This model also tested H1 of the study: *free school meal entitlement will have the greatest effect on GCSE attainment.* The socio-economic status model only included socio-economic status predictors at the pupil level and a cohort control variable. To answer RQ1, based on the within model effects, this model found having a mother with no qualifications had the greatest effect on GCSE attainment. Pupils whose mothers had no qualifications had lower GCSE scores than their peers whose mothers had a degree level qualification. Moreover, within this model, a father with no qualifications had the second highest effect. Pupils whose fathers had no qualifications had lower GCSE scores than their peers whose fathers had a degree level qualification. The joint third highest effects in the model were FSME and residing in a privately owned property. Pupils entitled to FSM had lower GCSE scores than their non-entitled peers, whilst pupils residing in privately owned property had higher GCSE attainment than their peers in property rented from the Northern Ireland Housing Association/Executive. The socio-economic status model failed to confirm H1 of this thesis as having a mother with no education qualifications had a greater effect on GCSE attainment than FSME. Despite not confirming H1, the

socio-economic status model reflected the importance of parental qualifications, FSME and housing tenure when considering GCSE attainment in Northern Ireland.

Table 11: Socio-economic status multilevel model (in order of within model effect size)

Log likelihood = -256505.7			Number of pupils: 61,373 Number of schools: 217
Variable	**β (SE)**	**Cohen's d**	**95% Confidence Intervals**
Mother Education Qualifications: No Qualifications (reference: degree level qualification)	-5.54 (0.26)***	-0.26	-0.29 -0.24
Father Education Qualifications: No Qualifications (reference: degree level qualification)	-4.05 (0.27)***	-0.20	-0.23 -0.17
Free School Meal Entitlement (reference: not entitled)	-4.00 (0.21)***	-0.18	-0.20 -0.16
Housing Tenure: Privately Owned (reference: Rented from the Northern Ireland Housing Association/Executive)	3.69 (0.25)***	0.18	0.15 0.20
Mother Education Qualifications: Other Qualifications (reference: degree level qualification)	-3.35 (0.39)***	-0.17	-0.21 -0.12
Father Education Qualifications: Other Qualifications (reference: degree level qualification)	-2.90 (0.28)***	-0.15	-0.18 -0.12
Mother Occupation: Unemployed (reference: professional occupation)	-2.75 (0.29)***	-0.13	-0.16 -0.10
Property Value: ≤ £100,000 (reference: >£200,000)	-2.66 (0.24)***	-0.12	-0.15 -0.10
Father Education Qualifications: School Qualifications (reference: degree level qualification)	-2.22 (0.22)***	-0.11	-0.14 -0.09

Table 11 continued

Log likelihood = -256505.7			Number of pupils: 61,373 Number of schools: 217
Variable	**β (SE)**	**Cohen's d**	**95% Confidence Intervals**
Mother Education Qualifications: School Qualifications (reference: degree level qualification)	-2.06 (0.19)***	-0.10	-0.12 -0.08
Property Value: £101-£150,000 (reference: >£200,000)	-1.91 (0.20)***	-0.09	-0.11 -0.07
Mother Occupation: Routine (reference: professional occupation)	-1.16 (0.20)***	-0.05	-0.07 -0.03
Father Occupation: Routine (reference: professional occupation)	-0.93 (0.23)***	-0.04	-0.07 -0.02
Father Occupation: Unemployed (reference: professional occupation)	-0.82 (0.42)	-0.04	-0.09 0.01
Housing Tenure: Private Rental (reference: Rented from the Northern Ireland Housing Association/Executive)	0.75 (0.29)**	0.03	-0.00004 0.07
Property Value: £151-£200,000 (reference: >£200,000)	-0.55 (0.20)**	-0.03	-0.05 -0.003
Mother Occupation: Intermediate (reference: professional occupation)	0.14 (0.19)	0.01	-0.01 0.03
Father Occupation: Intermediate (reference: professional occupation)	-0.15 (0.21)	-0.01	-0.03 0.02

Table 11 continued

Log likelihood = -256505.7			Number of pupils: 61,373 Number of schools: 217
Variable	**β (SE)**	**Cohen's d**	**95% Confidence Intervals**
Controls			
Cohort 2 (reference: Cohort 1)	0.44 (0.15)**	0.01	-0.01 0.03
Cohort 3 (reference: Cohort 1)	0.25 (0.16)	0.01	-0.01 0.02
No mother data (reference: mother data provided)	-7.59 (0.31)***	-0.33	-0.36 -0.29
No father data (reference: father data provided)	-6.04 (0.24)***	-0.27	-0.29 -0.25
Housing tenure: other (reference: Rented from the Northern Ireland Housing Association/Executive)	1.17 (0.56)*	0.05	-0.01 0.12
Property value: none provided (reference: >£200,000)	-1.49 (0.36)***	-0.07	-0.12 -0.03
NI-MDM (Income)	0.16 (0.03)***		

****** p≤0.001, **p≤0.01, *p≤0.05***

Note: Cohen's d was not calculated for the independent variable of NI-MDM (income). This was a continuous variable and it did not make conceptual sense to calculate Cohen's d that is the comparison of two means.

4.3.2 Full Model

Building upon the socio-economic status model, the next stage of model building was to add the remaining factors of religion, gender, school type and school management structure. This model provided an opportunity to examine the effects of pupil level socio-demographics and school level factors on GCSE attainment. The full model also examined whether the effects of the socio-economic measures varied when other predictors were included in the model. This model aimed to fulfil RA1, RQ1, RQ2, and hypotheses 1-4 of the study. The following section examines each predictor variable in turn, beginning with the SES measures, followed by religion, gender, school type and school management structure. A summary of the factors with the greatest effects on GCSE attainment in the full multilevel model is then provided, followed by a discussion of how the full model answered the research questions (1 and 2) and hypotheses (1-4).

When considering the SES factors, pupils entitled to FSM had lower GCSE scores than their peers who were not entitled to FSM (β=-3.75, SE=0.21, p≤0.001, d=-0.17, 95% CI: -0.19, -0.15) (Table 12). The score difference equated to pupils entitled to FSM achieving one less GCSE at grade F than their non-entitled peers.

Table 12: Within model effect of Free School Meal Entitlement on GCSE score

Log likelihood = -255270.2			Number of pupils: 61,373 Number of schools: 217	
Variable	**β (SE)**	**Cohen's d**	**95% Confidence Intervals**	
Free School Meal Entitlement *(reference: not entitled to Free School Meals)*				
Entitled to Free School Meals	-3.75 (0.21)***	-0.17	-0.19	-0.15

****** p≤0.001, **p≤0.01, *p≤0.05***

A positive relationship between GCSE scores and housing tenure was evident (Table 13). Pupils residing in privately owned property (owned outright/with mortgage) had higher GCSE scores than their peers residing in property rented from the Northern

Ireland Housing Association/Executive (β=3.94, SE=0.25, p≤0.001, d=0.18, 95% CI: 0.16, 0.21). This score difference was the equivalent to pupils residing in privately owned property achieving one additional GCSE at grade F. To a lesser extent, a positive relationship between residing in privately rented property and higher GCSE scores was also reflected, however this effect was negligible within the model (β=0.80, SE=0.28, p≤0.01, d=0.03, 95% CI: 0.002, 0.07). Maintaining a focus on property variables, the greater the value of the property a pupil resided in, the higher their GCSE score (Table 13). Pupils residing in property worth £100,000 or less (β=-2.53, SE=0.24, p≤0.001, d=-0.12, 95% CI: -0.14, -0.09) (equivalent to achieving one less GCSE at grade G), between £101-£150,000 (β=-1.85, SE=0.20, p≤0.001, d=-0.09, 95% CI:-0.11, -0.06) (equivalent to achieving one less GCSE at grade U) and between £151-£200,000 (β=-0.54, SE=0.19, p≤0.01, d=-0.03, 95% CI: -0.05, -0.003), had lower GCSE scores than their peers residing in property worth more than £200,000. The magnitude of the above effects was small according to the guidelines outlined by Von Secker and Lissitz (1999). Moreover, the GCSE score difference between pupils residing in property valued between £101-£150,000 and more than £200,000 was marginal, whilst the latter score difference between pupils residing in property valued between £151-£200,000 and more than £200,000 was negligible.

Table 13: Within model effects of Housing Tenure and Property Value on GCSE Score

Log likelihood = -255270.2			Number of pupils: 61,373 Number of schools: 217
Variable	**β (SE)**	**Cohen's d**	**95% Confidence Intervals**
Housing Tenure *(reference: Rented from the Northern Ireland Housing Association/Executive)*			
Privately owned (outright/with mortgage)	3.94 (0.25)***	0.18	0.16 0.21
Privately rented	0.80 (0.28)**	0.03	0.002 0.07
Property Value *(reference: >£200,000)*			
≤ £100,000	-2.53 (0.24)***	-0.12	-0.14 -0.09
£101-£150,000	-1.85 (0.20)***	-0.09	-0.11 -0.06
£151-£200,000	-0.54 (0.19)**	-0.03	-0.05 -0.003

****** p≤0.001, **p≤0.01, *p≤0.05***

When considering parental status, mothers' and fathers' qualifications had a positive and statistically significant effect on a pupil's GCSE attainment within the full multilevel model (Table 14). For both maternal and paternal qualifications, a clear trend was apparent; the higher a parent's education qualifications, the higher a pupil's GCSE score. Pupils whose mothers had no qualifications had lower GCSE scores than their peers whose mothers had a degree level qualification (β=-5.71, SE=0.25, p≤0.001, d=-0.27, 95% CI: -0.29, -0.25). This score difference was the equivalent to pupils with a mother with no qualifications achieving one less GCSE at grade D. The same trend was apparent for pupils whose fathers had no qualifications but to a lesser extent. The score difference equated to these pupils achieving one less GCSE at grade E than their peers whose fathers had a degree level qualification (β=-4.12, SE=0.26, p≤0.001, d=-0.20, 95% CI: -0.23. -0.17). In addition, pupils whose mothers had other

qualifications had lower GCSE scores than their peers whose mothers had degree level qualifications (β=-3.40, SE=0.39, p≤0.001, d=-0.17, 95% CI: -0.22. -0.12). This score difference equated to pupils whose mothers had other qualifications achieving one less GCSE at grade F. This trend was also apparent when considering fathers with other qualifications but the score difference equated to achieving one less GCSE at grade G (β=-2.91, SE=0.27, p≤0.001, d=-0.15, 95% CI: -0.18, -0.12). The lowest GCSE score difference when considering both maternal and paternal qualifications was between those pupils who had a parent with school level qualifications and those who had a parent with a degree level qualification. The score difference was the equivalent to pupils with a mother/father who had school level qualifications achieving one less GCSE at grade G than their peers whose mother/father had a degree level qualification (β=-2.14, SE=0.18, p≤0.001, d=-0.10, 95% CI: -0.12, -0.08 and β=-2.13, SE=0.21, p≤0.001, d=-0.11, 95% CI: -0.13, -0.08, respectively).

Continuing the focus on parental status through their occupation within the full multilevel model, there were no statistically significant differences in the GCSE attainment of pupils with a mother or father with an intermediate occupation and pupils whose mother or father had a professional occupation. However, for the remaining maternal occupation categories, the GCSE score differences were statistically significant. For mothers' occupation, the greatest difference within the model was between pupils with an unemployed mother and those with a mother in a professional occupation. Pupils with an unemployed mother had lower GCSE scores than their peers whose mothers had a professional occupation (β=-2.82, SE=0.29, p≤0.001, d=-0.13, 95% CI: -0.16, -0.10). This score difference equated to pupils with an unemployed mother achieving one less GCSE at grade G. Pupils with a mother in a routine occupation had marginally lower GCSE scores than their peers whose mother had a professional occupation (β=-1.20, SE=0.20, p≤0.001, d=-0.05, 95% CI: -0.08, -0.03). This score difference was the equivalent to pupils with a mother in a routine occupation achieving one less GCSE at grade U. When shifting focus to fathers' occupation, having a father with a routine occupation (β=-0.90, SE=0.23, p≤0.001, d=-0.04, 95% CI: -0.07, -0.02) or an unemployed father (β=-0.84, SE=0.41, p≤0.001, d=-0.04, 95% CI: -0.09, 0.01) had similar negative and negligible effects on GCSE attainment, when compared to pupils with fathers in a professional occupation.

When comparing the magnitude of effects for parental status factors (education qualifications and occupational status), the full multilevel model presents parental qualifications to have greater effects on GCSE attainment than their occupational status (Table 14). When comparing the within model effects of maternal and paternal education qualifications, it was evident that maternal qualifications had a marginally greater effect on GCSE scores. However, this does not mean paternal education was not important. Its statistically significant and consistent effect on GCSE attainment within the models highlights its importance within analysis. Similarly, the influence of mothers' and fathers' occupational status on GCSE attainment should not be disregarded because of their lower within model effects than education qualifications. These remain important predictors to consider in analysis.

One aspect of the Northern Ireland Multiple Deprivation Measure 2010 (income) was examined in the full multilevel model. This measure reflected a positive relationship between higher GCSE scores and residing in less deprived area deciles according to income (β=0.16, SE=0.03, $p \leq 0.001$) (Table 14).

Table 14: Within model effects of Mother and Father Qualifications and Occupation on GCSE score

Log likelihood = -255270.2			Number of pupils: 61,373 Number of schools: 217
Variable	**β (SE)**	**Cohen's d**	**95% Confidence Intervals**
Mother Qualifications (reference: degree level)			
No qualifications	-5.71 (0.25)***	-0.27	-0.29 -0.25
Other qualifications	-3.40 (0.39)***	-0.17	-0.22 -0.12
School qualifications	-2.14 (0.18)***	-0.10	-0.12 -0.08
Father Qualifications (reference: degree level)			
No qualifications	-4.12 (0.26)***	-0.20	-0.23 -0.17
Other qualifications	-2.91 (0.27)***	-0.15	-0.18 -0.12
School qualifications	-2.13 (0.21)***	-0.11	-0.13 -0.08
Mother Occupation (reference: professional occupation)			
Intermediate Occupation	0.21 (0.19)	0.01	-0.01 0.03
Routine Occupation	-1.20 (0.20)***	-0.05	-0.08 -0.03
Unemployed	-2.82 (0.29)***	-0.13	-0.16 -0.10

Table 14 continued

Log likelihood = -255270.2			Number of pupils: 61,373 Number of schools: 217
Variable	**β (SE)**	**Cohen's d**	**95% Confidence Intervals**
Father Occupation (reference: professional occupation)			
Intermediate Occupation	-0.17 (0.20)	-0.01	-0.03 0.01
Routine Occupation	-0.90 (0.23)***	-0.04	-0.07 -0.02
Unemployed	-0.84 (0.41)*	-0.04	-0.09 0.01
NI-MDM Income	0.16 (0.03)***		

****** p≤0.001, **p≤0.01, *p≤0.05***

Note: Cohen's d was not calculated for the independent variable of NI-MDM (income). This was a continuous variable and it did not make conceptual sense to calculate Cohen's d that is the comparison of two means.

The remaining pupil level predictors included in the full multilevel model were religion and gender. In the full model, religion had a varying effect on GCSE attainment (Table 15). The GCSE score difference between Catholic and Protestant pupils was not statistically significant. In addition, the score difference between pupils with no religion and pupils affiliating with Catholicism was not statistically significant. However, pupils affiliating with other religions had marginally higher GCSE scores than their Catholic peers (β=1.45, SE=0.35, p≤0.001, d=0.06, 95% CI: 0.03, 0.09). This score difference equated to other religion pupils achieving one additional GCSE at grade U than their Catholic peers. Gender had a statistically significant effect on attainment within the model (Table 15). Female pupils had higher GCSE scores than their male peers (β=6.38, SE=0.14, p≤0.001, d=0.27, 95% CI: 0.26, 0.39). The gender score difference equated to female pupils achieving one additional GCSE at grade C than their male peers. When examining the magnitude of this effect, the guidelines outlined by Von Secker and Lissitz (1999) suggest it was small. However, in practice, it had a noteworthy impact on GCSE attainment.

Table 15: Within model effects of Religion and Gender on GCSE score

Log likelihood = -255270.2			Number of pupils: 61,373 Number of schools: 217
Variable	**β (SE)**	**Cohen's d**	**95% Confidence Intervals**
Religion *(reference: Catholic)*			
Protestant	0.30 (0.27)	0.01	-0.01 0.03
Other religion	1.45 (0.35)***	0.06	0.03 0.09
No religion	0.51 (0.35)	0.02	-0.01 0.05
Gender *(reference: male)*			
Female	6.38 (0.14)***	0.27	0.26 0.39

****** p≤0.001, **p≤0.01, *p≤0.05***

School level effects were also considered in the full multilevel model through the factors of school type and school management structure (Table 16). When considering

school type, pupils attending a grammar school had significantly higher GCSE attainment scores than their peers attending non-grammar schools (β=24.13, SE=1.73, p≤0.001, d=1.32, 95% CI: 1.31, 1.34). The score difference was the equivalent to grammar school pupils achieving three additional GCSEs at grades A*, A and B. According to the guidelines outlined by Von Secker and Lissitz (1999), this indicates a large effect. With school management structure, there was a statistically significant difference in GCSE scores between voluntary schools and controlled schools. Controlled schools had lower GCSE scores than voluntary schools, with the score difference being the equivalent to controlled school pupils achieving one less GCSE at grade F (β=-3.85, SE=1.76, p≤0.05, d=-0.20, 95% CI: -0.22, -0.18). Although the score difference between pupils attending voluntary and integrated schools was also statistically significant (according to the confidence intervals associated with the effect), the magnitude of the within model effect was marginal (β=-1.45, SE=2.40, p>0.05, d=-0.09, 95% CI: -0.12, -0.06). The score difference in favour of pupils attending Catholic maintained schools was also significant according to the associated confidence intervals but the attainment difference was marginal (β=1.97, SE=2.08, p>0.05, d=-0.11, 95% CI: 0.09, 0.13). These score differences equated to pupils attending integrated schools achieving one less GCSE at grade U than their voluntary school peers, whilst pupils attending Catholic maintained schools achieved one additional GCSE at grade U.

Table 16: Within model effects of School Type and Management Structure on GCSE Score

Log likelihood = -255270.2			Number of pupils: 61,373 Number of schools: 217
Variable	**β (SE)**	**Cohen's d**	**95% Confidence Intervals**
School Type			
(reference: non-grammar)			
Grammar	24.13 (1.73)***	1.32	1.31 1.34
School Management Structure			
(reference: voluntary)			
Controlled	-3.85 (1.76)*	-0.20	-0.22 -0.18
Catholic Maintained	1.97 (2.08)	0.11	0.09 0.13
Integrated	-1.45 (2.40)	-0.09	-0.12 -0.06

****** p≤0.001, **p≤0.01, *p≤0.05***

4.3.2.1 Summary

The overall patterns of the full multilevel model highlighted that attending a grammar school over a non-grammar school had the greatest within model effect on GCSE scores (β=24.13, SE=1.73, p≤0.001, d=1.32, 95% CI: 1.31, 1.34). This was the equivalent to grammar school pupils achieving three additional GCSEs at grades A*, A and B. The second highest effect was gender, as females had higher GCSE scores than their male peers (β=6.38, SE=0.14, p≤0.001, d=0.27, 95% CI: 0.26, 0.39). The score difference was the equivalent to females achieving one additional GCSE at grade C. Of the various SES measures, having a mother with no qualifications compared to a mother with a degree level qualification had the greatest negative within model effect on GCSE attainment (β=-5.71, SE=0.25, p≤0.001, d=-0.27, 95% CI: -0.29, -0.25). This score difference was the equivalent to pupils with a mother who had no qualifications achieving one less GCSE at grade D. The next greatest effect within the model was having a father with no qualifications, which was the equivalent to achieving one less GCSE at grade E, when compared to pupils whose father had a degree qualification (β=-4.12, SE=0.26, p≤0.001, d=-0.20, 95% CI: -0.23, -0.17). The third highest effect

of SES factors in the full model was residing in a privately-owned property. These pupils had higher GCSE scores than those residing in a property rented from the Northern Ireland Housing Association/Executive. The score difference equated to those residing in privately owned property achieving one additional GCSE at grade F (β=3.94, SE=0.25, p≤0.001, d=0.18, 95% CI: 0.16, 0.21). In the full multilevel model, FSME and having a mother with 'other' qualifications had the joint fourth greatest SES effects on total GCSE score when compared to other SES indicators. The score difference equated to those entitled to FSM achieving one less GCSE at grade F than their non-entitled peers (β=-3.75, SE=0.21, p≤0.001, d=-0.17, 95% CI: -0.19, -0.15). This was also apparent for having a mother with other qualifications (β=-3.40, SE=0.39, p≤0.001, d=-0.17, 95% CI: -0.22. -0.12). Despite this slight variation between models in the variable order of the third highest effect, when comparing the socio-economic factors across the socio-economic multilevel model and the full multilevel model, it was evident that all socio-economic factors had consistent effects on GCSE attainment (Table 17). The only noteworthy difference between the two models was the category of private rental became statistically significant in the full multilevel model when examining the confidence intervals associated with its given effect. However, the magnitude of its within model effect continued to reflect a negligible difference in the GCSE attainment of pupils.

4.3.2.2 How do these trends compare to the other attainment measures?

The GCSE English model reflected the same findings as the overall GCSE score model. Following the highest within model effect of school type (attending a grammar school), gender had the second greatest effect on GCSE attainment, which was in favour of females. In the GCSE maths model, attending a grammar school also had the highest within model effect on attainment. Although females continued to reflect higher attainment than their male peers, having a mother with no qualifications had the second greatest effect on GCSE maths attainment. In this model, pupils whose mothers had no qualifications had lower GCSE mathematics attainment than their peers whose mothers had degree level qualifications. In the GCSE/Equivalents A*-G model, attending a grammar school also had the greatest within model effect on attainment. However, the second highest effect within the model was residing in privately owned property, with such pupils having higher attainment than those residing in property rented from the Northern Ireland Housing Association/Executive.

Similarly to the above models, in the GCSE/Equivalents A*-G model, females continued to reflect higher GCSE attainment than their male peers (Appendix C, Tables 17-19).

4.3.2.3 Relating back to research question

The full multilevel model aimed to fulfil RA1 of this thesis: *examine the influences of socio-economic status, religion, gender and school type on post-primary attainment in Northern Ireland*. As the full multilevel model included measures of a pupil's socio-economic status, religious affiliation and gender, in addition to the school level factors of school type and school management structure, this model successfully fulfilled RA1.

This model also aimed to answer RQ1 and RQ2, whilst testing hypotheses 1-4. Research Question 1 of this thesis asked: *which socio-economic status factor has the greatest effect on GCSE attainment?* Both the SES model and the full multilevel model answered this research question. The magnitude, direction and statistical significance of the socio-economic measures were consistent across the SES model and the full multilevel model (Table 17). The only difference was private rental became a statistically significant predictor in the full model. However, the magnitude of the effect remained consistent and was negligible in both models. When considering SES trends in both multilevel models, having a mother with no qualifications had the greatest socio-economic effect on GCSE attainment. In both models, having a father with no qualifications had the second greatest socio-economic effect on GCSE score. Free school meal entitlement had the joint third highest effect in the SES model with residing in a privately owned property, whilst in the full multilevel model, residing in a privately owned property had the third highest socio-economic effect. Although the order of the third highest socio-economic effect varied slightly across the models, when comparing the beta and Cohen's *d* values, there were marginal differences between the two multilevel models that led to the difference in effect order. In summary, to answer RQ1, consistent with the findings of the SES model, the full multilevel model found the SES factor with the greatest within model effect on GCSE attainment was having a mother with no education qualifications. Similarly to the SES model, the full multilevel model therefore failed to confirm H1 that *free school meal entitlement will have the greatest effect on GCSE attainment.*

When considering RQ2: *how does a pupil's socio-economic status, religion, gender and school type affect their GCSE attainment*, the full multilevel model found attending a grammar school had the largest within model effect on total GCSE score compared to all other factors. Pupils attending a grammar school had higher GCSE scores than their peers attending non-grammar schools. The full multilevel model found the second highest effect in the model was gender, with females having higher GCSE scores than their male peers. This finding confirmed H4 of the study: *girls will have higher GCSE attainment than their male peers.* Religion varied in its statistical significance in the full multilevel model. The attainment differences between Protestant and Catholic pupils, and no religion and Catholic pupils were negligible and not statistically significant. The only statistically significant difference between religion categories was the marginally higher attainment of pupils affiliating with other religions, when compared to their Catholic peers. This finding therefore failed to confirm H3 that: *Catholic pupils will have higher GCSE attainment than their Protestant, other religion and no religion peers.* Research Question 2 also asked about the effects of a pupil's socio-economic status on their GCSE attainment. The full multilevel model found having a mother with no qualifications had the third highest effect (after school type and gender). Having a father with no qualifications, followed by residing in a privately owned property had the next highest SES effects in the full model. Although pupils from lower socio-economic backgrounds had lower GCSE attainment than their less economically deprived peers (H2), as FSME did not have the greatest SES effects on GCSE attainment, the findings of the full model failed to confirm the latter part of H2 that: *free school meal entitlement, a mother's education qualifications and a father's education qualifications will have the greatest SES effects on GCSE attainment, respectively.*

Table 17: Comparison of within model effects across SES and full multilevel model

	Number of pupils: 61,373 Number of schools: 217			Number of pupils: 61,373 Number of schools: 217		
	Log likelihood = -256505.7			Log likelihood = -255270.2		
	SES Model			**Full Model**		
	β (SE)	**Cohen's d**	**95% Confidence Intervals**	**β (SE)**	**Cohen's d**	**95% Confidence Intervals**
Free School Meal Entitlement (reference: not entitled to Free School Meals)	-4.00 (0.21)***	-0.18	-0.20 -0.16	-3.75 (0.21)***	-0.17	-0.19 -0.15
Property Value (reference: >£200,000)						
≤ £100,000	-2.66 (0.24)***	-0.12	-0.15 -0.10	-2.53 (0.24)***	-0.12	-0.14 -0.09
£101-£150,000	-1.91 (0.20)***	-0.09	-0.11 -0.07	-1.85 (0.20)***	-0.09	-0.11 -0.06
£151-£200,000	-0.55 (0.20)**	-0.03	-0.05 -0.003	-0.54 (0.19)**	-0.03	-0.05 -0.003
Housing Tenure (reference: rented from the Northern Ireland Housing Association/Executive)						
Privately owned (outright/mortgage)	3.69 (0.25)***	0.18	0.15 0.20	3.95 (0.25)***	0.18	0.16 0.21
Privately rented	0.75 (0.29)**	0.03	-0.00004 0.07	0.80 (0.28)**	0.03	0.002 0.07
Mother Qualifications (reference: degree level)						
No qualifications	-5.54 (0.26)***	-0.26	-0.29 -0.24	-5.71 (0.25)***	-0.27	-0.29 -0.25

Table 17 continued

	Number of pupils: 61,373 Number of schools: 217 Log likelihood = -256505.7			Number of pupils: 61,373 Number of schools: 217 Log likelihood = -255270.2		
	SES Model			**Full Model**		
	β (SE)	**Cohen's d**	**95% Confidence Intervals**	**β (SE)**	**Cohen's d**	**95% Confidence Intervals**
Mother Qualifications (reference: degree level)						
School level qualifications	-2.06 (0.19)***	-0.10	-0.12 -0.08	-2.14 (0.18)***	-0.10	-0.12 -0.08
Other qualifications	-3.35 (0.39)***	-0.17	-0.21 -0.12	-3.40 (0.39)***	-0.17	-0.22 -0.12
Father Qualifications (reference: degree level)						
No qualifications	-4.05 (0.27)***	-0.20	-0.23 -0.17	-4.12 (0.26)***	-0.20	-0.23 -0.17
School level qualifications	-2.22 (0.22)***	-0.11	-0.14 -0.09	-2.13 (0.21)***	-0.11	-0.13 -0.08
Other qualifications	-2.90 (0.28)***	-0.15	-0.18 -0.12	-2.91 (0.27)***	-0.15	-0.18 -0.12
Mother Occupation (reference: professional occupation)						
Intermediate occupations	0.14 (0.19)	0.01	-0.01 0.03	0.21 (0.19)	0.01	-0.01 0.03
Routine occupations	-1.16 (0.20)***	-0.05	-0.07 -0.03	-1.20 (0.20)***	-0.05	-0.08 -0.03
Unemployed	-2.75 (0.29)***	-0.13	-0.16 -0.10	-2.82 (0.29)***	-0.13	-0.16 -0.10

Table 17 continued

	Number of pupils: 61,373 Number of schools: 217 Log likelihood = -256505.7			Number of pupils: 61,373 Number of schools: 217 Log likelihood = -255270.2		
	SES Model			**Full Model**		
	β (SE)	**Cohen's d**	**95% Confidence Intervals**	**β (SE)**	**Cohen's d**	**95% Confidence Intervals**
Father Occupation (reference: professional occupation)						
Intermediate occupations	-0.15 (0.21)	-0.01	-0.03 0.02	-0.17 (0.20)	-0.01	-0.03 0.01
Routine occupations	-0.93 (0.23)***	-0.04	-0.07 -0.02	-0.90 (0.23)***	-0.04	-0.07 -0.02
Unemployed	-0.82 (0.42)	-0.04	-0.09 0.01	-0.84 (0.41)*	-0.04	-0.09 0.01
Controls (in both models)						
Cohort 2 (reference: Cohort 1)	0.44 (0.15)**	0.01	-0.01 0.03	0.49 (0.15)***	0.01	-0.01 0.03
Cohort 3 (reference: Cohort 1)	0.25 (0.16)	0.01	-0.01 0.02	0.26 (0.15)	0.01	-0.01 0.02
No mother data (reference: mother data provided)	-7.59 (0.31)***	-0.33	-0.36 -0.29	-7.35 (0.31)***	-0.32	-0.35 -0.28
No father data (reference: father data provided)	-6.04 (0.24)***	-0.27	-0.29 -0.25	-6.01 (0.24)***	-0.28	-0.28 -0.25

Table 17 continued

	Number of pupils: 61,373 Number of schools: 217 Log likelihood = -256505.7			Number of pupils: 61,373 Number of schools: 217 Log likelihood = -255270.2		
	SES Model			**Full Model**		
	β (SE)	**Cohen's d**	**95% Confidence Intervals**	**β (SE)**	**Cohen's d**	**95% Confidence Intervals**
Housing tenure: other (reference: Rented from the Northern Ireland Housing Association/Executive)	1.17 (0.56)*	0.05	-0.01 0.12	1.22 (0.55)*	0.05	-0.01 0.12
Property value: none provided (reference: >£200,000)	-1.49 (0.36)***	-0.07	-0.12 -0.03	-1.43 (0.35)***	-0.07	-0.11 -0.03
NI-MDM (Income)	0.16 (0.03)***			0.16 (0.03)***		
Other factors (full model only)						
Religion *(reference: Catholic)*						
Protestant	-	-	-	0.30 (0.27)	0.01	-0.01 0.03
Other religion	-	-	-	1.45 (0.35)***	0.06	0.03 0.09
No religion	-	-	-	0.51 (0.31)	0.02	-0.01 0.05

Table 17 continued

	Number of pupils: 61,373 Number of schools: 217 Log likelihood = -256505.7			Number of pupils: 61,373 Number of schools: 217 Log likelihood = -255270.2		
	SES Model			**Full Model**		
	β (SE)	**Cohen's d**	**95% Confidence Intervals**	**β (SE)**	**Cohen's d**	**95% Confidence Intervals**
Gender *(reference: male)*						
Female	-	-	-	6.38 (0.14)***	0.27	0.26 0.39
School Type (reference: non-grammar)						
Grammar	-	-	-	24.13 (1.73)***	1.32	1.31 1.34
School Management Structure (reference: voluntary)						
Controlled	-	-	-	-3.85 (1.76)*	-0.20	-0.22 -0.18
Catholic Maintained	-	-	-	1.97 (2.08)	0.11	0.09 0.13
Integrated	-	-	-	-1.45 (2.40)	-0.09	-0.12 -0.06
Controls in full model only						
Religion not stated (reference: Catholic)	-	-	-	-4.22 (0.30)***	-0.18	-0.21 -0.14
Other maintained (reference: voluntary)	-	-	-	8.16 (6.60)	0.58	0.44 0.73

**** p≤0.001, **p≤0.01, *p≤0.05.*

Note: Cohen's d was not calculated for the independent variable of NI-MDM (income). This was a continuous variable and it did not make conceptual sense to calculate Cohen's d that is the comparison of two means.

4.3.3 Interaction Models

Multilevel models with interaction terms were executed to gain a greater understanding of the intersectionality between socio-economic status, religion, gender and school type. Interaction terms provided an opportunity to statistically test the combined effects of factors to determine if there were differences between social groups. The research aims and questions determined which interaction terms were created for analysis. Through interaction terms, this study aimed to acknowledge that pupils are not a homogenous group. Social categories within the larger social group of 'pupils' are important to consider in education research as factors may affect social groups of pupils differently.

To illustrate this, the full multilevel model was split according to gender to examine whether factors had different effects on the GCSE attainment of male and female pupils. When comparing male and female attainment trends in the respective models, attending a grammar school had the greatest within model effect on GCSE attainment for both genders. The second highest effect for both males and females was having a mother with no qualifications. In the male model, the third highest effect was having a father with no qualifications. For females, the third highest effect was residing in a privately-owned property. Splitting the models according to pupils' gender highlighted relative consistency for males and females in the effects of attending a grammar school and having a mother with no qualifications. However, there was a degree of variability evident in the factors that had the third highest effect within the models (Appendix C, Table 20). In addition, fathers' education qualifications reflected a greater effect magnitude in the male model, whilst the direction and statistical significance of fathers' occupation differed slightly for male and female pupils. It is important to highlight these differences between genders are only descriptive and interaction terms are needed to statistically test whether there are meaningful differences in the effects of factors according to pupils' gender. Based on this exploratory analysis, interaction terms were created to test the interactions between the following factors: gender and religion, gender and FSME, gender, religion and FSME, gender and mother's education, gender and father's education, and gender and school type. In addition, interaction terms were also created to test the combined within model effects of:

religion and FSME, FSME and school type, and religion and school type (separate interactions for Catholic and other religion).

Free school meal entitlement was used as an SES indicator in some of the interaction terms. As FSME was already a binary variable, its original structure meant no recode or dropping of cases was necessary to use this variable in an interaction term. Along with its binary structure, the prominence of FSME in existing literature and the above analysis provided conceptual justifications for its interaction with other factors. Moreover, mothers' and fathers' education qualifications were recoded to create interaction terms as these factors had the greatest SES effects on GCSE scores in the SES and full multilevel model. Mothers' and fathers' education qualifications were recoded into a binary structure to determine whether there was a significant attainment difference between male and female pupils who had a mother/father with no qualifications (0) and those with a mother/father with any education qualification (1), respectively. In addition, the variable of religion was recoded for analytical purposes. Firstly, into a binary structure of Protestant (0) and Catholic (1) and secondly, into a binary structure of 'other religions' (1) and all other categories (Catholic/Protestant/no religion/religion not stated) (0). The creation of these interaction terms, the data manipulation that was executed and justifications for such are outlined in detail in Chapter Three (Section 3.11.7).

To summarise, the interaction terms created for analysis were between the following factors:

- Gender and Religion.
- Gender and FSME.
- Religion and FSME.
- Gender, Religion and FSME.
- Gender and Mother's Education.
- Gender and Father's Education.
- Gender and School Type.
- Religion (Catholic/Protestant) and School Type (1).
- Religion (other religion/else) and School Type (2).
- FSME and School Type.

4.3.4 Descriptive analysis of variables included in interaction terms

Descriptive statistics are provided in the following section for the interaction terms that were statistically significant in analysis (gender and religion; gender and father's education; gender and school type; other religion and school type, and FSME and school type). For the interactions that were not statistically significant (gender and FSME; religion and FSME; gender, religion and FSME; gender and mother's education, and Catholic and grammar), no analysis is provided as it suggests there was no statistically meaningful difference between the GCSE attainment of the groups included in the respective interaction terms.

4.3.4.1 Gender and Religion

When considering gender and religion in Cohort 1, females affiliating with Catholicism and other religions had the highest attainment of 7.14 GCSEs A*-C (SD=3.31 and SD=3.35, respectively). In Cohort 2 and Cohort 3, females affiliating with other religions had the highest GCSE attainment (mean=7.40, SD=3.16 and mean=7.35, SD=3.23, respectively). Male pupils affiliating with Protestantism narrowly had the lowest attainment in all cohorts, with male pupils affiliating with no religion reflecting similar averages. Male pupils affiliating with Protestantism had a mean of 5.39 GCSEs A*-C in Cohort 1 (SD=3.68), 5.52 GCSEs A*-C in Cohort 2 (SD=3.67), and 5.51 GCSEs A*-C in Cohort 3 (SD=3.63) (Appendix C, Table 21).

4.3.4.2 Gender and Father's Qualifications

In all three cohorts, female pupils with a father who had a degree level qualification had the highest attainment of 8.76 GCSEs A*-C in Cohort 1 (SD=2.27), 8.78 GCSEs A*-C in Cohort 2 (SD=2.30), and 8.88 GCSEs A*-C in Cohort 3 (SD=2.17). Male pupils whose fathers had no qualifications had the lowest attainment in all three cohorts, achieving 4.69 GCSEs A*-C in Cohort 1 (SD=3.59), 4.53 GCSEs A*-C in Cohort 2 (SD=3.56), and 4.56 GCSEs A*-C in Cohort 3 (SD=3.60) (Appendix C, Table 22).

4.3.4.3 Gender and School Type

Across cohorts, females attending grammar schools had the highest attainment mean of 9.18 GCSEs A*-C in Cohort 1 (SD=1.57), 9.17 GCSEs A*-C in Cohort 2 (SD=1.46), and 9.25 GCSEs A*-C in Cohort 3 (SD=1.44). This was followed by male pupils attending grammar schools who had a mean of just below 9 GCSEs A*-C in each cohort (SD=2.15 in Cohort 1, SD=2.06 in Cohort 2 and SD=1.94 in Cohort 3). Female pupils attending non-grammar schools had the next highest attainment means in all cohorts of around 5 GCSEs A*-C (SD=3.40 in Cohort 1, SD=3.39 in Cohort 2 and SD=3.50 for Cohort 3). Male pupils attending non-grammar schools had the lowest GCSE attainment means across cohorts of just below 4 GCSEs A*-C (SD=3.24 in Cohort 1, SD=3.19 in Cohort 2 and SD=3.31 in Cohort 3) (Appendix C, Table 23).

4.3.4.4 Religion and School Type

Across religion categories, those pupils attending grammar schools had higher GCSE attainment than their peers attending non-grammar schools. The highest average was amongst Catholic pupils attending grammar schools who had an average of 9.16 GCSEs A*-C in Cohort 1 (SD=1.86), 9.14 GCSEs A*-C in Cohort 2 (SD=1.74) and 9.35 GCSEs A*-C in Cohort 3 (SD=1.56). Pupils within the remaining religion categories (Protestant, other religion, no religion) attending grammar schools had mean attainment rates ranging from 8.7-8.9 GCSEs A*-C in all three cohorts (Appendix C, Table 24). This reflected marginal differences in the attainment of pupils based on their religion when they attended a grammar school. When considering non-grammar schools, Catholic pupils had the highest average in Cohort 1 and Cohort 2 (mean=4.96, SD=3.44 and mean=5.03, SD=3.36, respectively). In Cohort 3, pupils affiliating with other religions had the highest average of 5.04 GCSEs A*-C (SD=3.34). Catholic pupils closely followed with an average of 4.92 GCSEs A*-C (SD=3.48). In non-grammar schools, Protestant pupils had the lowest average in Cohort 1, with 3.91 GCSEs A*-C (SD=3.21). In Cohort 2, Protestant pupils and pupils affiliating with no religion had the lowest averages of 3.92 GCSEs A*-C (SD=3.21), and 3.93 GCSEs A*-C (SD=3.16), respectively. In Cohort 3, pupils with no religion had the lowest average of 4.20 GCSEs A*-C in non-grammar schools (SD=3.35) (Appendix C, Table 24).

4.3.4.5 FSME and School Type

In both school types (grammar/non-grammar), pupils entitled to FSM had lower GCSE attainment than their non-entitled peers attending the same school type. When considering average attainment differences based on FSME within school types, the difference was lower between grammar school pupils in all three cohorts. Pupils eligible for FSM attending non-grammar schools achieved an average of around 5 GCSEs A*-C less than their grammar school peers entitled to FSM in all three cohorts. When comparing the attainment differences between pupils not entitled to FSM attending grammar and non-grammar schools, those pupils attending non-grammar schools achieved an average of around 4 GCSEs A*-C lower than their peers not entitled to FSM attending grammar schools (Appendix C, Table 25).

4.3.5 Interaction Models

Models were executed for each of the interaction terms listed above using the dependent variable of overall GCSE score. Interaction terms that were statistically significant were as followed: gender and religion, gender and father's education, gender and school type, other religion and school type, and FSME and school type. The following interaction terms were not statistically significant and are not discussed further in this chapter but are considered in depth in Chapter Five: gender and FSME, religion and FSME, gender, religion and FSME, gender and mother's education, and Catholic and school type. For the interaction terms that were statistically significant, Cohen's *d* was calculated to examine the mean GCSE score differences between groups included in the interaction. As previously outlined, the effects reported in this chapter are within model effects, which should be considered when interpreting the results of the interaction terms.

4.3.5.1 Gender and Religion Interaction Model

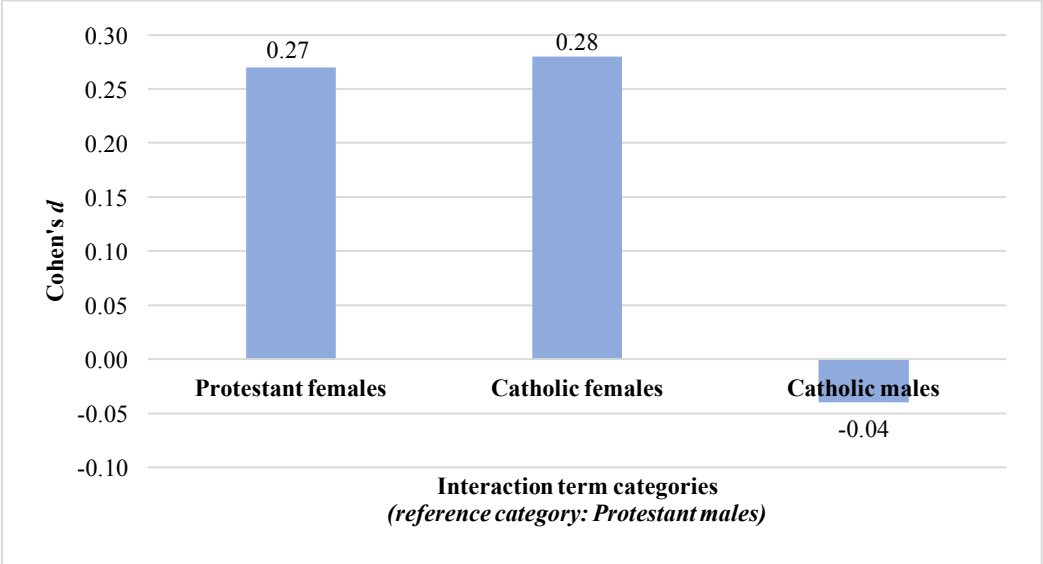
This model included all male and female pupils identifying as either Catholic or Protestant. In total, there were 48,619 pupils in 217 schools included in the model. The interaction term of gender and religion was statistically significant, meaning the attainment differences between gender and religion categories were important to consider. In the interaction term, Protestant males were the reference category. This was to determine whether Protestant male pupils had lower GCSE attainment than

their peers. The interaction term highlighted that Protestant female pupils had higher GCSE scores than Protestant males (d=0.27, 95% CI: 0.24, 0.30) (Table 18). Catholic females also had higher GCSE scores than Protestant males (d=0.28, 95% CI: 0.25, 0.30) (Table 18). The extent to which Protestant females and Catholic females had higher GCSE scores than Protestant males was similar in magnitude (Figure 1). The interaction term found that despite the GCSE attainment difference between Catholic males and Protestant males being in favour of the latter, the attainment difference was negligible (d=-0.04, 95% CI: -0.06, -0.01) (Table 18). Despite the mean score difference between Catholic and Protestant males being negligible, this finding contrasts the rhetoric of Protestant males underachieving within the Northern Ireland education system. Figure 1 illustrates the mean GCSE score differences between groups included in this interaction term.

Table 18: Differences in mean GCSE scores between groups in the interaction term between gender and religion

	Cohen's *d*	95% Confidence Intervals
Protestant females (compared to Protestant males)	0.27	0.24, 0.30
Catholic females (compared to Protestant males)	0.28	0.25, 0.30
Catholic males (compared to Protestant males)	-0.04	-0.06, -0.01

Figure 1: Differences in mean GCSE scores between groups in the interaction term between gender and religion



The GCSE score differences illustrated in Figure 1 are in comparison to the reference category of Protestant males, which is represented by the zero line on the y axis.

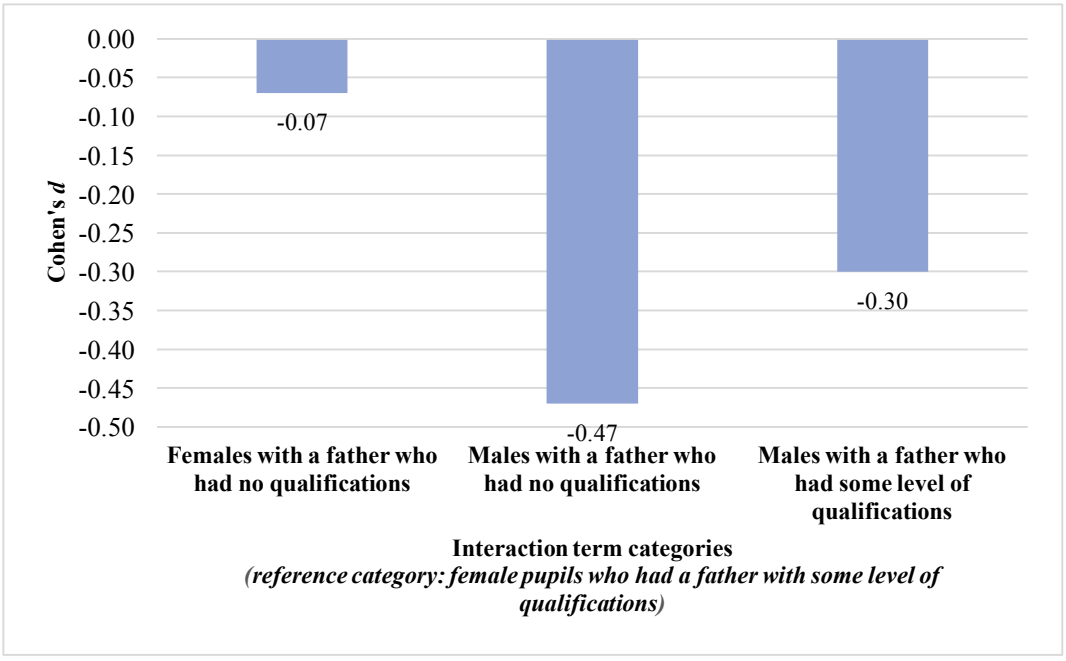
4.3.5.2 Gender and Father's Education Interaction Model

This model included all pupils that paternal data was provided for. In total, there were 42,297 pupils in 217 schools included in the model. The interaction term of gender and father's education was statistically significant. In the interaction term, female pupils who had a father with some level of qualifications were the reference category. Table 19 indicates that all other categories included in the interaction term had lower GCSE scores than the reference category. The largest difference was male pupils who had a father with no qualifications having lower GCSE scores than female pupils who had a father with some level of qualifications (d=-0.47, 95% CI: -0.50, -0.44). In addition, male pupils who had a father with some level of qualifications had lower attainment than females with a father who had some level of qualifications (d=-0.30, 95% CI: -0.32, -0.28). The smallest mean GCSE score difference in the interaction term was females who had a father with no qualifications having marginally lower scores than females who had a father with some level of qualifications (d=-0.07, 95% CI: -0.10, -0.03). Figure 2 illustrates the mean GCSE score differences between groups included in this interaction term.

Table 19: Differences in mean GCSE scores between groups in the interaction term between gender and father's education

	Cohen's *d*	95% Confidence Intervals
Females with a father who had no qualifications (compared to females with a father who had some level of qualifications)	-0.07	-0.10, -0.03
Males with a father who had no qualifications (compared to females with a father who had some level of qualifications)	-0.47	-0.50, -0.44
Males with a father who had some level of qualifications (compared to females with a father who had some level of qualifications)	-0.30	-0.32, -0.28

Figure 2: Differences in mean GCSE scores between groups in the interaction term between gender and father's education



The GCSE score differences illustrated in Figure 2 are in comparison to the reference category of female pupils who had a father with some level of qualifications, which is represented by the zero line on the y axis.

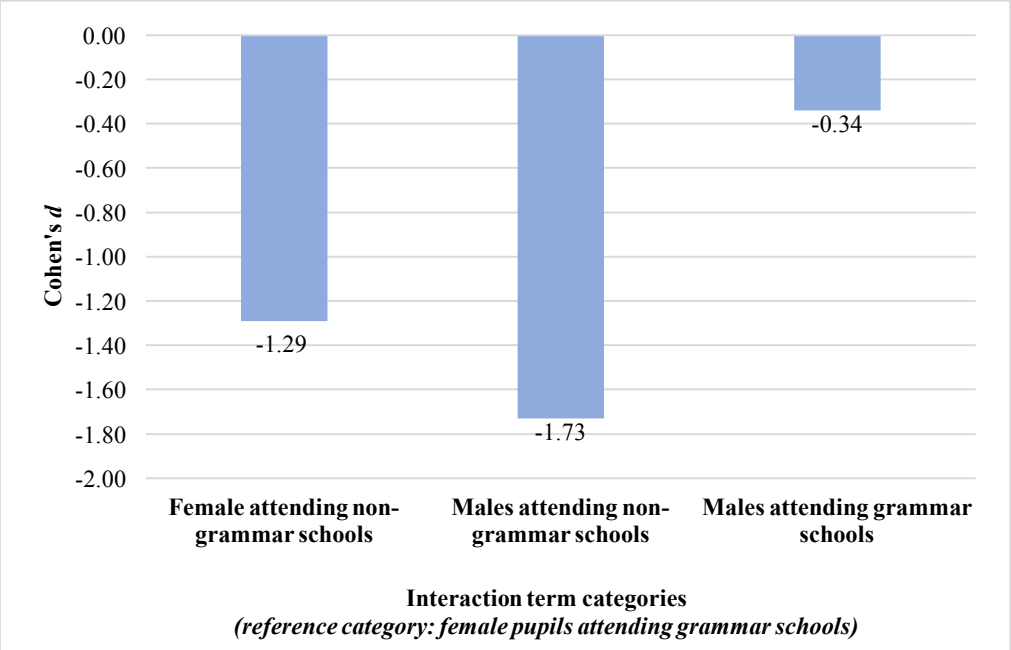
4.3.5.3 Gender and School Type Interaction Model

This model included male and female pupils attending grammar and non-grammar schools. The full pupil cohort of 61,373 pupils in 217 schools were included in the model. The interaction term between gender and school type was statistically significant. In this interaction, female pupils attending grammar schools were the reference category. Overall, this interaction term highlighted that females attending grammar schools had higher GCSE scores than pupils in all other categories. Table 20 indicates that the largest mean score difference was male pupils attending non-grammar schools having lower GCSE scores than their female peers attending grammar schools (d=-1.73, 95% CI: -1.76, -1.71). The second highest score difference was females attending non-grammar schools having lower GCSE scores than females attending grammar schools (d=-1.29, 95% CI: -1.31, -1.26). The smallest score difference in this interaction term was male pupils in grammar schools having lower scores than their female peers in grammar school (d=-0.34, 95% CI: -0.36, -0.31). Figure 3 illustrates the mean GCSE score differences between groups included in this interaction term.

Table 20: Differences in mean GCSE scores between groups in the interaction between gender and school type

	Cohen's *d*	95% Confidence Intervals
Females attending non-grammar schools (compared to females attending grammar schools)	-1.29	-1.31, -1.26
Males attending grammar schools (compared to females attending grammar schools)	-0.34	-0.36, -0.31
Males attending non-grammar schools (compared to females attending grammar schools)	-1.73	-1.76, -1.71

Figure 3: Differences in mean GCSE scores between categories in the interaction term between gender and school type



The GCSE score differences illustrated in Figure 3 are in comparison to the reference category of female pupils attending grammar schools, which is represented by the zero line on the y axis.

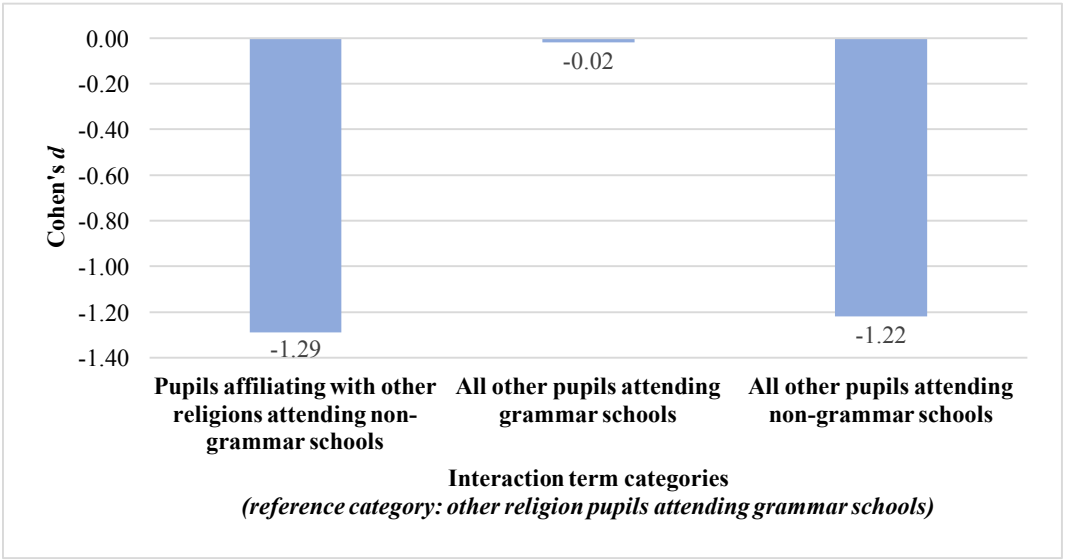
4.3.5.4 Other Religion and School Type Interaction Model

This model included the full pupil cohort of 61,373 pupils in 217 schools. The interaction term between other religion and school type was statistically significant. In this interaction term, other religion pupils attending grammar schools were the reference category. Table 21 indicates that in this interaction term, the largest mean score difference was other religion pupils attending non-grammar schools having lower GCSE scores than their other religion peers attending grammar schools (d=-1.29, 95% CI: -1.36, -1.22). The second highest mean score difference in the interaction term was Catholic, Protestant, no religion and no stated religion pupils attending non-grammar schools having lower scores than other religion pupils attending grammar schools (d=-1.22, 95% CI: -1.27, -1.17). The lowest score difference was between grammar school pupils affiliating with Catholicism, Protestantism, no religion and no stated religion, and other religion pupils attending grammar schools (d=-0.02, 95% CI: -0.06, 0.03). However, the score difference between grammar school pupils based on these religion categories was negligible and not statistically significant. Figure 4 illustrates the mean GCSE score differences between groups included in this interaction term.

Table 21: Differences in mean GCSE scores between groups in the interaction term between other religion and school type

	Cohen's *d*	95% Confidence Intervals
Other religion pupils attending non-grammar schools (compared to other religion pupils attending grammar schools)	-1.29	-1.36, -1.22
All other pupils (Catholic, Protestant, no religion, no stated religion) attending grammar schools (compared to other religion pupils attending grammar schools)	-0.02	-0.06, 0.03
All other pupils (Catholic, Protestant, no religion, no stated religion) attending non-grammar schools (compared to other religion pupils attending grammar schools)	-1.22	-1.27, -1.17

Figure 4: Differences in mean GCSE scores between groups in the interaction term between other religion and school type



The GCSE score differences illustrated in Figure 4 are in comparison to the reference category of other religion pupils attending grammar schools, which is represented by the zero line on the y axis. In Figure 4, 'all other pupils' refers to pupils affiliating as Catholic, Protestant, no religion and no stated religion.

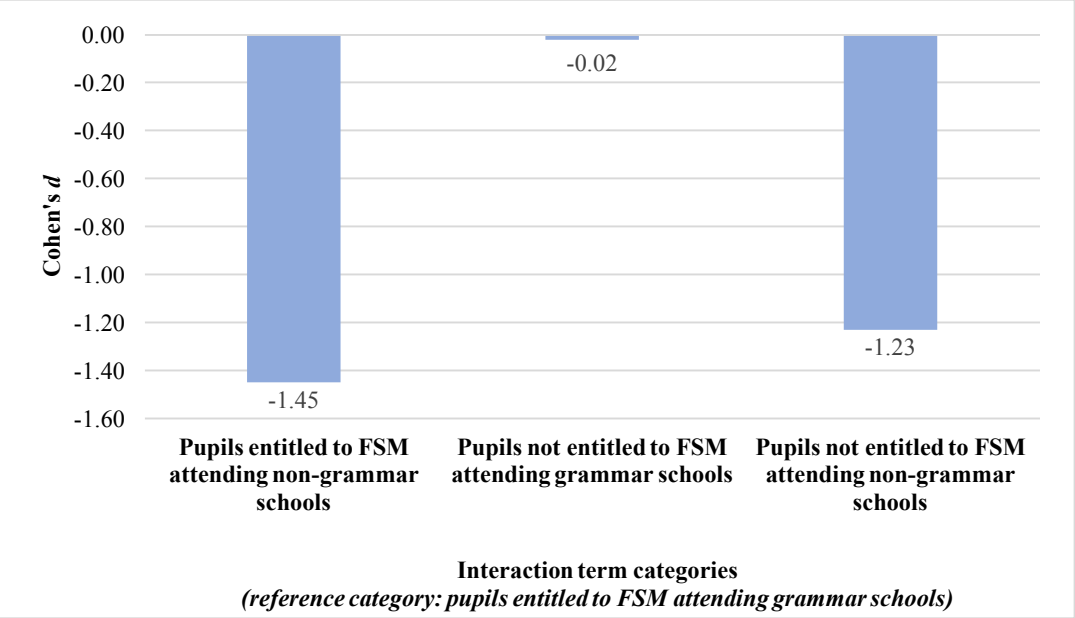
4.3.5.5 FSME and School Type Interaction Model

In this model, the full pupil cohort was included in analysis. In total, 61,373 pupils in 217 schools were included in the model. The interaction term between FSME and school type was statistically significant. In the interaction term, pupils entitled to FSM attending grammar schools were the reference category. The interaction term highlighted that the largest mean GCSE score difference was pupils entitled to FSM attending non-grammar schools having lower scores than their entitled peers attending grammar schools (d=-1.45, 95% CI: -1.51, -1.39). The second largest mean score difference was pupils not entitled to FSM attending non-grammar schools having lower score than pupils entitled to FSM attending grammar schools (d=-1.23, 95% CI: -1.28, -1.18). The lowest mean score difference in this interaction term was between grammar school pupils entitled to FSM and not entitled to FSM (d=-0.02, 95% CI: -0.07, 0.03). However, this attainment difference was negligible and not statistically significant (Table 22). Figure 5 illustrates the mean GCSE score differences between groups included in this interaction term.

Table 22: Differences in mean GCSE scores between groups in the interaction term between FSME and school type

	Cohen's *d*	95% Confidence Intervals
Pupils entitled to FSM attending non-grammar schools (compared to pupils entitled to FSM attending grammar schools)	-1.45	-1.51, -1.39
Pupils not entitled to FSM attending grammar schools (compared to pupils entitled to FSM attending grammar schools)	-0.02	-0.07, 0.03
Pupils not entitled to FSM attending non-grammar schools (compared to pupils entitled to FSM attending grammar schools)	-1.23	-1.28, -1.18

Figure 5: Differences in mean GCSE scores between groups in the interaction term between FSME and school type



The GCSE score differences illustrated in Figure 5 are in comparison to the reference category of grammar school pupils entitled to FSM, which is represented by the zero line on the y axis.

4.3.5.6 Relating back to research question

The interaction models aimed to fulfil RA2: *examine how interactions between socio-economic status, religion, gender and school type influence attainment.* This research aim was fulfilled through the statistically significant interaction terms between: gender and religion; gender and father's education; gender and school type; other religion and school type, and FSME and school type. The interaction models also aimed to answer RQ3 and RQ3a, whilst testing hypotheses 5-13 of the study. However, as the interaction terms of: gender and FSME (H6); religion and FSME (H7); gender, religion and FSME (H8); Catholic and school type (H10), and gender and mother's education (H12) were not statistically significant, their corresponding hypotheses (6, 7, 8, 10 and 12) were not confirmed. In addition, as the interaction of gender, religion and FSME was not statistically significant, RQ3a (*are Protestant working class boys underachieving when compared to other groups?*) could not be fully answered. As the interaction term of gender, religion and FSME was not statistically significant, it would indicate that the differences between groups were not meaningful, which somewhat contests the discourse of the underachievement of Protestant working class boys in the Northern Ireland education system. However, as the interaction term between gender and religion was statistically significant, the attainment of Protestant males was examined in detail.

When considering RQ3 (*how do possible interactions between independent variables influence GCSE attainment?*) and RQ3a (*are Protestant working class boys underachieving when compared to other groups?*), the interaction term between gender and religion was statistically significant and allowed the attainment of Protestant male pupils to be considered, somewhat answering RQ3a. This interaction term found Protestant females (d=0.27, 95% CI: 0.24, 0.30), and Catholic females had higher GCSE scores than Protestant males (d=0.28, 95% CI: 0.25, 0.30). The interaction term found that the direction of the attainment difference between Catholic males and Protestant males was in favour of the latter, however the magnitude of such difference was negligible (d=-0.04, 95% CI: -0.06, -0.01). The finding of this interaction term therefore contests the rhetoric of Protestant male pupils underachieving in the Northern Ireland education system. When relating the findings from this interaction term back to RQ3a, it can be argued Protestant male pupils were not underachieving when compared to their peers. However, this interaction term did

not account for the SES dimension included in RQ3a. As the attainment difference between Catholic males and Protestant males was negligible in this interaction term, H5 of this study (*Catholic girls will have the highest GCSE attainment, followed by Catholic boys. Protestant girls followed by Protestant boys will have the lowest relative attainment*) was not confirmed. Overall, the interaction term of gender and religion highlighted the importance of incorporating interaction terms into statistical models to provide accurate arguments, rather than using descriptive statistics alone to infer about attainment trends.

Continuing to answer RQ3 (*how do possible interactions between independent variables influence GCSE attainment?*), the interaction term of gender and father's education was statistically significant. This interaction term found the largest mean GCSE score difference was male pupils with a father who had no qualifications having lower scores than their female peers who had a father with some level of qualifications (d=-0.47, 95% CI: -0.50, -0.44). The smallest mean GCSE score difference in the interaction was females who had a father with no qualifications having marginally lower scores than females who had a father with some level of qualifications (d=-0.07, 95% CI: -0.10, -0.03). The findings from this interaction term failed to confirm H13: *female pupils with a father who had some qualification will have the highest GCSE attainment, followed by male pupils. Male pupils with a father who had no qualifications will have the lowest attainment.*

The remaining interaction terms that were statistically significant examined gender, religion and FSME, respectively, in relation to school type. These interaction terms aimed to acknowledge the 'grammar school effect' discussed in the literature (see Chapter Two, Section 2.8.1). This analysis aimed to explore whether gender, religion and SES had the same effects on pupils regardless of the school type they attended. These interaction terms aimed to answer RQ3 and the corresponding hypotheses (9-11). The interaction term between gender and school type highlighted the largest mean GCSE score difference was male pupils attending non-grammar schools having lower GCSE scores than their female peers attending grammar schools (d=-1.73, 95% CI: -1.76, -1.71). The smallest score difference in this interaction term was male pupils in grammar schools having lower scores than their female peers in grammar schools (d=-0.34, 95% CI: -0.36, -0.31). Overall, this interaction term highlighted that females

attending grammar schools had higher GCSE scores than pupils in all other categories. This interaction term confirmed H9 that: *girls attending grammar schools will have the highest GCSE attainment, followed by boys attending grammar schools. Boys attending non-grammar schools will have the lowest attainment.*

Hypothesis 10 referred to two interaction terms, one of which was not statistically significant (Catholic and school type). The second interaction term included in H10 (other religion and school type) was statistically significant. This interaction term found other religion pupils attending grammar schools had higher GCSE scores than non-grammar school pupils in both religion categories. The attainment difference between grammar school pupils in both religion categories was negligible. When considering this interaction term in relation to H10 (*...in the other religion and grammar interaction term, all other pupils (affiliating with Catholicism, Protestantism, no religion and no stated religion) attending grammar schools will have the highest attainment, followed by pupils affiliating with other religions attending grammar schools*), the hypothesis was not confirmed. Overall, the findings of this study cannot confirm H10.

The final interaction term that was statistically significant in analysis was between FSME and school type. This interaction term found the largest mean GCSE score difference was non-grammar school pupils entitled to FSM having lower scores than their entitled peers attending grammar schools (d=-1.45, 95% CI: -1.51, -1.39). The lowest mean score difference between grammar school pupils entitled to FSM and not entitled to FSM was negligible and not statistically significant (d=-0.02, 95% CI: -0.07, 0.03). When considering this interaction term in relation to H11 (*pupils not entitled to free school meals attending grammar schools will have the highest GCSE attainment, whilst pupils entitled to free school meals attending non-grammar schools will have the lowest GCSE attainment. Pupils entitled to free school meals attending grammar schools will have higher GCSE attainment than their entitled peers attending non-grammar schools*), the findings of the interaction term confirmed the hypothesis to a certain extent. Pupils entitled to FSM attending grammar schools had higher attainment than their entitled and non-entitled peers attending non-grammar schools. However, the attainment difference between grammar school pupils entitled to FSM and not entitled to FSM was negligible and not statistically significant. This limits the extent to which H11 can be confirmed by the findings of the study.

Overall, the interaction terms that were statistically significant in this study highlighted the importance of incorporating interaction terms into statistical models to provide accurate arguments about the multiplicative effect of factors, rather than their additive effect on GCSE attainment. In addition, the interaction terms highlighted the importance of incorporating such terms into statistical models rather than using descriptive analysis alone to infer about attainment trends. Interaction terms provide greater accuracy about the differences between groups, in contrast to descriptive statistics that are not statistically tested.

4.3.6 Null Model

The final model structure to be discussed in this chapter is the null model. Although this model was executed at the beginning of analysis, as the latter section (4.3.6.1) discusses variance in the full multilevel model, it is the concluding analytical section of this chapter. This section provides a summary of how effective the full multilevel model was in explaining variation in GCSE attainment in Northern Ireland. As highlighted in Chapter Three (Section 3.9.2.1), a null model consisting of only the dependent variable and school level identifier was created to calculate the Variance Partition Coefficient (VPC) to determine the unexplained variance at the individual and school level. The null multilevel model for overall GCSE score indicated that a higher proportion of unexplained variance in GCSE attainment was attributed to the pupil level (51.2%) than the school level (48.8%) (Table 23).

4.3.6.1 Variance at the individual and school level

Step by step models were executed to examine how variance was altered at the school and pupil level as independent variables were added to the fixed effects model. The VPC was calculated for the school and individual level using the following equations:

School VPC was calculated with the following formula:

$$VPC_e = \frac{\sigma^2_e}{\sigma^2_e + \sigma^2_u}$$

Pupil VPC was calculated with the following formula:

$$VPC_u = \frac{\sigma^2_u}{\sigma^2_e + \sigma^2_u}$$

In a model that included only the pupil level variables, the unexplained variation in GCSE attainment at the pupil level was 58.6%, whilst the unexplained variation at the school level was 41.4%. When school level factors of school type and school management structure were added to the model, the unexplained variance in the GCSE attainment at the pupil level was 86.1%, whilst the unexplained variation at the school level was 13.9%. The final pupil and school variation levels presented above reflect the final random intercept multilevel model examining total GCSE score. Tables outlining the random effects parameters, and the constant and residual variance cannot be included in this thesis due to NISRA guidelines. When all pupil and school level predictor variables were included in the model, the unexplained variance in GCSE attainment at the pupil level was much greater than that unexplained at the school level. This highlights that the majority of variance at the school level was explained by the school level independent variables included in the model.

4.3.6.2 Relating back to research question

The null model and VPC calculations aimed to fulfil RA3 of the study: *explore the unexplained variation in the full multilevel model at the pupil and school level.* By calculating the VPC for the pupil and school level, RA3 was fulfilled. In addition, this analysis aimed to answer RQ4: *what is the unexplained variation in GCSE attainment in the full multilevel model at the individual and school level*, and test H14 (*the unexplained variance in GCSE attainment will be greater at the individual level than the school level).*

When considering RQ4, the null model indicated that a higher proportion of unexplained variance in GCSE attainment was attributed to the pupil level (51.2%) than the school level (48.8%). This confirmed H14 that a higher proportion of unexplained variance was evident at the individual level than school level. As more independent variables were added to the model, there was a relative increase in the variance unexplained at the pupil level. However, the actual level of overall unexplained variance within the model was reduced. In all models, the greatest difference in the variance partition was apparent when school level factors were added to the model. This reduced the unexplained variation in GCSE attainment at the school level and meant the majority of the unexplained variance was at the pupil level.

4.4 Overall Summary

Overall, this chapter has outlined and discussed the analysis conducted in this thesis to examine the influence of pupil level socio-demographics and school level factors on GCSE attainment in Northern Ireland. The data used to execute such analysis was the first in Northern Ireland to link the Census (2011), School Leavers Survey (2010-2014) and School Census (2010-2014) to examine post-primary attainment trends in Northern Ireland. The data used in this study also provided the first opportunity to explore multiple socio-economic indicators in one statistical model to determine their relative effects on GCSE attainment. In total, this thesis had three research aims, four research questions and 14 hypotheses to examine. As discussed in this chapter, the analytical strategy of the executed multilevel models can be viewed as a building block approach as each model builds upon the previous model to fulfil the research aims and answer the research questions and hypotheses. This chapter discussed the following multilevel models: the SES model, the full multilevel model, the full model split by pupils' gender, interaction models and the null model.

The SES model found the socio-economic indicators with the greatest within model effects on GCSE attainment were parental education. Having a mother or father with no qualifications, compared to a mother or father with a degree level qualification had a negative impact on GCSE attainment, respectively. This model also highlighted that FSME and housing tenure were important SES factors to consider in analysis as they had the joint third highest effects in the model.

Building upon the socio-economic status model, the full multilevel model examined the influence of SES, religion, gender, school type and school management structure on GCSE attainment. In this model, attending a grammar school had the largest effect on GCSE attainment compared to all other factors. The second highest effect in the model was gender, with females having higher GCSE scores than their male peers. The full multilevel model found having a mother with no qualifications had the third highest effect on GCSE attainment (after school type and gender). This was followed by having a father with no qualifications and residing in a privately owned property. Religion varied in its statistical significance in the full multilevel model. The only statistically significant difference was the marginally higher attainment of pupils

affiliating with other religions when compared to their Catholic peers. The attainment difference between Protestant and Catholic pupils was negligible and not statistically significant. When comparing the SES model and the full multilevel model, the magnitude and direction of the socio-economic measures were consistent. The only difference was private rental became a statistically significant factor in the full model, however the magnitude of its effect remained negligible. In both models, parental education had the greatest SES effects on GCSE attainment. In the SES model, FSME had the joint third highest effect with housing tenure. However, residing in a privately owned property had the third highest SES effect in the full model, whilst FSME had the joint fourth highest socio-economic effect with having a mother with an 'other' qualification.

Splitting the full multilevel models by gender provided context to the importance of creating interaction terms in analysis. The splitting of models according to pupils' gender only allowed differences in GCSE attainment to be descriptively reported as the differences between the models were not statistically tested. Despite this, the descriptive analysis highlighted the importance of viewing pupils as a heterogeneous social group as some factors had different effects on male and female pupils. Building upon this exploratory analysis, a total of five interaction models were statistically significant in analysis: gender-religion; gender-father's education; gender-school type; other religion-school type and FSME-school type. However, this study found that the interactions between: gender and FSME; religion and FSME; gender, religion and FSME; Catholic and school type, and gender and mother's education were not statistically significant. The interaction terms in this thesis highlighted the importance of incorporating interaction terms into statistical models to provide accurate arguments about the multiplicative effect of factors, rather than their additive effect on GCSE attainment.

Of key importance to this thesis was the interaction term of gender, religion and FSME not being statistically significant. Such finding suggests that the GCSE attainment differences between groups included in the interaction were not statistically meaningful. This somewhat contests the discourse suggesting Protestant working class boys underachieve in the Northern Ireland education system. The statistically significant interaction term of gender and religion allowed an examination into the

attainment of Protestant males. This interaction term found Protestant females and Catholic females had higher GCSE scores than Protestant males. However, the attainment difference between Catholic males and Protestant males was negligible. This finding also contests the discourse that Protestant males are underachieving in the Northern Ireland education system when compared to their peers at GCSE level.

Moreover, the interaction term of gender and fathers' education found the largest mean score difference was male pupils with a father who had no qualifications having lower GCSE scores than their female peers who had a father with some level of qualifications. The remaining interaction terms that were statistically significant examined gender, religion and FSME (respectively) in relation to school type attended. From these, the interaction term of gender and school type highlighted the largest mean GCSE score difference was male pupils attending non-grammar schools having lower GCSE scores than their female peers attending grammar schools. This interaction term highlighted that females attending grammar schools had higher GCSE scores than pupils in all other categories. In addition, the interaction term between other religion and school type found other religion pupils attending grammar schools had higher GCSE scores than non-grammar school pupils in both religion categories. However, the attainment difference between grammar school pupils in both religion categories was negligible. The final interaction term that was statistically significant in analysis was between FSME and school type. This interaction term found the largest mean GCSE score difference was pupils entitled to FSM attending non-grammar schools having lower scores than their entitled peers attending grammar schools.

The final stage of analysis examined the level of unexplained variation in GCSE attainment at the pupil and school level in the null model and full multilevel model. This analysis found that as more independent variables were added to the model, there was a relative increase in the unexplained variance at the pupil level. However, the actual level of overall unexplained variance within the model was reduced when all independent variables were added. This analysis also found the greatest difference in the variance partition was apparent when school level factors were added to the model.

4.5 Policy implications of key findings

This section briefly considers the policy implications and recommendations of this study based on the key findings presented in this chapter. These outlined policy implications and recommendations will be discussed in greater detail in the next chapter (Section 5.12).

4.5.1 Socio-Economic Status

There are three key areas for policy recommendations according to socio-economic status. Firstly, this study has highlighted the importance of maternal and paternal education levels in understanding a child's GCSE attainment. It is therefore recommended that future studies examining educational attainment disparities, when possible, include a measure of parental qualifications. This will ensure that future policies are adequately informed by a measure that provides an insight into the economic, cultural and social capital a child has access to within the home. There is also a need for future policies to acknowledge and implement practical initiatives to mediate the negative consequences of low parental qualifications. Future policies should aim to increase parental engagement, understanding and involvement with their child's education, both within and outside of the home environment.

Secondly, this study reaffirms the effectiveness of FSME as a socio-economic predictor of GCSE attainment in analysis. It is therefore recommended, based on the findings of this thesis, that FSME should remain a key socio-economic measure in future educational research. However, as the concept of socio-economic status is multidimensional, when possible, socio-economic status should be considered with more than one factor to effectively inform policy in an inclusive manner.

Thirdly, in the executed analysis of this thesis, housing tenure had one of the largest socio-economic effects on GCSE attainment. The influence of housing tenure on attainment is likely to be mediated by factors such as household income, home environment and neighbourhood. Future research should therefore endeavour to explore the relationship between housing tenure and the outlined factors to determine a more detailed understanding of its implications on educational attainment. Moreover, future policy initiatives should also be targeted towards the areas of household income,

home environment and neighbourhood to reduce attainment disparities amongst pupils.

4.5.2 Religion

The findings from this study may impact the direction of the current discourse around the underachievement of Protestant working class boys in the Northern Ireland education system. This is due to the findings of this thesis reflecting that religion is not as substantial a contributor to educational attainment disparities as previous research has suggested. This thesis failed to support the discourse that Protestant pupils have lower GCSE attainment than their Catholic peers. More specifically, it failed to confirm that Protestant working class boys are underachieving within the Northern Ireland education system. Such findings have clear policy implications that will likely impact the current direction and evidence base of the rhetoric around religion and attainment, and more specifically, the discourse around Protestant working class boys. Based upon the analysis of this study, it is recommended that future policy direction and initiatives are informed by studies that have statistically tested attainment differences between pupils according to their religious affiliation and has accounted for interactions between factors. In addition, based on the findings of this thesis, it is recommended that policies and interventions focus on SES, gender and school type to mitigate the attainment disparities between pupils, as these have a greater influence on GCSE attainment.

4.5.3 Gender

The findings from the analysis of this thesis highlight that gender remains a key indicator of GCSE attainment in Northern Ireland, when compared to religious affiliation and socio-economic status. Future policy initiatives aiming to reduce gendered attainment disparities should focus on promoting equality in pupils', parents' and teachers' perceptions of school subjects and gender abilities. In addition, ensuring male learning strategies and interests are considered within the classroom structure and curriculum content may also be worth discussing in future policies and initiatives.

4.5.4 School Type

In the executed analysis of this study, grammar school attendance had the greatest effect on GCSE attainment. The main policy implication of such finding is that the selective education system disproportionately benefits grammar school pupils. Future policies and initiatives should therefore ensure that attending a non-grammar school does not act as a barrier to high GCSE attainment in Northern Ireland. When considering this, it is recommended that future policies and initiatives critically discuss how to improve the relative performance of non-grammar schools to reduce the inequality of the selective education system.

4.6 Conclusion

To conclude, the analysis of this thesis highlighted the importance of conducting multilevel models in educational research to account for the clustering of pupils within schools and to allow school level factors to be considered in the same statistical model as individual level factors. The data used for analysis in this study highlighted the importance of school type, gender and socio-economic status, particularly a mother's and a father's education qualifications, FSME and housing tenure. In addition, the data analysis reflected the importance of incorporating interaction terms into statistical analysis to provide accurate arguments about the multiplicative effects of factors. The inclusion of interaction terms ensures there is no reliance on descriptive analyses that have not statistically tested differences or have inferred about the additive effects of factors. Overall, the richness of the linked dataset used for analysis in this thesis provided a unique opportunity to examine post-primary attainment in Northern Ireland according to factors that have not been previously available for analysis in education data. The findings of the models discussed in this chapter therefore aimed to fulfil an existing gap in the literature within the Northern Ireland education context. This will be discussed further in the next chapter.

Chapter Five: Discussion

5.1 Introduction

This thesis had the overall aim of examining post-primary attainment trends in Northern Ireland through the individual and collective influences of socio-demographics and school factors. Within this, three, more specific, aims explored: firstly, the influences of socio-economic status, religion, gender and school type on post-primary attainment in Northern Ireland. Secondly, how interactions between socio-economic status, religion, gender and school type influence GCSE attainment. Thirdly, the unexplained variation in GCSE attainment at the pupil and school level in the full multilevel model. To fulfil these aims, this thesis used the first linked dataset in Northern Ireland to combine the Census (2011), School Leavers Survey and School Census to examine GCSE attainment trends for three whole population Year 12 cohorts from the consecutive academic years of 2010/2011, 2011/2012 and 2012/2013. To date, in Northern Ireland, there has been no education data that has provided an opportunity to execute such an in-depth analysis into the influences of pupil level and school level factors on GCSE attainment. The linked dataset used for analysis in this thesis therefore provided a unique opportunity to explore and discuss a current gap within educational research in Northern Ireland. This chapter critically discusses the key findings of the analysis in relation to existing literature and theory, namely social identity theory and Bourdieu's (1986, 1984) concepts of capital and habitus. The discussion begins with socio-economic status, followed by religion, gender and school type. The interactions between the factors are then discussed. Throughout the chapter, the effect sizes from the full multilevel model are presented for reference. As outlined in Chapter Four, when interpreting the effects discussed in this chapter, it is important to acknowledge that they are within model effects. The original contribution of this thesis to the field of education in Northern Ireland is also highlighted throughout. The empirical and theoretical importance of this study, its strengths and limitations, its implications for policy and practice, and potential next steps for future research are also discussed.

5.2 Socio-Economic Status

Socio-economic status is a prominent factor in understanding attainment disparities across compulsory education in the UK (Hobbs, 2016; Strand, 2014; Themelis, 2013; Strand, 2011; Connolly, 2004). As reflected in Chapter Two, socio-economic status is a multidimensional concept with various factors being used to measure its influence on educational attainment. Socio-economic background therefore remains a complex and important factor to consider in education analysis and is subsequently a core focus to this thesis. No study within Northern Ireland has examined the relative effects of: FSME, maternal and paternal status (education and occupation), property factors (housing tenure and property value) and spatial deprivation (NI-MDM 2010 for income), on GCSE attainment in one statistical model. In Northern Ireland, this is likely to be the result of no previously available datasets providing a linkage between the socio-economic variables from the Census and education attainment data. As a result, the nature of the attainment gap between pupils according to socio-economic status has been somewhat limited to discussions of FSME in Northern Ireland. This thesis aims to provide a contribution to the field by examining the within model effects of multiple SES measures on GCSE attainment in Northern Ireland. The closest analysis to this is provided by Ilie, Sutherland and Vignoles (2017) who conducted an in-depth exploration into the effectiveness of FSME against other SES measures in England, using the LSYPE (Wave 1) and the Census 2001 to compare GCSE attainment in 2006 (n=12,678). The results of this thesis are timely given the newly restored Northern Ireland Executive and its New Decade New Approach deal that highlights the need "… to address links between persistent educational underachievement and socio-economic background…" (Northern Ireland Office, 2020, p.7).

When considering RQ1 of this thesis, the results showed that having a mother with a degree level qualification was the socio-economic factor that had the greatest within model effect on GCSE attainment. Pupils with a mother who had no qualifications had the lowest GCSE scores compared to pupils with a mother who had a degree level qualification (d=-0.27). This was also evident when considering father's education, which had the second highest socio-economic effect within the models. Similarly, pupils with a father who had no qualifications had the lowest GCSE scores compared to pupils with a father who had a degree level qualification (d=-0.20). The relative

effects of a mother's and a father's qualifications on a pupil's GCSE attainment have not been previously considered in the Northern Ireland context. This analysis found that both maternal and paternal qualifications were important predictors of GCSE attainment but it was evident that maternal qualifications had a stronger influence. This is discussed further in Section 5.2.1.

The results of this thesis also highlighted that FSME was the joint third highest effect (with housing tenure) in the SES model and the joint fourth highest SES effect on GCSE attainment in the full multilevel model (with mothers with other qualifications). In both models, pupils entitled to FSM had lower GCSE attainment than pupils who were not entitled to FSM. Free school meal entitlement as a predictor of GCSE attainment in the Northern Ireland context will be discussed in more detail at a later stage in this chapter (Section 5.2.2).

In addition, the analysis found that residing in a privately owned property had the joint third highest effect in the SES model (with FSME) and the third highest effect of SES factors in the full multilevel model. Pupils residing in a privately owned property had higher GCSE scores than pupils residing in a property rented from the Northern Ireland Housing Association/Executive (d=0.18). This finding is supported by existing research conducted in the UK which indicates that pupils residing in property owned outright or with a mortgage have the highest GCSE attainment rates, whilst those residing in property rented from a housing association, council or local authority have the lowest GCSE attainment rates (Lessof et al., 2018; Ilie, Sutherland and Vignoles, 2017; Whelan, 2017; Bramley and Karley, 2007; Ermisch and Francesconi, 2001). Moreover, despite the relevance of property value in examining the relationship between socio-economic status and educational attainment, it has not been previously studied in the UK due to the lack of available data. The data used in this thesis provided the first opportunity to examine the within model effects of property value on GCSE attainment, which held a positive relationship with GCSE attainment. Analysis found pupils residing in property valued at more than £200,000 had the highest GCSE attainment, when compared to pupils residing in property of the lowest value category of less than or equal to £100,000 (d=-0.12).

When considering parental occupation status in analysis, few studies have statistically tested the effects of paternal occupation on GCSE attainment in Northern Ireland and no study in Northern Ireland has statistically tested the effects of maternal occupation on attainment. When considering maternal occupation in the full multilevel model, an unemployed mother had the greatest negative effect on a pupil's GCSE attainment when compared to a mother in a professional occupation (d=-0.13). To a lesser extent, pupils with a mother in a routine occupation had marginally lower GCSE attainment scores than those with a mother in a professional occupation (d=-0.05). In contrast, there was no discernible difference in GCSE scores between pupils with a mother in an intermediate occupation and those with a mother in a professional occupation (d=0.01). With father's occupation, similarly to maternal occupation, there was no discernible difference in the GCSE attainment of pupils with a father in an intermediate occupation and those with a father in a professional occupation (d=-0.01). In addition, having a father with a routine occupation or an unemployed father had the same negative and negligible effect on GCSE attainment within the models, when compared to pupils with fathers in a professional occupation (d=-0.04, respectively). In the Northern Ireland context, Shuttleworth and Daly (2000) examined the influence of fathers' occupational status on GCSE attainment using the Standard Occupational Classification; a measure of which the NS-SEC is based upon. This thesis somewhat supports the finding by Shuttleworth and Daly (2000) that pupils with fathers in professional occupations had higher GCSE attainment than pupils with fathers in non-professional occupations.

The final socio-economic measure included in analysis was the NI-MDM (2010) for income which reflected an increase in GCSE attainment with a one decile increase towards residing in a less deprived area (β=0.16). The NI-MDM (2010) for income deprivation has not been previously examined in relation to educational attainment. This is likely the result of no previous dataset combining Census variables with education data in Northern Ireland. However, across the UK, pupils residing in socially advantaged wards outperformed their peers living in deprived wards. This was evident across various measures of deprivation such as the Income Deprivation Affecting Children Index (Ilie, Sutherland and Vignoles, 2017), the Scottish Index of Multiple Deprivation (Scottish Government, 2016b) and the Index of Multiple Deprivation (Smith et al., 2005). Ilie, Sutherland and Vignoles (2017) used the Income Deprivation

Affecting Children Index in their respective analysis which ranks neighbourhoods based on the proportion of children living in low income households. The authors found this deprivation measure was not a strong predictor of GCSE attainment, when compared to other socio-economic indicators such as FSME, highest parental education and occupation status. The findings of this thesis complement the conclusions from Ilie, Sutherland and Vignoles (2017) but in the Northern Ireland context.

5.2.1 Why does parental education have higher within model effects than all other SES factors?

As outlined above, maternal and paternal qualifications had the greatest socio-economic effects on a pupil's GCSE attainment in both the socio-economic and full multilevel model of this thesis. Analysis found that maternal qualifications had a greater within model effect on GCSE attainment than paternal qualifications (d=-0.27 and d=-0.20, respectively). In the full multilevel model, the difference in the magnitude of the effect between the two parental education categories of no qualifications (d=0.07) suggests that while maternal qualifications had a greater effect on GCSE attainment, both maternal and paternal qualifications were important predictors of attainment. The greater within model effect of maternal qualifications can be explained by the division of labour within the home, where mothers continue to spend the most time on childcare and remain the predominant care provider in the home (Ermisch and Francesconi, 2001; Oakley, 1993). With mothers spending a greater proportion of time with children in the home, their practical inputs such as the use of extensive vocabulary and effectively supporting their child with homework (Harding, Morris and Hughes, 2015), are likely to have a greater influence on a child's educational outcomes than paternal input of similar structures. Mothers are therefore more directly involved in the development of a child's cultural capital (Oakley, 1993), which improves their advantage in the education system. This finding therefore supports the argument from Reay (2005) that mothers have the most influence over a child's education in the home.

More generally, the analysis found that pupils who had a mother with school level qualifications or other qualifications also had lower GCSE attainment than their peers

whose mothers had degree level qualifications (d=-0.10 and d=-0.17, respectively). However, such attainment differences were not as large within the model as that between having a mother with no qualifications and having a mother with a degree level qualification (d=-0.27). This finding was also apparent for fathers' qualifications. Having a father with school qualifications (d=-0.11) or other qualifications (d=-0.15) had a negative effect on GCSE attainment when compared to having a father with a degree level qualification. In the full multilevel model, fathers with school qualifications (compared to degree level qualifications) had a similar effect on a pupil's GCSE attainment to mothers with school level qualifications (d=-0.11 and d=-0.10, respectively). As no educational research in Northern Ireland has examined the influence of mothers' and fathers' education qualifications on their child's GCSE attainment, this study provides an original contribution to the literature within the Northern Ireland context.

The results of this thesis pose the question: why do parental qualifications have higher within model effects on GCSE attainment than all other socio-economic predictors included in analysis? When considering this question, it is important to highlight that parental qualifications provide an insight into the influence of various socio-economic elements that other measures do not. For example, parental qualifications are likely to be a key indicator and determinant of a parent's occupational status, cultural capital, economic capital and social capital. Parental qualifications can therefore provide an insight into parental characteristics that other measures cannot. When considering Bourdieu's (1986) concepts of economic and social capital as explanations to the above question, as education level influences occupational status, parents with high education qualifications are more likely to have greater levels of economic capital than parents with lower or no qualifications. Higher educated parents therefore have more readily available monetary capital to ensure there are educational resources within the home to enhance a child's knowledge and cultural capital to improve their educational attainment (Veenstra, 2010). In addition, based on a parent's economic and cultural capital, a parent's social capital may provide the opportunity to access networks which provide insights into the education processes to help a pupil succeed within the system (Ball, 2003). The social capital of parents with higher education qualifications may also provide them with greater confidence and ability to communicate with those in power in the school environment. In contrast, studies focusing upon mothers with

lower qualifications found they lacked confidence in the school environment and communicating with teachers due to their lower levels of cultural and social capital (Travers, 2017; Reay, 1998).

Building upon the economic and social capital explanations outlined above, the finding that parental qualifications had the greatest within model effects on a pupil's GCSE attainment can be particularly understood through Bourdieu's concept of cultural capital. Bourdieu (1984) outlined cultural capital as an individual's cultural position based on their tastes and knowledge of literature, arts and music. This definition was broadened by Lareau and Weininger (2003) to include the possession of cultural and social competencies such as knowledge of institutional contexts, processes and expectations, along with the skills of reading, communication and analytical reasoning. Cultural capital is a central concept to understand educational success. This is the result of the curriculum content and teaching in the education system being aligned with the expectation that pupils possess a certain level of cultural capital. In turn, the education system works to further develop a pupil's cultural capital through the structure of the school institution and curriculum content.

In relation to above, drawing upon parents' possession of cultural capital, the higher attainment of pupils with highly qualified parents may be the result of such parents learning the knowledge, skills and behaviours that are rewarded within the education system through their own experiences (Lareau and Cox, 2011; Eccles, 2005). Parents with higher education qualifications may therefore be more likely to ensure the development of their child's cognitive and non-cognitive skills within the home that are rewarded within the school environment (Davies and Guppy, 2006). If a parent possesses high levels of cultural capital, they can transmit such capital to their child through learning activities and resources within the home environment to enhance their educational attainment (Davies and Guppy, 2006; Eccles, 2005). For example, parents may read to their children, engage in discussions and watch factual documentaries on current affairs in science, politics, history and the arts. In a cyclical process, the cultural capital a pupil develops and accumulates in the home is built upon and complemented within the school environment (Bourdieu and Passeron, 1979). This process of cyclical reaffirmation between settings is likely to enhance a pupil's cultural capital, which indirectly improves their educational attainment. For parents who have lower

education qualifications, they are less likely to have extensive knowledge of the education system to effectively support and implement learning practices within the home to benefit their child's educational attainment (Reay, 2005, 1998).

In addition, parental knowledge of the wider education system may result in those with higher qualifications making conscious decisions about the primary and post-primary school their child attends. Parents may be selective in such process due to factors such as a school's reputation. Parents with higher qualifications may also be more aware of the top performing schools within a geographical area and the post-primary schools that are most commonly attended by pupils from certain primary schools. Parents with higher qualifications are therefore more likely to have a greater understanding in how the education system works which can help them effectively invest in their child's education to ensure positive outcomes (Lareau and Cox, 2011; Eccles, 2005).

The outlined conscious decisions of parents with higher qualifications and their cultural capital may positively affect their child's education trajectory and aspirations. Although in this thesis we are unaware of the circumstances that have been experienced before and after the data collection points of the Census and GCSE attainment, as highlighted, there are many factors that relate to parents that may feed in to the educational trajectory of a child. Strand and Wilson (2008) note that parents have been viewed as one of the most substantial factors in shaping a child's aspirations as they provide resources, support and encouragement for learning. For example, parents may positively affect the education trajectory and aspirations of their child through the primary and post-primary school chosen, along with the value they place upon education, homework and school activities. This re-emphasises the importance of the home environment and parental characteristics such as higher socio-economic position, all of which have a positive influence on a pupil's education aspirations and attainment.

5.2.2 Is Free School Meal Entitlement an effective indicator of GCSE attainment?

The effectiveness of FSME as a SES measure in educational research has been heavily debated within the literature and at times, has been a controversial topic in Northern

Ireland. This thesis can shed light on the effectiveness of FSME as a useful indicator of SES in Northern Ireland, when compared to other socio-economic measures. The results of this thesis found FSME was the joint third highest effect on GCSE attainment in the SES model and the joint fourth highest SES effect in the full multilevel model. Across the models, the absolute within model effect of FSME remained relatively consistent, with pupils entitled to FSM having lower GCSE attainment than their non-entitled peers (d=-0.17). The analysis of this thesis therefore supports existing studies examining the Northern Ireland context which found pupils entitled to FSM have lower GCSE attainment than their non-entitled peers (Department of Education, 2019a; Borooah and Knox, 2017; Shuttleworth and Daly, 2000; Shuttleworth, 1995). However, some studies that have statistically tested FSME as a predictor of GCSE attainment are somewhat outdated and have not included the full Year 12 cohort of the academic year in focus (Shuttleworth and Daly, 2000; Shuttleworth, 1995). This thesis therefore contributes to the literature by examining the influence of FSME on GCSE attainment compared to other SES measures, using recent attainment data for three whole population Year 12 cohorts in Northern Ireland.

Social identity theory can be used to understand the negative influence of FSME on GCSE attainment. Social identity theory highlights that an individual's behaviour and outcomes (such as educational attainment) can be understood according to the social group they belong to and the subsequent identity they internalise (Hogg et al., 2004). In this case, the social groups are either being entitled to FSM or not entitled to FSM. By identifying with a social group such as being entitled to FSM, an individual internalises associated norms and expectations which influence their behaviours, attitudes and outcomes (Brewer, 2001). In addition, social identity theory continues that if belonging to an in-group such as entitled to FSM is perceived more negatively than the competing out-group of not entitled to FSM, it can impact upon how pupils perceive themselves. Such perceptions can affect education trajectories and outcomes as individuals view themselves in a defined position relative to comparative social groups that may be viewed more favourably (Brewer, 2001). Bourdieu's (1986) concept of capital also provides explanations for the negative influence of FSME on GCSE attainment. Central to the reason behind why the social group of 'entitled to FSM' have lower GCSE attainment than their non-entitled peers are their lower levels of economic capital. Pupils entitled to FSM reside in a household with a total income

of £16,190 or less, or in a household receiving the following benefits: income support, income-based jobseekers allowance, income-related employment and support allowance, state credit pension, child tax credit, working tax credit or universal credit (House of Commons Education Committee, 2014). Low levels of economic capital within households means learning resources that could assist with educational and cultural capital development are less likely to be available within the home (Hirsch, 2007; Ball, 2003). Consequently, in school, pupils from lower socio-economic background are less likely to be equipped socially and cognitively for the expectations of the school learning environment. In relation to this, Lee and Bowen (2006) found that parents of children who are entitled to FSM had less involvement in their child's schooling, fewer educational discussions and lower expectations for their child's attainment, when compared to parents whose children were not entitled to FSM. This may be the result of such parents potentially spending less years in the education system and not having adequate levels of cultural capital to transmit to their children. Subsequently, as the academic culture of the school environment may be unfamiliar to pupils from lower socio-economic backgrounds, it can lead to feelings of isolation and inferiority, thus negatively impacting upon their educational attainment. Travers (2017) suggests this can be linked to schools' failure in acknowledging or understanding the cultural differences of pupils from less advantaged backgrounds. This relates to the argument of Bourdieu and Passeron (1979) that education is a middle-class construct, meaning it is difficult for pupils from less advantaged backgrounds to achieve within it.

Overall, FSME had one of the greatest SES effects within the executed models and reflected a negative impact on GCSE attainment (d=-0.17). Relating this to the debate of FSME effectiveness as a SES measure in education research, it can be argued from these results that FSME has a substantial impact on GCSE attainment in Northern Ireland and therefore remains an important socio-economic measure to consider in educational research in such context. This finding aligns with Ilie, Sutherland and Vignoles (2017) who found parental education (based on the household highest) had a slightly greater explanatory power than FSME in explaining GCSE attainment in England. However, similarly to this thesis, Ilie, Sutherland and Vignoles (2017) do not disregard the importance of FSME in educational research and suggest it is still an effective measure. Although the analysis in this thesis indicates FSME is an effective

indicator of GCSE attainment in Northern Ireland, the results highlight that when multiple SES indicators are available for analysis within one study, these should be included to provide a more in-depth exploration into the influence of socio-economic background, using measures that examine different elements of such concept on GCSE attainment.

5.2.3 Summary of socio-economic status factors

The analysis of this thesis aimed to examine the relationships between socio-economic background and GCSE attainment in Northern Ireland. By doing so, it answered RQ1 and RQ2 of this thesis which were interested in identifying the socio-economic factor that had the greatest effect on GCSE attainment within the executed models. Across both the SES model and the full multilevel model, the magnitude of the socio-economic effects was relatively consistent. In both models, the same two factors had the greatest effects on GCSE attainment: maternal qualifications and paternal qualifications, respectively. This successfully answered RQ1 but failed to confirm H1 of the study which suggested FSME would have the greatest effect on GCSE attainment.

In summary, the original contributions of this thesis in examining the effects of socio-economic indicators on educational attainment in Northern Ireland are as follows. Firstly, the relationship between a mother's qualifications and a pupil's GCSE attainment in Northern Ireland had not previously been considered in statistical analysis until this thesis. Secondly, the relationship between a father's qualifications and a pupil's GCSE attainment in Northern Ireland had not previously been considered. This thesis was therefore the first to examine the relative within model effects of mothers' and fathers' qualifications on GCSE attainment in Northern Ireland. Thirdly, this study was the first to examine the within model effects of a mother's occupational status on GCSE attainment in Northern Ireland. By doing so, it provided the first analysis to examine the relative effects of mothers' and fathers' occupational status on GCSE attainment in Northern Ireland. Overall, this thesis presented the most detailed analysis into the effects of mothers and fathers socio-economic position on GCSE attainment than has previously been provided in the Northern Ireland context. Finally, the relationship between property variables (housing tenure and property value) and GCSE attainment had not been previously examined in

Northern Ireland. This was likely the result of no available data to examine such trends. More specifically, the relationship between property value and GCSE attainment has not been examined across the UK. However, as the data used for analysis in this thesis combined Census (2011) data with education data, it provided the first opportunity to explore these relationships in Northern Ireland; highlighting the original contribution of this thesis.

Overall, the SES analysis provided in this thesis contributes to the literature as it is the only study to examine the relative effects of multiple socio-economic indicators on GCSE attainment in Northern Ireland, within one model. In the wider UK context, the only other study to the author's knowledge to examine multiple SES factors to determine which had the greatest effect on GCSE attainment is by Ilie, Sutherland and Vignoles (2017), who focused upon England and included different factors to this thesis in their respective analysis. Due to the somewhat unique social setting of Northern Ireland as a post-conflict society and its selective education system (both academically and religiously), ensuring analysis examines trends specific to Northern Ireland is important for the implementation of effective policies. In addition, the inclusion of three whole population Year 12 cohorts in this thesis provides an original contribution to the literature as existing education studies in Northern Ireland have only used a sample of, or one, Year 12 cohort in respective analyses. The inclusion of three Year 12 cohorts in this thesis allowed for the within model effects of explanatory factors to be controlled for over different academic years, something of which is not commonly executed in existing studies.

5.3 Religion

It is reported across studies that Protestant pupils have lower GCSE attainment than their Catholic peers (Department of Education, 2019d; Borooah and Knox, 2017; Leitch et al., 2017). More specifically, it is reported Protestant working class male pupils are underachieving in the Northern Ireland education system (this is discussed in more detail in Section 5.7) (Burns, Leitch and Hughes, 2015; McManus, 2015; Lundy et al., 2012; Mulvenna, 2012; Purvis, 2011). However, such discourse is based upon descriptive analysis of GCSE attainment trends in Northern Ireland that use individual religious affiliation or residential wards that are predominantly affiliated

with one religion. Previously, few studies have statistically tested the relationship between religious affiliation and GCSE attainment in Northern Ireland. The lack of existing studies statistically testing the relationship between religious affiliation and GCSE attainment, along with the limited data available to analyse such relationship highlights the need for greater statistical analysis to better inform discourse within the field.

This thesis found religion had a mixed effect on GCSE attainment. Most notably, the direction of the GCSE score difference between Catholic and Protestant pupils was in favour of Protestants. However, the magnitude of this score difference within the model was negligible (d=0.01), suggesting no meaningful attainment difference between the religious groups. This was the most important finding in relation to religious affiliation as Catholicism and Protestantism make up the majority of the population in Northern Ireland according to the 2011 Census (45.1% and 48.4%, respectively) (NISRA, 2012). This result contrasts the discourse of Protestant pupils' underachievement within the Northern Ireland education system (Department of Education, 2019d; Borooah and Knox, 2017; Leitch et al., 2017). When religious affiliation is tested as a predictor of GCSE attainment, the difference between Catholic and Protestant pupils is negligible, meaning the attainment difference is not in the direction, nor as large in magnitude as what is reported in existing studies that often rely on descriptive statistics. In addition, this analysis found that the GCSE attainment difference between no religion pupils and Catholic pupils was negligible within the model (d=0.02). This again questions the extent to which there is a meaningful attainment difference between pupils based on their religious affiliation. Moreover, the GCSE attainment difference between pupils affiliating with other religions and pupils affiliating with Catholicism was marginal within the model (d=0.06). Overall, religion did not have as large an effect on GCSE attainment as expected.

The results of this thesis can be considered in relation to Shuttleworth (1995), who also statistically tested the relationship between GCSE attainment and religion in a sample of 1,480 Year 12 pupils from the Secondary Education Leavers Survey 1990/1991 in Northern Ireland. In contrast to the findings of this thesis, Shuttleworth (1995) found that Catholic pupils had slightly higher GCSE attainment than their non-Catholic peers but this was not a statistically significant difference. In addition, the

findings of this thesis fail to support analysis conducted by Borooah and Knox (2017) on data from the academic year of 2013/2014 (n=22,764). Borooah and Knox (2017) found Catholic pupils were more likely than Protestant pupils to achieve five or more GCSEs A*-C, including English and maths. It is important to highlight the categorisation of religion categories differs between this thesis and the studies presented by Shuttleworth (1995), and Borooah and Knox (2017). Shuttleworth (1995) categorised religion as Catholic and non-Catholic, whilst Borooah and Knox (2017) categorised religion as Catholic, Protestant and other. This thesis has a more sensitive measure of five categories (Catholic, Protestant, other religion, no religion, no stated religion) based upon the 2011 Census and three whole population Year 12 cohorts. The difference in measurement, sample size and covariates included in analysis may explain why this thesis did not support the outcomes of Shuttleworth (1995) and Borooah and Knox (2017).

Relating the above findings to social identity theory, although Catholicism and Protestantism remain the most widely recognised forms of identity in Northern Ireland (Ysseldyk, Matheson and Anisman, 2010; Muldoon et al., 2007; Mitchell, 2005), these social identities did not have as large an influence on GCSE attainment as expected. This suggests that although social identity theory helps our understanding of social group divisions and comparisons in Northern Ireland, the extent to which it explains the lack of an attainment difference between Catholic and Protestant pupils was limited. The theoretical concept of habitus outlined by Bourdieu (1984) can also be drawn upon here. Relating to a collective habitus, community and cultural factors can help explain the similar habitus dispositions shared by individuals from the same religion. For example, due to the historical discrimination experienced, Catholic communities traditionally viewed education as an opportunity to overcome societal biases and improve their overall status (Shuttleworth, 1995), whilst Protestants communities traditionally joined trade occupations and prioritised such training over education (Purvis, 2011). However, as there was no statistically significant attainment difference found in this analysis between Catholic and Protestant pupils, it would suggest that the habitus of the different religious groups is either: not as distinct from one another as expected and subsequently does not have as great an influence on attainment, or, the collective habitus of social groups does not have a substantial influence on GCSE attainment. Similarly to social identity theory, the lack of a

substantial effect and no statistically significant attainment difference between Catholic and Protestant pupils in this analysis questions and limits the explanatory power, along with the suitability of Bourdieu's (1984) concept of habitus in understanding GCSE attainment differences, or the lack of differences, in Northern Ireland according to religious affiliation.

The reporting of the underachievement of Protestant pupils has real implications for community relations and equality of opportunity in Northern Ireland. With regards to community relations, it can lead to animosity between Protestant and Catholic communities. If it is being reported that Catholic pupils are gaining higher GCSE attainment, it can lead to the assumption that Catholic schools are provided better resources than post-primary schools predominantly attended by Protestant pupils. This is reflected in the annual Northern Ireland Life and Times survey which highlighted 14% of adults agreed the government spends more than is fair on schools for Catholic pupils (ARK, 2001a), compared to 7% who agreed the same for schools for Protestants (ARK, 2001b). With 82% of adults in Northern Ireland agreeing that religion will always make a difference to the way people feel about one another (ARK, 2004), it is of key importance that reports of GCSE attainment according to religious affiliation are accurate. This is especially the case to ensure community relations between Catholic and Protestant communities continue to improve, as 88% of adults in the 2013 Northern Ireland Life and Times survey agreed that young people can make a substantial contribution in bringing the two main religious communities together in Northern Ireland (ARK, 2013). The implications of the reporting on community relations also connects with the equality of opportunity for all religions in Northern Ireland. Ensuring the accurate reporting of no statistical difference in the GCSE attainment of Catholics and Protestants will ensure attitudes on the ability of pupils, the performance of schools and the opportunities for employment and further education are informed with an accurate discourse of the attainment trends according to religious affiliation.

In summary, although religious identity remains of key importance to Northern Ireland, it may not be a key driving force behind attainment differentials, despite the currently accepted discourse in the field. This suggests the focus of educational research in Northern Ireland should not be upon: religious identities, the religious

division of pupils in the system or how religion affects attainment but instead focused upon reducing the attainment differences amongst pupils according to factors such as socio-economic status and gender. By focusing on factors that have a greater influence on educational attainment, it will, in turn improve a pupil's attainment regardless of their religion. Overall, the lack of a substantial effect and no statistically significant difference within the model between Catholic and Protestant pupils' GCSE attainment was a somewhat surprising finding in this thesis due to: the emphasis placed upon religion in the Northern Ireland context, religion being a key determinant in post-primary school choice and the focus on reporting attainment differences according to religion in the past.

5.4 Gender

This thesis found female pupils in Northern Ireland achieved higher GCSE scores than their male peers (d=0.27). This supported existing literature in the wider UK context (Department for Education, 2018a; Department for Education, 2018b; Department for Education, 2017a), and further afield in the USA, Canada, Australia, New Zealand and Denmark (Tinklin et al., 2001; Epstein et al., 1999). The effect of gender on GCSE attainment in Northern Ireland had previously been considered in statistical analysis by Shuttleworth (1995), Shuttleworth and Daly (2000), and Borooah and Knox (2017). These studies found male pupils had lower GCSE attainment than their female peers. Other reports in Northern Ireland also found female pupils had higher GCSE attainment than their male peers but did not statistically test such difference (Department of Education, 2019a; Leitch et al., 2017). This thesis therefore provides an updated analysis within the Northern Ireland context of the statistically tested GCSE attainment difference between genders.

The higher GCSE performance of female pupils can be understood through three key areas: the school, the home and the peer group. When considering school level explanations, the classroom setting may favour female learning strategies, leading to male pupils' frustrations that negatively impact their educational outcomes (Leitch et al., 2017; Warrington, Younger and McLellan, 2003; Younger, Warrington and Williams, 1999). This relates to the feminisation of teaching. As a higher proportion of teachers are female, it may result in female teachers favouring female learning

styles, which could negatively impact upon the delivery of the curriculum for male pupils. Moreover, the feminisation of teaching can lead to female pupils being exposed to more positive role models in education, which has a greater positive impact on their academic attitudes, when compared to males. Building upon this, a teacher's expectations and attitudes may influence pupils' gendered attitudes of certain subjects (Salisbury, Rees and Gorard, 1999; Younger, Warrington and Williams, 1999). For example, if a teacher reflects high expectations of female pupils in subjects such as mathematics, it may positively influence female pupils' attitudes and subsequent attainment. This feeds into a pupil's gender identity which can be positively or negatively influenced by teacher attitudes and expectations, which in turn influence a pupil's academic trajectory and outcomes. However, such argument is not clear cut as variations in male social identity are evident within schools (Travers, 2017; Lyng, 2009). For example, Lyng (2009) identified masculinity in schools in the forms of: macho, geek, golden boy and nerd, which provided an explanation for variation in male attainment. By acknowledging this, it shifts focus from deterministic gendered assumptions to an understanding that not all male pupils embody a macho masculinity that may result in lower attainment. However, Connolly (2004) notes that if schools continue to implement processes that do not meet male learning strategies, it may lead to the reinforcement of masculine identities that contribute to the restriction of boys' education outcomes.

Shifting focus to the home environment to understand the higher attainment of females, socialisation may be a key contributor to the difference in attainment rates between genders. As the socialisation process of which boys and girls are exposed to differs, it could be argued it alters their perception of subjects, learning strategies and later educational outcomes (Schmader and Block, 2015). Based upon the gendered socialisation, expectations and norms experienced, it impacts upon an individual's social identity construction. Gendered socialisation may leave individuals more likely to enact gendered behaviour (such as reading for girls) (Chaplin and Aldao, 2013; Francis and Skelton, 2005). However, as females outperform their male peers in GCSE attainment, a shift may be apparent in the socialisation experienced by females in their abilities of once male dominated subjects such as mathematics and science. Traditional gendered social norms relating to these subjects may therefore now be challenged. Based upon such processes, an individual constructs their social identity, highlighting

the intertwined nature of socialisation and identity in explaining gender attainment differences.

The final explanation for gender attainment differences is an individual's peer group. Peer group is a key factor in understanding gendered attainment patterns (Gibbons and Telhaj, 2016; Robertson and Symons, 2003). The peer group an individual belongs to reaffirms their identity, along with characteristics of the in-group and out-group (Tarrant, 2002). For example, if a female belongs to a peer group (in-group) that positively views their academic abilities across all subjects, this is likely to have a positive influence on their attainment, despite the norm associated with their gender's ability in certain subjects. In contrast, in relation to the masculinity study conducted by Lyng (2009), if a male pupil belongs to a peer group (in-group) that associates with the masculine identity of 'macho', it may leave male pupils who have higher attainment to affiliate with the masculine identity of 'geek', which may be deemed as the out-group. Affiliating with an identity such as 'macho' and belonging to such peer group may subsequently have a negative impact on an individual's attainment.

5.5 School Type

As Northern Ireland continues to practice a selective education system, school type remains an important factor to consider in analysis. The descriptive analysis highlighted in Section 4.2.6 indicated that the current rate of pupils attending grammar and non-grammar schools remains consistent with the patterns reported by Gallagher and Smith in 2000. The statistical analysis of this thesis found grammar school attendance was the greatest predictor of high GCSE attainment in Northern Ireland when compared to all other pupil level and school level factors within the model. Pupils attending grammar schools had significantly higher GCSE attainment scores than their peers attending non-grammar schools (d=1.32). This supports previous studies which found grammar school attendance had a positive and statistically significant effect on GCSE attainment in Northern Ireland (Gallagher and Smith, 2000; Shuttleworth and Daly, 2000; Shuttleworth, 1995). In their respective analyses, each of the above studies reported that attending a grammar school had the highest effect on GCSE attainment. More recent reports of the attainment differences according to school type have been provided by the Department of Education (2019d), however

such report only provides descriptive statistics. The data used in this thesis differs from previous studies that have examined the effects of the selective education system in Northern Ireland on GCSE attainment. As the data includes three whole population Year 12 cohorts who completed their GCSEs in consecutive academic years, it is the largest scale study to date to examine the effects of grammar school attendance on GCSE attainment in Northern Ireland. The consistent results of grammar school pupils gaining higher GCSE attainment raises the question of why this is the case. Gallagher and Smith (2000) noted in Northern Ireland, higher entrance grades are the most important factor for attending a grammar school, meaning caution should be taken when examining the effects of school type attended. In addition, Shuttleworth (1995) suggested the dilution of deprivation in grammar schools (fewer pupils entitled to FSM), their academic ethos and high academic expectations of pupils may explain attainment differences by school type. These explanations will be discussed in more detail throughout this section in relation to the theoretical framework of Bourdieu's concepts (1986, 1984) of capital and habitus, and social identity theory.

Bourdieu's (1986, 1984) concepts of capital and habitus are useful in understanding why grammar school pupils have higher GCSE attainment than their non-grammar school peers. The consistently higher performance of grammar school pupils may reflect their higher levels of cultural and economic capital, which assists with their success in the education system. This can be understood through parental socio-economic characteristics. When considering cultural capital, a mother, father, or both parents who have high levels of qualifications are more likely to possess higher levels of cultural capital and knowledge based on their longer years in the education system (Eccles, 2005). Such knowledge about the education system can improve a child's attainment outcomes as higher educated parents are more likely to be confident in the school environment, communicating with teachers and guiding their child's education trajectory (Travers, 2017; Lareau and Cox, 2011; Reay, 2005; Reay, 1998). In addition, the higher levels of cultural capital of highly educated parents can be transmitted directly to a child through the learning strategies practiced within the home to develop and accumulate cognitive and non-cognitive skills that are rewarded in school (Pomerantz, Moorman and Litwack, 2007; Davies and Guppy, 2006; Eccles, 2005). If a higher rate of grammar school pupils has a parent(s) with high qualifications, there is likely to be greater levels of cultural capital amongst grammar

school pupils. This can assist our understanding of the higher GCSE attainment of grammar schools. Moreover, parents with high education levels may also reflect high expectations of their children, which subsequently impacts their child's educational attainment in a positive direction (Pomerantz, Moorman and Litwack, 2007; Eccles, 2005). In sum, parental possession of cultural capital and the transmission of such to their children through their knowledge of the education system, parenting practices, and the expectations and motivation provided to a child, can improve their attainment outcomes. These explanations outline predetermining factors that may assist our understanding of higher GCSE attainment in grammar schools.

When considering explanations according to economic capital, parents with higher qualifications are more likely to have a professional or intermediate occupation than those with low/no qualifications. As a result, they are also more likely to have greater levels of economic capital that can be used to provide educational resources within the home to assist with a child's educational attainment (Veenstra, 2010). Moreover, parents with higher levels of economic capital are more likely to afford and invest in private tutoring for their child to ensure they gain entrance to grammar schools. These additional resources provided to a child based on their parents' economic and cultural capital can therefore improve their educational attainment. If a greater proportion of grammar school parents have both high education qualifications and a professional or intermediate occupation, their children are subsequently at an advantage due to the additional educational resources and capital provided. These capital forms, their accumulation and their development are likely to be complemented in the home and school environments. This process of cyclical reaffirmation of capital accumulation and development between settings enhances a pupil's capital levels, which indirectly enhances their educational attainment. It is therefore not all about what happens when a pupil attends a grammar school; the predetermining factors that assist a pupil in gaining entrance to a grammar school also play an important role in understanding GCSE attainment. It can be argued that it is therefore a concentrated mixture of these outlined predetermining predictors that play a key role in understanding the greater GCSE attainment scores of grammar school pupils in Northern Ireland.

Building upon the above arguments, a central component to the predetermined factors is a pupil's prior academic attainment and ability before they gain a place at a grammar

school. To gain entrance to a grammar school in Northern Ireland, Primary 7 pupils are subjected to an assessment of their academic abilities (the transfer test). Pupils who gain a place in grammar schools are those with high transfer test scores and subsequently, high levels of measured academic attainment and ability. For example, Gallagher and Smith (2000) noted that their analysis found practically all pupils who achieved a grade A in the transfer test attended a grammar school, whilst practically all pupils who achieved a grade D attended non-grammar schools. Moreover, the majority of pupils who achieved a grade B attended grammar schools, whilst the majority of pupils achieving a grade C attended non-grammar schools (Gallagher and Smith, 2000). This provides support to the argument outlined by Gallagher and Smith (2000) that there is limited overlap in the measured attainment and ability of pupils attending grammar and non-grammar schools. Pupils attending grammar schools therefore have higher levels of academic attainment and ability than their non-grammar school peers from the onset, helping explain the consistent GCSE attainment difference in favour of grammar school pupils. Subsequently, it is not necessarily grammar schools as a structure that lead to higher GCSE attainment but the pre-existing levels of high academic ability and attainment that grammar school pupils possess. Within the Northern Ireland context, Gallagher and Smith (2000) emphasised that the achievement of a high transfer test grade was the most important factor in gaining entrance to a grammar school. As a result, caution should be exercised when determining the effect of school type and the transfer test on later academic attainment.

Moreover, the geographical location where a pupil resides is also an important explanatory factor in understanding the effects of school type on GCSE attainment. Although a slightly outdated study, Shuttleworth and Daly (2000) found a higher proportion of pupils (60%) residing in the 25% least deprived wards in Northern Ireland attended grammar schools, compared to 20% of pupils living in the 25% most deprived wards. These results illustrated a negative correlation between residing in deprived wards and attending grammar schools, which negatively impacted educational attainment. This relates to Shuttleworth's (1995) argument of grammar schools reflecting a dilution of deprivation as fewer pupils reside in deprived wards and a lower proportion are entitled to FSM. A more recent study conducted by Gorard and Siddiqui (2018) in England supports the above findings in the Northern Ireland context, with the authors adding that grammar school pupils were more likely to live

in less deprived areas in England. In summary, the lower deprivation of the neighbourhoods grammar school pupils are likely to reside in; the higher transmission and possession of cultural and economic capital from their parents; the greater educational resources available within the home; prior academic ability and the likelihood of highly ranked post-primary schools being located in less deprived neighbourhoods, are all potential explanatory factors to consider when examining the higher attainment of grammar school pupils in Northern Ireland.

Drawing upon social identity theory and accounting for the predetermining factors discussed above, when a pupil begins to embed themselves within the school they attend and identify as a pupil attending such school type, it affects their social identity and how they perceive themselves within the wider education system. If attending a grammar school is viewed positively (in-group), it can positively influence an individual's perception of themselves and indirectly enhance their educational attainment. In addition, the norms and expectations associated with the social group of 'grammar school pupils' will be influenced by the academic ethos and high academic expectations such school structure places upon their pupils. Pupils' identification with the school type they attend and the expectations affiliated with such identity are therefore influential on their behaviours and subsequent educational outcomes. This reflects that a pupil's identification with the school type they attend can alter their internal dispositions (habitus). This change in habitus according to the school type attended can also enhance the cultural capital an individual possesses through greater levels of such evident in grammar schools, which may indirectly improve their educational outcomes.

The above discussion clearly indicates that Bourdieu's concepts of capital and habitus, along with social identity theory are useful in understanding GCSE attainment differences according to school type in Northern Ireland. However, the outlined explanations embedded in the theoretical framework encompass a range of predetermined factors that are external to the school type attended and its environment. Therefore, the results of this study do not necessarily indicate that grammar schools as an educational institution are causing higher GCSE attainment but instead their associated characteristics may be of greater relevance. With the outlined predetermining factors and a pupil's academic ability prior to their attendance at a

grammar school being of key importance, it raises a question surrounding the effectiveness of a selective education system. Gorard and Siddiqui (2018) examined the effectiveness of academic selection and the role of ability in England, using the Key Stage 4 cohort from the National Pupil Database in 2015 (n=549,203). Gorard and Siddiqui (2018) stated that at present, once prior ability and attainment is accounted for, it cannot be concluded that grammar schools are obtaining better results than non-grammar schools, when equivalent pupils in terms of family income (FSME), ethnicity and residential location, are compared in the different school structures. Gorard and Siddiqui (2018) concluded from their analysis that a selective education system does not lead to better results for either grammar or non-grammar school pupils, once the intake characteristics of pupils attending grammar schools are accounted for. Such argument was also reflected by Kitchen and Hobbs (2016) who noted the difficulty in estimating the impact of school type on attainment as differences in outcomes may be explained by other intertwined factors such as the prior attainment of pupils and the varying characteristics of pupil intakes to different school types.

More broadly, the OECD (2019) considered the effectiveness of selective education systems across different geographical contexts according to PISA data from cycles 2000-2015. The OECD (2019) suggested that placing pupils into schools according to their ability can have detrimental consequences on the efficiency, equity and aggregated performance of a school system. The OECD (2019) also highlighted the negative consequences a selective education system may have on social cohesion as it limits the opportunities for pupils to learn and communicate with peers from different social backgrounds as they are likely to attend different schools. Moreover, the OECD (2016) noted that after accounting for the socio-economic profile of pupils and schools, the association between pupils' performance and schools' selective admission policies was weak and observed in less than half of the countries that participated in PISA 2015. The OECD (2019, 2016, 2013) reports concluded that the overall performance of a school system does not improve if it has a greater proportion of academically selective schools. Overall, it is therefore clear that when examining the effects of school type on attainment, the interpretation of such should be exercised with caution due to the influence of a range of predetermining factors. Consequently, the relationship between school type and attainment is not one of a direct causal nature.

5.6 Summary

This thesis aimed to examine which socio-demographic or school level factor had the greatest effect on GCSE attainment in Northern Ireland. The key factors of interest were: socio-economic status, religious affiliation, gender and school type. This analysis answered RQ1 that was interested in which socio-economic status factor had the greatest effect on GCSE attainment within the models (maternal qualifications). The effects of socio-economic status and how it related to RQ1 were outlined and summarised above (Section 5.2-5.2.3). In addition, RQ2 which focused on the within model effects of socio-economic status, religion, gender and school type on GCSE attainment was answered through the executed analysis.

In relation to RQ2, it was found that school type had the greatest within model effect on GCSE attainment in Northern Ireland. This was a key predictor in analysis as it controlled for the selective education system practiced in Northern Ireland. This finding highlighted its substantial influence on pupils which positively favours those attending grammar schools. The within model effect of attending a grammar school was substantially larger than the second highest effect of gender in the full multilevel model. This finding complements previous studies in Northern Ireland that found grammar school attendance had the largest effect on GCSE attainment. However, the analysis in this thesis differs from previous studies as it used up to date data from three whole population Year 12 cohorts to control for the effects of school type across three consecutive academic years, which had not been previously executed. The higher attainment of grammar school pupils can be explained by social identity theory and Bourdieu's (1986, 1984) concepts of capital and habitus. These theories are an effective framework to understand attainment disparities in Northern Ireland according to school type attended.

The second largest within model effect was females having higher GCSE attainment than their male peers. This finding complemented previous studies in Northern Ireland and the wider UK context. Social identity theory was an effective explanation to understand gender differences in educational attainment. The next highest effects in analysis were the socio-economic measures of maternal and paternal qualifications (having a mother/father with no qualifications (compared to a mother/father with a degree level qualification, respectively)). Bourdieu's (1986) concept of capital was

useful to understand GCSE attainment differences according to parental qualifications. These socio-economic measures have not previously been examined in educational research in Northern Ireland, highlighting the contribution of this thesis to the literature.

Finally, in relation to RQ2, the findings of this thesis found that religion had the smallest and most varying within model effect on GCSE attainment, when compared to the other key predictors. This was the most surprising finding, one that also questioned the usefulness of social identity theory and Bourdieu's (1984) concept of habitus in understanding attainment according to religious affiliation in Northern Ireland. This finding is an important contribution to the literature as it statistically tested the relationship between religious affiliation and GCSE attainment, which few studies in Northern Ireland have executed. It also contrasts the suggestion that Protestant pupils are underachieving compared to their Catholic peers, therefore providing an informed analysis that will contribute to the discourse of the influence of religion on GCSE attainment in Northern Ireland. Overall, no study in Northern Ireland has examined GCSE attainment according to the range of factors included in this thesis. This is the result of some predictors only becoming available through the linkage of Census data with education data in Northern Ireland that was executed for this study.

5.7 Interaction of variables

Interaction terms that examine the multiplicative effect of factors on GCSE attainment are not commonly used in education research in Northern Ireland. Instead, there is an overreliance on the additive effects of factors which do not statistically test group differences. Interaction terms highlight the importance of viewing attainment differences between social groups as a multidimensional issue, with some factors having varying effects on different social groups of pupils. In the Northern Ireland context, no previous educational research has statistically tested interactions between: gender and FSME; gender and religion; gender, religion and FSME; gender and mother's education; gender and father's education; gender and school type; religion and school type, and FSME and school type. As Northern Ireland reflects a different context to the rest of the UK through its selective education system (both academically

and religiously) and transition to a post-conflict society, the extensive use of interaction terms in this thesis provided an original contribution to the literature. This is important as only one of the above interaction terms have been previously considered in the Northern Ireland context (Catholic and FSME (Shuttleworth, 1995)) and the structure of other interactions (gender-FSME, and gender-religion-FSME) in existing studies failed to examine between gender differences and between FSME status differences in the respective interaction terms (Borooah and Knox, 2017).

This thesis examined a total of 10 interaction terms, five of which were not statistically significant (gender and FSME; religion and FSME; gender, religion and FSME; gender and mother's education, and Catholic and grammar). This suggested there were no statistically meaningful differences in the GCSE attainment of pupils included in the interactions. For the interactions between gender and FSME, and religion and FSME, it suggested neither the interaction of gender nor religion with FSME had a substantial effect on GCSE attainment within the model. Existing studies have debated the statistical significance of the interaction effect between gender and FSME in England. The Department for Education and Skills (2007) found this interaction was statistically significant, yet Cassen and Kingdon (2007) found the interaction was not statistically significant. The finding of this interaction term not being statistically significant in the analysis of this thesis is particularly important for Northern Ireland. Given the complexity of the Northern Ireland context in relation to its transition to a post-conflict society and the implementation of a selective education system, the effects of interaction terms on educational attainment in England are not necessarily a natural comparator given the differences in context but remain the most effective comparators available.

When considering the interaction between religion and FSME, this thesis found it was not statistically significant in the executed model. However, Shuttleworth (1995) found in his analysis that Catholic pupils not entitled to FSM had significantly higher GCSE attainment than non-Catholics entitled to FSM. Although this thesis does not support Shuttleworth's finding, this could be the result of varying analytical strategies and religion categories between the studies. For example, Shuttleworth (1995) examined religion according to two categories: Catholics and non-Catholic pupils. These were derived from a sample of pupils from the Secondary Education Leavers

Survey in 1990/1991 (n=1,480). In contrast, this thesis examined religion in the interaction term using a more specific binary measure of Catholic and Protestant (the remaining religion categories were coded as missing) for three Year 12 pupil cohorts (n=48,619), rather than a sample of pupils. The variation in sample size, religion categories and covariates included in the respective models is likely to have affected the difference in statistical significance of the interaction term.

Moreover, there was no statistically significant effect of the interaction between gender and mothers' education in the executed model. This suggests a mother's education had no significant difference in its influence on the attainment of pupils according to their gender. A mother who holds some level of qualifications compared to a mother who holds no qualifications will possess a higher level of cultural capital, which indirectly, positively affects her economic and social capital. With higher levels of cultural, economic and social capital, mothers with qualifications can confidently support their child's education and subsequent attainment through effective learning strategies and educational support in the home (Travers, 2017; Reay, 2005; Reay, 1998). The positive influence of the capital possession of a mother is unlikely to differ for children according to their gender. Instead, it is the sole possession and transmission of these capital forms, especially cultural capital that is most important, rather than the gender of the child. In addition, in the executed analysis, affiliating with Catholicism or Protestantism did not have a statistically significant effect on a pupil's attainment according to the school type they attended. This may suggest that school type is a greater predictor of a pupil's GCSE attainment, regardless of their religious affiliation. This relates to the 'grammar school effect' (Gallagher and Smith, 2000), which suggests the characteristics of a grammar school are likely to have a preceding influence on pupils, regardless of other socio-demographics such as their religious affiliation.

In addition, the interaction between gender, religion and FSME was not statistically significant in the executed model. Relating this to Section 5.3 which examined the relationship between religious affiliation and GCSE attainment, this interaction term not being statistically significant contrasts existing discourse within Northern Ireland that forwards Protestant working class boys are underachieving (Burns, Leitch and Hughes, 2015; McManus, 2015; Lundy et al., 2012; Mulvenna, 2012; Purvis, 2011).

Existing studies have defined the three concepts similarly to this thesis; gender and religious affiliation are taken from pupil level data and 'working class' is determined according to a pupil's FSME. Despite similarities in defining this social group, a fundamental difference between existing studies and this thesis is the examination of Protestant working class boys' GCSE attainment according to a statistically tested interaction term. In existing studies, the additive effects of factors in statistical and descriptive analyses have been used as evidence to underpin this discourse. However, as highlighted, interaction terms are of key importance to understand the multiplicative (combined) effects of factors. Interaction terms ensure the additive effects of factors are not used to make inferences about their multiplicative effects which can reflect a different pattern. Although Borooah and Knox (2017) examined the collective effects of SES and religion on GCSE attainment in Northern Ireland for each gender, such interactions failed to analyse between gender differences and between FSME status differences. The finding of this thesis overcomes such limitation by providing an interaction term that statistically tests between group differences for all three factors included in the interaction.

A total of five interaction terms were statistically significant in analysis: gender and religion; gender and fathers' education; gender and school type; other religion and school type, and FSME and school type. The interaction term between gender and religion examined the two predominant religions of Catholic and Protestant. For the purposes of the interaction, the remaining religion categories were coded as missing. This interaction provided further evidence that Protestant boys are not underachieving in the Northern Ireland education system. This interaction found both Catholic females and Protestant females had higher GCSE attainment than Protestant males in the executed model (d=0.28 and d=0.27, respectively). However, the GCSE attainment difference between Catholic males and Protestant males was negligible (d=-0.04), questioning the extent to which there was a practically meaningful difference between male pupils based on religion. Despite the effect direction being in favour of Protestant males, as the difference is negligible, the findings of this interaction term contradict the discourse that Protestant boys have the lowest GCSE attainment in Northern Ireland. Although this interaction term was statistically significant in the executed analysis, the higher performance of Catholic and Protestant female pupils compared to their Protestant male peers suggests gender is the driving predictor in this interaction

term. Equally, this suggests religion does not exacerbate attainment differences between pupils to the extent suggested in previous studies.

Although the interaction between gender and mothers' education was not statistically significant, the interaction between gender and fathers' education was statistically significant. Surprisingly, the interaction term between gender and maternal education found a mother's qualifications mattered the same for pupils regardless of their gender but the influence of paternal qualifications differed according to the gender of pupils. The interaction term found male pupils with a father who had no qualifications had the lowest GCSE attainment compared to the reference category of female pupils with a father who had some level of education qualifications (d=-0.47). The magnitude of effects reflected in this interaction between groups suggests gender is a driving force. With the interaction between gender and a father's qualification not being previously examined, this is a potential area for further examination in future studies.

Cross-level interactions were also examined to provide an insight into the multiplicative effects of the selective education system and a pupil's socio-demographic profile on GCSE attainment. Cross-level interactions have not been previously examined in Northern Ireland, highlighting the contribution of this thesis to the literature. The interaction term between gender and school type reaffirmed the positive influence of attending a grammar school, with grammar school pupils of both genders gaining higher GCSE attainment than their male and female peers attending non-grammar schools. In addition, the cross-level interaction between affiliating with 'other' religions and attending a grammar school found that there was no discernible attainment difference between grammar school pupils affiliating with 'other' religions and those affiliating with Catholicism, Protestantism, no religion and no stated religion (d=-0.02). Such a small difference may suggest that the attendance of a grammar school is a more important predictor in this interaction than the religious affiliation of a pupil. The third cross-level interaction that was statistically significant in analysis was between FSME and school type. This interaction found that pupils attending non-grammar schools that were either entitled or not entitled to FSM had lower GCSE attainment than grammar school pupils entitled to FSM (d=-1.45 and d=-1.23, respectively). The higher GCSE attainment of pupils entitled to FSM attending grammar schools, compared to pupils not entitled to FSM attending non-grammar

schools, once again indicates the influence of attending a grammar school on attainment. As outlined previously, the 'grammar school effect', the characteristics of grammar school pupils and the subsequent dilution of deprivation within such school structure are important explanations for why grammar school pupils gain higher GCSE attainment than their non-grammar school peers in the cross-level interactions.

The cross-level interactions outlined above support Bourdieu's (1986, 1984) concepts of capital and habitus, along with social identity theory. Drawing upon Ingram (2011), an individual's habitus can be influenced by two incompatible fields: the field of origin (socio-demographic profile) and the social field (grammar/non-grammar school attendance). If the two fields conflict, for example, being from a deprived background and attending a grammar school, it may result in the influence of one field outweighing the other. For example, despite pupils sharing similar habitus structures according to socio-demographics such as their gender and socio-economic background, the influence of the school type attended may be greater for those attending grammar schools. Therefore, if a pupil attends a grammar school, this may be their predominant social identity which positively influences their outcomes, regardless of their other identity forms based on SES, religion or gender. This perspective also highlights that attainment differences within a social group may be evident as not all individuals associating with such group may accept and enact their identity to the same extent. This theoretical explanation based on Bourdieu and social identity theory is helpful when considering why grammar school pupils have higher attainment trends regardless of their socio-economic background, religion or gender.

5.7.1 Summary

In summary, the extensive use of interaction terms in this thesis highlight the importance of viewing attainment differences between pupils as a multidimensional issue. As reflected through the examination of both pupil level and cross-level interactions, pupil level socio-demographics and school level factors do not work in isolation but interact to collectively influence attainment. Interaction terms in this thesis therefore acknowledge the complexity of the attainment differences between pupils by examining the multiplicative effects of factors. The aim of these interaction terms was to methodologically move beyond what many studies in the Northern

Ireland context have executed in their respective analyses to better understand educational attainment disparities. The inclusion of interaction terms aimed to answer RQ3 and RQ3a of this thesis that were interested in the effects of possible interactions between predictors on GCSE attainment. More specifically, RQ3a was interested in examining the attainment of Protestant working class boys to analyse whether they were underachieving compared to their peers. However, the interaction term aiming to answer RQ3a was not statistically significant. This thesis therefore did not find evidence to support the rhetoric of Protestant working class boys underachieving within the Northern Ireland education system. This was further evidenced by the interaction between gender and religion, which found although Protestant boys had marginally greater GCSE attainment scores than Catholic boys, the difference was negligible within the executed analysis of this thesis. Such findings are of relevant timing to Northern Ireland with the newly restored Executive highlighting the need to address Protestant working class boys' attainment (Northern Ireland Office, 2020). The findings of the interaction terms in this thesis can effectively be explained through the theoretical framework of Bourdieu and social identity theory.

5.8 Variation

This thesis also examined the level of unexplained variation in GCSE attainment at the pupil and school level in the full multilevel model. In doing so, RQ4 of the thesis was answered. To interpret the unexplained variation at the individual and school level, the random parts of the multilevel model were examined. The null model indicated that approximately half of the variation in GCSE attainment was at the school level and half was at the pupil level. When the full multilevel model was considered, the proportion of unexplained variance at the school level decreased considerably to 13.9%. This suggests that most variance at the school level was explained by school type and school management structure, whilst most of the remaining unexplained variation of GCSE attainment was at the pupil level. A discussion on the remaining unexplained variation at the pupil level will be provided later in this chapter (Section 5.11). The remaining unexplained variance at the school level could be hypothetically explained by school ethos. Ellis (2013) defined school ethos as the experienced or perceived culture of the institution, which can positively influence a pupil's sense of belonging, confidence and relationships with teachers. As outlined by Ellis (2013), Deal and Peterson (1999) noted there were four key elements to a school's ethos (or

culture): firstly, a collective vision of all parties on the purpose of education; secondly, the implemented rituals and traditions of a school; thirdly, the history of a school and how it relates to its present context, and finally, the architecture of the school building and school symbols which promote an effective learning environment and a sense of belonging. In turn, each of these outlined elements can positively influence the educational attainment outcomes and trajectory of pupils. As highlighted by Ellis (2013) and Deal and Peterson (1999), the school level concept of ethos is wide ranging in the factors it encompasses. It may therefore be an effective explanatory factor to understand the remaining unexplained variance in GCSE attainment at the school level.

In addition, a pupil's prior attainment is likely to be an omitted variable in analysis that could help explain the remaining unexplained variation in GCSE attainment at both the school and pupil level. Prior attainment was not accounted for as a separate measure in analysis as such indicator was not available in the dataset. When considering prior attainment at the school level, some of its related variance will be included in the explained variance of school type. This is the result of academic selection in Northern Ireland, with pupils who gain high transfer test grades gaining entrance to a grammar school (Kelleher, Smyth and McEldowney, 2016; Gallagher and Smith, 2000). As a result, grammar school pupils are more likely to have higher prior attainment than their non-grammar school peers, and subsequently are more likely to achieve higher GCSE grades. This is discussed in detail in Section 5.5. Prior attainment is therefore important in determining the school a pupil attends, whilst also providing an insight into their academic abilities and intelligence. As a result, it is likely prior attainment would have added a substantial level of explanatory power to the multilevel model at the school level, which in turn, would have also included variance related to a pupil's academic ability and intelligence. A pupil's academic ability and intelligence will be outlined in greater detail in Section 5.11, when unexplained variance at the pupil level is discussed.

5.9 Study Importance

5.9.1 Theoretically

The theory of social identity and Bourdieu's (1986, 1984) concepts of capital and habitus were used throughout this thesis to assist our understanding of GCSE attainment differences in Northern Ireland based on a pupil's socio-demographic profile and school level factors. To the author's knowledge, this was the first instance that social identity theory and Bourdieu's concepts had simultaneously been used within a theoretical framework to understand educational attainment disparities in Northern Ireland. This thesis highlighted that these theoretical perspectives predominantly complement one another and combined, provide a good fit to understanding educational attainment in Northern Ireland. The combined perspective of social identity theory and Bourdieu's (1986, 1984) concepts of capital and habitus was extremely helpful when considering the influence of SES and school type on attainment, as Bourdieu's concepts effectively filled the relative explanatory gaps of social identity theory.

This thesis reaffirmed the effectiveness of using social identity theory in Northern Ireland; thus, supporting Bloomer and Weinreich (2004) who stated social identity theory was a dominant theoretical underpinning of research in Northern Ireland. This thesis has also highlighted the importance of shifting focus from examining only one aspect of an individual's identity to viewing identity as a multidimensional concept. In doing so, this thesis acknowledged the questions posed by Hogg et al., (2004) of whether identities are related to one another and whether multiple identities can simultaneously be viewed as important as one another. The findings suggest that multiple identities can be related to one another, as highlighted through the statistical significance of interaction terms executed in analysis. The interaction terms also suggest identities may be simultaneously as important as one another but this is likely to be dependent upon the individual. The interaction terms highlight that factors are collectively important in the creation of an individual's overall identity, which impacts their GCSE attainment.

Similarly, the use of Bourdieu in this thesis reaffirmed the appropriateness of using the concepts of capital and habitus to study educational attainment disparities in the Northern Ireland context. Bourdieu's concepts are especially beneficial in explaining

the influences of the selective education system and SES on GCSE attainment in Northern Ireland. This thesis has also highlighted how Bourdieu's (1986, 1984) concepts of capital and habitus can be successfully used in conjunction with social identity theory to provide a more in-depth understanding of educational attainment trends. The use of Bourdieu in this study not only complemented the theoretical perspective of social identity but also filled the explanatory gaps that social identity fell short in fully explaining, especially in relation to socio-economic factors. This thesis therefore highlights the appropriateness of using more than one theory to effectively explain educational attainment trends according to a wide range of socio-demographics and school level factors.

5.9.2 Empirically

The data used in this thesis was central to its empirical contribution. This thesis used the first dataset in Northern Ireland to combine the Census (2011), School Leavers Survey and School Census for analysis. This data linkage provided the first opportunity to examine GCSE attainment of three consecutive Year 12 cohorts, according to predictor variables that had not been previously analysed in Northern Ireland. These factors included: housing tenure, property value, mothers' education, fathers' education, mothers' occupation and NI-MDM (2010) for income. Subsequently, the analysis of this thesis was the first to include multiple socio-economic measures to examine their relative effects on GCSE attainment in Northern Ireland. Such analysis is timely given the aims of the newly restored Northern Ireland Executive in examining the links between socio-economic background and educational attainment. More generally, the richness of the data provided an opportunity to examine the relationship between the value of the property in which a pupil resides and GCSE attainment. This relationship had not been examined in the UK context, thus highlighting a wider knowledge gap this thesis examined. Furthermore, the data structure allowed a continuous measure of GCSE attainment score to be created for analysis, which provided each alphabetical grade a numeric score. This closely aligned with the shift in the grading system in England and Northern Ireland. The use of a continuous GCSE score also provided an opportunity to view attainment on a continuum, rather than a binary structure that removes the complexity of the different attainment magnitudes. The in-depth analysis presented in

this thesis reflects the benefits and importance of merging existing data to provide an inclusive understanding of educational attainment trends in Northern Ireland to better inform policy, practice and discourse within the field. This thesis supports and advocates the perspective of the House of Commons Education Committee (2014) which argued the importance of allowing education attainment data to be linked with family background data to allow for the relationships between attainment and socio-economic/socio-demographic measures to be examined.

The empirical contributions of the analysis can be understood according to the key factors of interest. In relation to socio-economic status, this thesis examined indicators that had not been previously studied in Northern Ireland. Thus, the findings of this thesis provided a greater in-depth insight into the influence of SES on GCSE attainment in Northern Ireland than that previously available. The analysis highlighted that parental qualifications, residing in a privately owned property and FSME had the greatest within model SES effects on GCSE attainment. Such findings are important as parental qualifications and housing tenure had not been previously examined in education studies in Northern Ireland. This thesis also highlights that despite the debate surrounding the effectiveness of FSME, it has a significant effect on GCSE attainment. Although FSME does not have the highest SES effect in the executed models, it remains an important indicator of educational attainment in Northern Ireland. However, based on the findings of this thesis, it is recommended that when possible, parental education qualifications are used in addition to FSME in studies examining the influence of SES on attainment, to provide a more in-depth understanding of trends based on different socio-economic measures.

In relation to religious affiliation, its relationship with GCSE attainment in Northern Ireland is often reported through descriptive statistics, with few studies statistically testing its effects on GCSE attainment. This thesis provided an in-depth statistical analysis and found no significant difference in the GCSE attainment of Catholic and Protestant pupils within the executed models. The influence of religion on GCSE attainment was also considered through interaction terms in analysis, which failed to support the discourse that Protestant working-class boys are underachieving within the Northern Ireland education system. Further evidence for this was provided through the interaction term for gender and religion which indicated the attainment difference

between Catholic males and Protestant males was negligible. Overall, the analysis throughout this thesis highlighted that Protestant pupils are not underachieving within the Northern Ireland education system. More specifically, Protestant boys and Protestant working class boys are not underachieving. This is a key contribution of a timely manner as it suggests religious affiliation at the pupil level is not as substantial a predictor of educational attainment in Northern Ireland as suggested by existing discourse. The analysis of this thesis suggests socio-economic status, gender and school type are driving attainment differences between social groups of pupils more heavily than religious affiliation. The greater within model effects of these predictors will indirectly affect the attainment of pupils affiliating with different religions as they also belong to these respective social groups. As a result, policy and practice aiming to reduce attainment disparities between pupils may be more effectively directed by predominantly focusing on gender, socio-economic and school type, rather than religion.

Finally, interaction terms that examined the multiplicative effect of factors on GCSE attainment are not commonly used in education research in Northern Ireland. Instead, there is a reliance on the additive effects of factors which do not always robustly test between group differences. Interactions between: gender and FSME; gender and religion; gender, religion and FSME; gender and mother's education; gender and father's education; gender and school type, religion and school type, and FSME and school type, had not previously been statistically tested in Northern Ireland. This thesis therefore contributes to the literature through its extensive use of interaction terms in analysis.

Overall, this thesis is an important study for the Northern Ireland context as its transition to a post-conflict society, its selective education system, and its socio-historical and cultural factors mean studies outside of Northern Ireland cannot be relied upon to infer about its attainment trends. In summary, this thesis has provided a contribution to the literature by examining multiple socio-economic predictors within one statistical model to determine which is the most effective measure of GCSE attainment. This analysis has been previously restricted in Northern Ireland due to the limited availability of data. The findings of this thesis highlight the relative importance of parental qualifications and housing tenure on GCSE attainment within the executed

models; factors that are not commonly analysed within education studies in Northern Ireland. This thesis also reaffirms the importance of FSME as a predictor of GCSE attainment. Moreover, this thesis provides an informed discourse around the effects of religious affiliation on educational attainment in Northern Ireland. The analysis found religion was not a main driver of GCSE attainment and fails to support the rhetoric that Protestant pupils and more specifically, Protestant working class boys are underachieving within the Northern Ireland education system. Finally, this study reflects the importance of viewing pupils as a heterogeneous social group that factors affect differently, thus emphasising the importance of interaction effects in educational research, especially in Northern Ireland where such analysis is lacking.

5.10 Study Strengths

A key strength of this study was the data used for analysis. The data provided the largest cohort of pupils and schools that has been available for analysis in Northern Ireland. As the data provided three whole population Year 12 cohorts at the pupil and school level, the data are nationally representative in its results. The large scope of the data allowed for the operationalisation of a comprehensive analytical framework that accounted for various pupil level socio-demographics and school level factors to explain GCSE attainment patterns in Northern Ireland; some of which had not been analysed until this study. In addition, controlling for the within model effects of the predictor variables across three consecutive academic years had not been previously executed in education studies in Northern Ireland, indicating a strength of this thesis. Moreover, the scope of the data provided an opportunity to create a GCSE score indicator that measured GCSE attainment on a continuum which varied in magnitude, rather than a static binary outcome. This attainment measure aligned with the shift in the GCSE grading system in England and Northern Ireland, allowing the results of this thesis to be comparable with future studies and reports using the new numerical grading system. Finally, the statistical method of multilevel modelling used to execute analysis in this thesis provided the possibility of examining school level effects in the same model as pupil level effects, whilst ensuring the clustering of pupils within schools was accounted for. The calculation of effect sizes also allowed for comparability with other studies which was a key strength. Overall, the data and methods employed in this thesis allowed a more detailed examination of the influence

of a pupil's socio-demographic profile and school level factors on GCSE attainment than has previously been achieved in Northern Ireland.

5.11 Study Limitations

Unexplained variation in GCSE attainment at the pupil and school level was examined in the full multilevel model. As outlined previously (Section 5.8), in the full multilevel model, there was 13.9% of variance that remained unexplained at the school level. This suggested that the school level factors in the full multilevel model (school type and school management structure) explained a high proportion of variation in GCSE attainment. However, at the pupil level, 86.1% of the total variance remained unexplained in the full multilevel model. This indicates that there were pupil level factors not included in the model that may be important predictors of GCSE attainment. Such finding reflects the limitation of omitted variable bias in this study, which is particularly relevant at the pupil level of the full multilevel model. There are factors that are likely to be important pupil level predictors of attainment that were not measurable concepts in the data used for analysis. Some of these are discussed below.

As outlined in Section 5.8, a pupil's prior attainment was an omitted variable from analysis due to its unavailability in the dataset. If it was available for inclusion as a co-variate, it is likely to have explained variance in GCSE attainment at both the pupil and school level. Building upon the discussion in Section 5.8, when considering prior attainment at the pupil level, it is likely to have explained variation by providing an insight into a pupil's academic ability and intelligence. This is supported by Deary et al. (2007) who found that pupils' cognitive, mental and verbal abilities contributed to their academic attainment. Similarly, Morris, Dorling and Smith (2016) found pupils with greater cognitive abilities had higher academic attainment, whilst Krapohl et al. (2014) highlighted a positive relationship between a pupil's intelligence and GCSE attainment.

Prior attainment may have also explained variance in GCSE attainment in relation to a pupil's aspirations and attitudes. Subsequently, a pupil's aspirations would have been an important covariate to include in analysis if it was available in the dataset. This is due to a pupil's aspirations and expectations of their attainment having the potential to

influence their trajectory. If a pupil holds high aspirations, it can enhance their attainment (Khattab, 2015), by increasing their motivation and work ethic to gain high levels of attainment. This is further supported by Chowdry, Crawford and Goodman (2011) who found that pupils who had high aspirations and expectations of their academic ability had higher GCSE attainment. In relation to this, the peer group a pupil affiliates with can also influence their GCSE attainment (Mendolia, Paloyo and Walker, 2018). A peer group provides a pupil with an identity which is likely to influence their academic aspirations. This highlights the interconnectedness and importance of these factors which were not available nor subsequently included in analysis.

Furthermore, prior attainment may have also explained variance in GCSE attainment in relation to a pupil's home environment. The home environment relies heavily upon parental input. A pupil who has parents that provide educational resources within the home to improve their academic readiness and ability are likely to have higher educational attainment (Davies and Guppy, 2006; Eccles, 2005). This is further supported by Sammons et al. (2014) who found that pupils who had access to home learning resources and parents who were interested in their schooling were more likely to have higher GCSE attainment. Despite the importance of prior attainment and the home environment, these indicators were not available in the dataset used for analysis.

Building upon the discussion of unexplained variance at the school level and the role of school ethos (Section 5.8); at the pupil level, Sammons et al. (2014) found a pupil's positive perceptions of a school's characteristics such as: its emphasis on learning, positive behaviour policies, technological learning resources and teachers' relationships with pupils in terms of trust, respect, fairness and feedback, were important factors in achieving higher GCSE scores. Such factors align with school ethos but were not available in the dataset. Despite this, school characteristics and a pupil's perceptions of these are likely to have explained some of the remaining variation in GCSE attainment at the school and pupil level.

Finally, a pupil's emotional intelligence may have also explained variation in GCSE attainment at the pupil level. Rodeiro, Bell and Emery (2009) highlight that emotional intelligence is a multidimensional concept that includes a range of factors such as: a

pupil's wellbeing, motivation, stress management and self-control; all of which are factors that can influence a pupil's academic performance. Rodeiro, Bell and Emery (2009) concluded that there is the potential for substantial improvements in attainment if emotional intelligence in pupils is increased. Similarly, Chowdry, Crawford and Goodman (2011) found that pupils who reflected self-control and avoided risky behaviours had higher levels of GCSE attainment. More generally but also related to the above, Krapohl et al. (2014) highlighted a pupil's personality, behaviour and well-being are important factors to consider when examining GCSE attainment. This is echoed by Gutman and Vorhaus (2012) who highlight a pupil's social and emotional wellbeing are important indicators of GCSE attainment which were not measured in the data used for analysis.

These outlined factors reflect the limitation of omitted variable bias, which can help explain why a substantial level of variance in GCSE attainment remained unexplained at the pupil level. This highlights that despite the data used in this study being a key strength, as it was secondary data, it also had some limitations. The variables used in analysis were constrained to what was available within the dataset. As a result, pupil level factors that may have explained a greater amount of variation in GCSE attainment were not included in the analysis.

5.12 Key messages and implications for policy and practice

This thesis can inform education policies concerned with the GCSE attainment gap amongst pupils according to their socio-demographic profile and school factors. By better understanding the individual and collective influences of socio-economic status, religion, gender and school type on a pupil's GCSE attainment, it can inform policies interested in which social groups of pupils should be targeted more intensely to improve GCSE attainment in Northern Ireland. This study is a timely addition to the literature following the restoration of the Northern Ireland Assembly in January 2020 and its education aims in the New Decade New Approach deal. This section will outline the seven key messages of this thesis derived from the executed multilevel models and provide subsequent recommendations for policy and practice.

5.12.1 Key messages according to SES

There are three key messages from this thesis relating to socio-economic status. Firstly, the importance of parental education as a predictor of GCSE attainment. Secondly, the reaffirmation of the importance of FSME as a socio-economic predictor of GCSE attainment in Northern Ireland, and thirdly, the influence of housing tenure on GCSE attainment. These will each be discussed in more detail below.

Firstly, the findings from this thesis reflect the importance of parental education as a predictor of their child's GCSE attainment. Future initiatives should therefore aim to target those parents with lower or no qualifications to mediate such influence on their child's GCSE attainment. The Department of Education aim to increase parental involvement in their child's primary education through their initiative 'Give Your Child A Helping Hand', which promotes reading in the home and incorporating mathematics into everyday activities. However, for such initiative to be successful in improving a child's educational attainment, parents must feel competent in reading and mathematics, which parents with low or no qualifications may not be. When considering post-primary attainment, Higgins and Katsipataki (2015) highlight that different age groups of pupils are likely to require different parental involvement strategies to improve educational outcomes. Therefore, initiatives such as 'Give Your Child A Helping Hand' may not be as effective for pupils at the end of compulsory education. Initiatives for post-primary pupils should instead potentially focus on a parent's ability in supporting the development of their child's skills in their chosen subject areas, whilst supporting literacy and mathematics skills (Higgins and Katsipataki, 2015). Reducing the negative influence of low parental qualifications on a child's GCSE attainment could potentially be achieved by engaging parents more widely at the school level through classes that are facilitated by teachers to provide information on: the curriculum structure and content, what their child is learning in the classroom and how such learning can be consolidated within the home. Higgins and Katsipataki (2015) forwarded that regular school workshops for a certain time period could increase parents' confidence, whilst providing them with learning exercises to conduct with their children to improve literacy and mathematical outcomes. This would be particularly helpful for parents with low or no qualifications, whilst working to mitigate the negative impact of low parental qualifications.

Secondly, the effectiveness of FSME as a socio-economic predictor of GCSE attainment is heavily debated in existing literature. This thesis found that although FSME did not have the greatest within model effect on GCSE attainment, it remained an important socio-economic indicator. Based upon this finding, it is recommended that FSME remains a key socio-economic measure included in future analyses that are examining the influence of SES on educational attainment. For an in-depth exploration into socio-economic influences on GCSE attainment, the factors of parental education and housing tenure can also be examined. The results of this thesis illustrate that the impact of SES on educational attainment is multidimensional and should be considered with more than one factor to effectively inform policy and practice to promote the reduction of attainment disparities according to different elements of socio-economic background.

Thirdly, housing tenure (residing in a privately owned property) had one of the largest socio-economic effects on GCSE attainment in the executed analysis. This has implications for practice as this factor had not previously been considered in educational research in Northern Ireland. It is subsequently recommended that future studies examining the influence of SES on attainment in Northern Ireland consider this factor in analyses. However, the within model effects of housing tenure are likely to be mediated by factors such as household income, home learning environment and neighbourhood. Housing tenure as a stand-alone measure of SES therefore may not be an adequate indicator of SES effects on GCSE attainment. This reflects the importance of understanding the complexity of housing tenure as an explanatory factor by exploring its relationship with the factors outlined above. Further analysis is needed to understand the relationship between these factors and housing tenure which was beyond the remit of this thesis. Despite this, initiatives targeting the areas of income, home environment and neighbourhood may help reduce the within model effect of housing tenure outlined in this analysis. The initiatives outlined above when considering low levels of parental education could also be implemented to reduce attainment disparities between pupils according to their housing tenure.

5.12.2 Key messages according to religion

When examining religion as a pupil level predictor of GCSE attainment, it was found the attainment difference between Catholic pupils and Protestant pupils was negligible

in the executed model. This failed to support the discourse that Protestant pupils have lower GCSE attainment than their Catholic peers. This finding has implications for policy and practice as it suggests that religion is not as substantial a contributor to educational attainment than previous research has suggested. It is therefore recommended that the discourse around the underperformance of pupils based on their religious affiliation is informed by analysis that has statistically tested such differences. As this thesis found religion had the lowest and most varying within model effect on GCSE attainment compared to SES, gender and school type, it would also recommend policies and interventions to focus on SES, gender and school type, as these have greater effects on GCSE attainment. By focusing on such factors, it will indirectly improve the attainment of pupils according to their religious affiliation, as they also belong to social groups based on their SES, gender and school type attended.

More specifically, a common discourse of educational attainment in Northern Ireland is the underachievement of Protestant working class boys. This thesis examined the collective effects of socio-economic status, religion and gender on GCSE attainment and failed to provide evidence to support the discourse that Protestant working class boys are underachieving. In addition to its inaccuracy, the current reporting of Protestant working class boys underachieving in the education system can have negative consequences on their educational aspirations and self-expectations of their attainment and trajectory. It may even lead to a level of disengagement and Protestant working class boys fulfilling the expectation of achieving lower GCSE grades. With the findings of this thesis failing to support the discourse that Protestant boys, or Protestant working class boys are underachieving compared to their peers in the Northern Ireland education system, it reflects the importance of interaction effects. Such interactions suggest the influence of factors on attainment should not be considered in isolation from one another. Instead their multiplicative effects should be considered to accurately understand the combined effects of factors. This thesis moves beyond singular explanations for attainment differences amongst pupils and aims to explain disparities through the multiplicative effects of factors. It is therefore recommended that future research practice encourages studies to statistically test the interactions of factors to ensure evidence used to influence policy and practice is informed using in-depth analyses of the multiplicative effect of factors and not their descriptive or additive effects.

Shared education in Northern Ireland reflects a potentially effective provision that is implemented to overcome religious divisions in education and wider society. Loader and Hughes (2017) outline that since 2007, Northern Ireland has implemented a provision of shared education that works within the existing education system to create collaborative partnerships between controlled, Catholic maintained and integrated schools. Partnerships between schools provide an opportunity to share resources amongst teachers to promote pedagogic development, whilst sharing educational resources and experiences to collectively deliver classes to pupils from different school structures (Hughes, Loader and Nelson, 2018; Loader and Hughes, 2017; Duffy and Gallagher, 2016; Gallagher, 2016). Shared education can also work to promote attainment by expanding the subject choices for pupils to study in either their own school or the partner school (Hughes, Loader and Nelson, 2018). This provides pupils an opportunity to choose subjects that are most suited to their interests and skill set. This initiative promotes frequent contact between pupils of different school structures. This develops an inclusive learning environment and positive cross-community relations between Catholic and Protestant communities in Northern Ireland, whilst retaining the structure of the current education system that protects distinct religious identities (Hughes, Loader and Nelson, 2018; Loader and Hughes, 2017; Duffy and Gallagher, 2016; Gallagher, 2016). Relating to the historical context of Northern Ireland, education was once viewed as a means for Catholics to overcome societal discrimination and improve their disadvantaged position (Shuttleworth, 1995). Shared education continues to work to reduce the degrees of disadvantage experienced by communities in Northern Ireland, whilst improving cross-community relations (Hughes, Loader and Nelson, 2018). Such provision ultimately helps reduce the attainment difference between pupils according to their religious affiliation as it aims to bring pupils of different religions together and educate them. Despite the findings of this thesis suggesting religion is not a key driver of educational attainment differences in Northern Ireland, as religion continues to be a key identity marker, it illustrates that there is a place for shared education within the Northern Ireland education system to promote cross-community relations and improve the attainment of pupils through effective collaborations to share resources. There is also public support for shared education as highlighted through the Northern Ireland Life and Times survey. In 2014, 87% of respondents believed that relations between Protestant and Catholic communities would be improved through more mixing (ARK, 2014a).

When examining this in relation to education, 80% were in favour of more mixing in post-primary schools (ARK, 2014b). More specifically, 64% of respondents stated they were favourable of schools sharing classes, teachers or facilities (ARK, 2014c). Furthermore, the Young Life and Times Survey in 2018 found that 70% of 12-17 year olds were favourable of shared education (ARK, 2018a), with 65% who took part agreeing they were now better able to respect the views of others (ARK, 2018b).

5.12.3 Key messages according to gender

Furthermore, the results of this thesis found that gender had a greater within model effect on GCSE attainment than religion and all socio-economic measures. Gender therefore remains a key factor in understanding educational attainment trends in Northern Ireland. Initiatives aiming to tackle gendered attainment disparities could focus on promoting equality in pupils', parents' and teachers' perceptions of all school subjects, thus, continuing to shift assumptions that some subjects are more fitting for one gender. Reducing the gender attainment gap will also work to improve the attainment of pupils across other social groups they belong to.

5.12.4 Key messages according to school type

Finally, from the analysis conducted in this thesis, grammar school attendance had the greatest within model effect on GCSE attainment. This suggests the selective education system disproportionately benefits grammar school pupils, whilst potentially acting as a barrier for higher GCSE attainment amongst non-grammar school pupils. The results of this analysis do not necessarily indicate that grammar schools as institutions are the cause of higher GCSE attainment. Instead, the characteristics associated with grammar schools could explain their higher attainment rates. For example, the higher scores in the 'transfer test' (AQE and GL Assessment) needed to gain entry to a grammar school, the subsequently higher academic ability of grammar school pupils (Gallagher and Smith, 2000), the academic ethos embedded in grammar schools, the high academic standards expected of pupils and the dilution of deprivation experienced in grammar schools. In relation to this, it should be highlighted that not all eligible pupils complete the transfer test. The lack of available data makes it difficult to determine whether there are socio-demographic barriers to entering the transfer test. However, Gallagher and Smith (2000) note that pupils

attending grammar schools are more likely to come from higher socio-economic backgrounds. This could suggest that either; pupils from socially advantaged backgrounds are more likely to achieve higher grades in the transfer test than their deprived peers, or, a lower proportion of pupils from deprived backgrounds enter the transfer test and subsequently, a lower proportion attend grammar schools. As non-grammar school pupils may be more likely to reflect a socio-demographic profile associated with lower attainment, it widens the attainment gap further between pupils according to school type. The lower rates of grammar school pupils from lower socio-economic backgrounds and the likelihood of greater economic and cultural capital amongst pupils attending grammar schools also provide explanations for the higher attainment of grammar schools that policy makers should consider. Although the selective education system in Northern Ireland faces both support and criticism from society and political parties, if it is to remain, a key question for legislators and researchers to ask is how to improve the relative performance of non-grammar schools. Such question can be considered by reflecting upon the outlined grammar school characteristics and their transferability to non-grammar schools.

5.13 Future direction for research

Based upon the findings of this thesis, there are several directions future research can explore. Building upon the quantitative analysis of this thesis, future research could execute a qualitative strand to explore the experiences of pupils attending different school types according to their socio-demographic profile (for example, socio-economic background, religion and gender). This qualitative approach could examine pupils' opinions on how they believe socio-demographics and school type affects educational aspirations, trajectories and outcomes.

Future research could also analyse post-primary attainment according to A Levels, thus moving beyond the compulsory education system. Such analysis would provide an opportunity to explore whether pupil level and school level factors have a consistent influence on attainment from GCSE to A Level. In addition, A Level attainment could be examined according to a pupil's socio-demographic profile to determine whether certain demographics of pupils leave the education system after completing their GCSEs. The destination of pupils leaving the education system after completing their

GCSEs could also be explored according to their socio-demographic profile. When considering the earlier stages of the compulsory education system in Northern Ireland, further study into primary school attainment trends using a representative sample of schools and pupils would be a beneficial addition to the field. Publically available data on primary school attainment would allow research to uncover when attainment gaps between pupils begin to emerge in the education system. This would help inform policy to effectively combat attainment disparities earlier in the education system.

It is also recommended that future research examining the influence of SES on educational attainment continue to use more than one SES factor. By doing so, future research will provide an in-depth analysis, whilst accounting for the multidimensional structure of SES. If future data provided socio-economic measures such as income and cultural possessions, it would provide an opportunity for Bourdieu's concepts of economic capital and cultural capital to be created and statistically tested within the Northern Ireland context. Future quantitative research should also consider the inclusion of interaction terms to determine the multiplicative effects of factors to accurately inform discourse within the field.

This thesis provided an in-depth exploration into the within model effects of pupil level socio-demographics and school level factors on GCSE attainment in Northern Ireland. As highlighted throughout, the data used for analysis was a key strength of this study and was central to its original contribution. The results of this thesis reflect the benefits of data linkage and the extent to which it can provide an opportunity to examine factors that have not been previously considered. Based upon this, this thesis advocates for future data linkage to allow for more in-depth analyses that will inform educational discourse and policy. Linkage between data sources that examine the relationships between educational attainment, pupil's wellbeing (for example, emotional and social) and a pupil's social network (for example, peer group) would be beneficial in Northern Ireland, where in-depth analyses into such are currently lacking.

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The Administrative Data Research Network takes privacy protection very seriously. All information that directly identifies individuals will be removed from the datasets by trusted third parties, before researchers get to see it. All researchers using the Network are trained and accredited to use sensitive date safely and ethically, they will only access the data via a secure environment, and all of their findings will be vetted to ensure they adhere to the strictest confidentiality standards.

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Appendices

Appendix A: GL Assessment Analysis

Appendix A: Chapter 1 - GL Assessment Analysis

Introduction

In Northern Ireland, there is a current lack of statutory data on primary school attainment. As a result, there is limited analysis that examines the statistical effects of a pupil's socio-demographic profile and school level factors on primary school attainment in Northern Ireland. Research into primary school attainment disparities can help determine whether factors have a stronger, weaker or consistent influence on attainment as pupils' transition into post-primary education. Primary school attainment research is therefore integral to help our understanding of later attainment differences in post-primary education. The lack of available primary school attainment data within Northern Ireland highlights an important gap within the literature. As part of this thesis, data from GL Assessment were provided for three online tests administered in the academic year of 2016/2017. Attainment scores and pupil characteristics were provided for: Progress Test in English (PTE), Progress Test in Maths (PTM) and Cognitive Abilities Test (CAT) (4th Edition). The data provided an opportunity to examine attainment trends in Northern Ireland for a sample of primary school pupils. The GL Assessment data were provided for this study during the wait for the main analytical dataset becoming available. Analysis on the GL Assessment data received ethical approval from the School of Social Sciences, Education and Social Work at Queen's University Belfast (see Appendix A1). As the GL Assessment data were not the main analytical focus of this study and due to its limited scope, the attention of this thesis focuses upon the main dataset examining post-primary attainment trends. However, the analysis executed on the GL Assessment data provided an insight into primary school attainment trends that were not previously available in Northern Ireland. The GL Assessment data accounted for 36 primary schools in Northern Ireland. In 2016/2017, there were 821 primary schools in Northern Ireland (Department of Education, 2017a), meaning the sample accounted for only 4.4% of primary schools. It is important to acknowledge before presenting the results that the data were therefore not a representative indication of primary school attainment trends across Northern Ireland due to the small sample of schools and pupils that were not randomly selected.

Data for the PTE, PTM and CAT were used to execute statistical analysis through the method of multilevel modelling. The aim of this analysis was to examine the within model effects of pupil level and school level factors on primary school attainment in Northern Ireland. Of key interest to this thesis, the GL Assessment data provided an opportunity to examine primary school attainment trends according to gender and socio-economic status (Free School Meal Entitlement (FSME)). Analysis on each subject was conducted using three separate datasets which had different cohorts of pupils and schools, meaning subjects could not be controlled for within one statistical model. In addition, the data for each subject was cross-sectional, rather than longitudinal. This meant data did not refer to the same pupils as they progressed through primary education but provided a snapshot of pupils in specific year groups in the academic year of 2016/2017. Moreover, the cross-sectional nature of the data meant direct comparisons between pupils completing different scripts could not be made. In sum, due to the variation of cohort members across the PTE, PTM and CAT datasets, and the cross-sectional nature of the data, subjects could not be combined into one model for analysis. As a result, the executed approach of multilevel modelling was the most rational. This write up provides an overview of the data structure for each test (PTE, PTM and CAT), along with a discussion on the executed data manipulation, descriptive statistics and multilevel models, before the results of the analysis are presented. The results reported in the executed analysis refer to within model effects. This should be acknowledged when interpreting the presented findings.

Data Structure

Sample

As outlined above, the pupil and school sample varied for the PTE, PTM and CAT data (Table 1). The Progress Test in English data had a total sample size of 5,494 pupils in 32 primary schools. The Progress Test in Maths data had a total sample size of 5,536 pupils in 32 schools, and the Cognitive Abilities Test data had a total of 3,919 pupils in 36 schools. Data for the Progress Test in English and Maths were provided for the same schools, however, there was slight variation in the number of pupils' data provided in the respective subject datasets.

Table 1: Pupil and school sample size in each subject dataset

	Progress Test in English	Progress Test in Maths	Cognitive Abilities Test
Number of pupils	5,494	5,536	3,919
Number of schools	32	32	36

Scripts

The data provided by GL Assessment for PTE, PTM and CAT had numerous scripts that pupils completed according to their year group. Across all scripts, the Progress Test in English aimed to assess pupils on two core elements: comprehension (reading) and skills (grammar, spelling and punctuation) (GL Assessment, 2017a). Similarly, the Progress Test in Maths assessed pupils on two key areas: mental maths and written (non-mental) maths. These two mathematical components assessed a pupil's knowledge of the curriculum and their ability to apply mathematical processes to problems (GL Assessment, 2017b). The Progress Test in English and Maths followed the same script structure which ranged from Script 07 to Script 11. From the provided data, it was not clear what age or primary year group pupils were in. As a result, the scripts were used as a proxy for pupils' age. Each script was targeted at a standardised age group/primary year, as outlined below:

- Script 07 = aimed at 7-year-old (P3) pupils.
- Script 08 = aimed at 8-year-old (P4) pupils.
- Script 09 = aimed at 9-year-old (P5) pupils.
- Script 10 = aimed at 10-year-old (P6) pupils.
- Script 11 = aimed at 11-year-old (P7) pupils.

The Cognitive Abilities Test reflected a different structure, with three scripts that indicated the level of difficulty (Level A – Level C). The Cognitive Abilities Test was not based upon prior curriculum learning and had four key areas of assessment: verbal reasoning, quantitative reasoning, non-verbal reasoning and spatial (GL Assessment, 2017c). Each script was aimed towards different standardised age groups/primary year as outlined below:

- Level A = aimed at 8 – 9-year-old (P5) pupils.
- Level B = aimed at 10-year-old (P6) pupils.
- Level C = aimed at 11-year-old (P7) pupils.

Comparisons of scripts can be made descriptively between the Progress Test in English and Maths as the same script names targeted the same standardised aged group/primary year. As CAT reflected a different script structure (Level A – Level C), the following comparisons with CAT and PTE/PTM can be descriptively made: Script 08-09 and CAT Level A; Script 10 and CAT Level B; Script 11 and CAT Level C. However, as previously highlighted, subject comparisons must be taken with caution as the same pupils and schools are not provided across the data for the different subjects and scripts. In addition, the attainment differences of pupils between subjects are not statistically tested, meaning they can only be discussed descriptively.

Table 2 outlines the number of pupils that completed each script in English, maths and CAT. The proportion of pupils completing each script in the PTE and PTM data were similar. In the Cognitive Abilities Test data, a substantially lower proportion of pupils in the data completed Level C (8.9%), compared Level A (55.8%) and Level B (35.3%). These trends may reflect the greater use of assessments in Primary 5 to Primary 6 as pupils prepare for the transfer test. However, as data for each test were only provided from a small sample of schools and pupils in Northern Ireland, it is difficult to generalise about the use of these tests according to primary school year.

Table 2: Frequency of pupils completing each script across subjects

Script Name	Frequency (N and %)
Progress Test in English	
Script 07	1,027 18.7%
Script 08	1,171 21.3%
Script 09	1,226 22.3%
Script 10	1,116 20.3%
Script 11	954 17.4%
Total	5,494 100%
Progress Test in Maths	
Script 07	1,019 18.4%
Script 08	1,168 21.1%
Script 09	1,283 23.2%
Script 10	1,116 20.1%
Script 11	950 17.2%
Total	5,536 100%
Cognitive Abilities Test	
A	2,185 55.8%
B	1,384 35.3%
C	350 8.9%
Total	3,919 100%

Attainment Measure (Raw Score)

The attainment of pupils in each subject was provided as a raw score in the respective datasets. These raw scores were used as the dependent variable of attainment in the multilevel models for all three subjects. A total raw score was provided for English and mathematics. However, in the CAT data, raw scores were provided for each component (verbal, non-verbal, quantitative and spatial). To ensure consistency across the subject models, an overall raw score for CAT was computed for analysis by adding the raw scores for each component. This explains the larger mean scores, standard deviations and ranges in the CAT data when compared to PTE and PTM (Table 3). Figures 1-3 illustrate the distribution of raw scores across all scripts for the PTE, PTM and CAT data.

Table 3: Mean raw scores of pupils in each subject

	Number of pupils	Mean Raw Score	Standard Deviation	Range
Progress Test in English				
Script 07	1,027	19.33	9.64	0 - 38
Script 08	1,171	27.06	10.56	0 - 43
Script 09	1,226	25.83	10.48	0 - 49
Script 10	1,116	28.52	11.03	1-48
Script 11	954	30.85	13.22	1 - 56
Total	5,494			
Progress Test in Maths				
Script 07	1,019	23.86	8.82	1 - 43
Script 08	1,168	28.15	12.09	0 - 55
Script 09	1,283	40.04	11.97	1 - 61
Script 10	1,116	39.27	14.51	1 - 66
Script 11	950	41.54	16.33	3 - 70
Total	5,536			
Cognitive Abilities Test				
A	2,185	74.74	28.70	0 - 158
B	1,384	88.61	28.30	0 - 161
C	350	88.68	26.32	32 - 153
Total	3,919			

Figure 1: Distribution of raw scores for the Progress Test in English

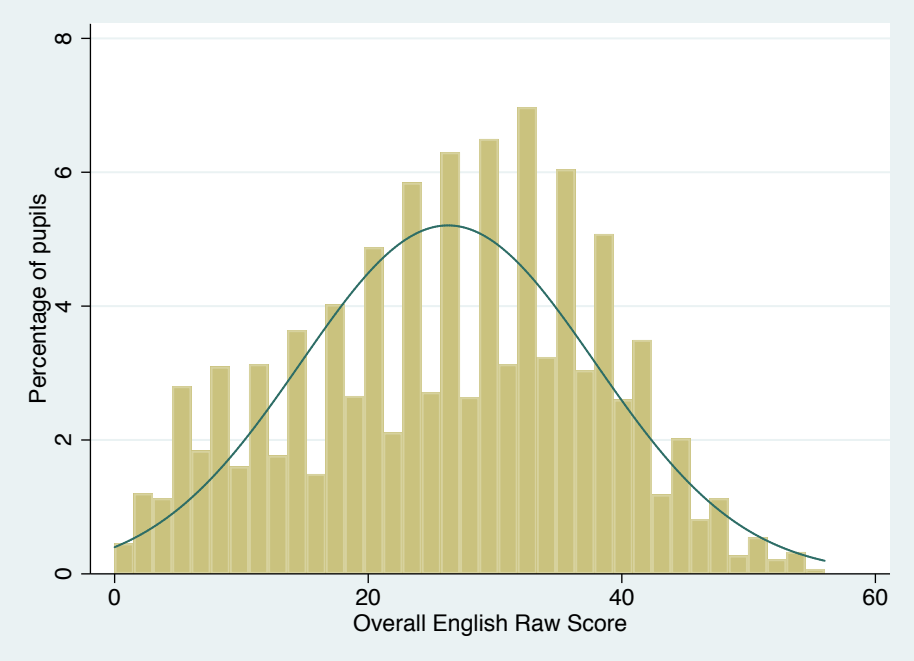


Figure 1 illustrates the distribution of raw scores in English for all pupils.

Figure 2: Distribution of raw scores for the Progress Test in Maths

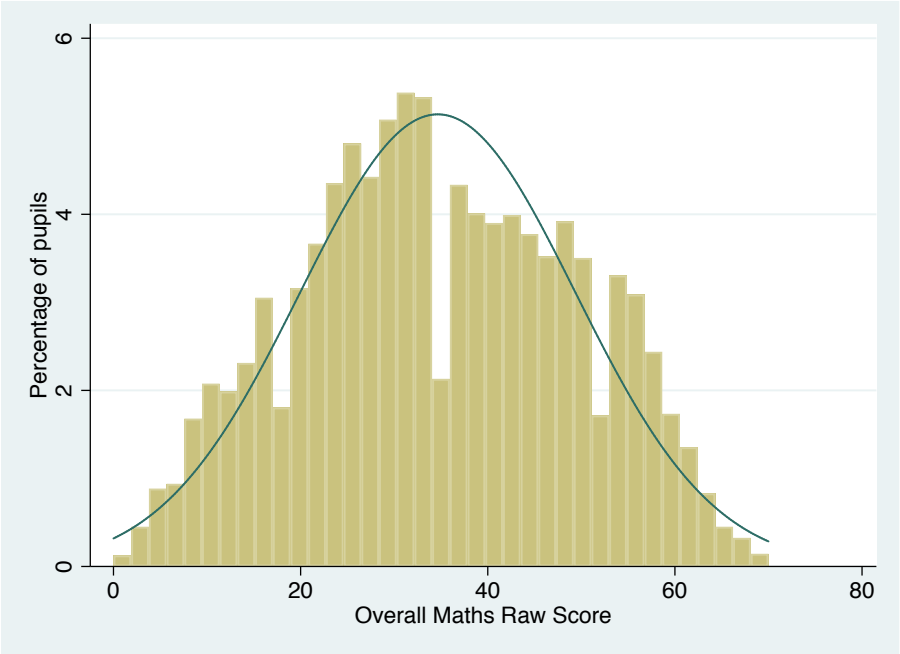


Figure 2 illustrates the distribution of raw scores in mathematics for all pupils.

Figure 3: Distribution of raw scores for the Cognitive Abilities Test

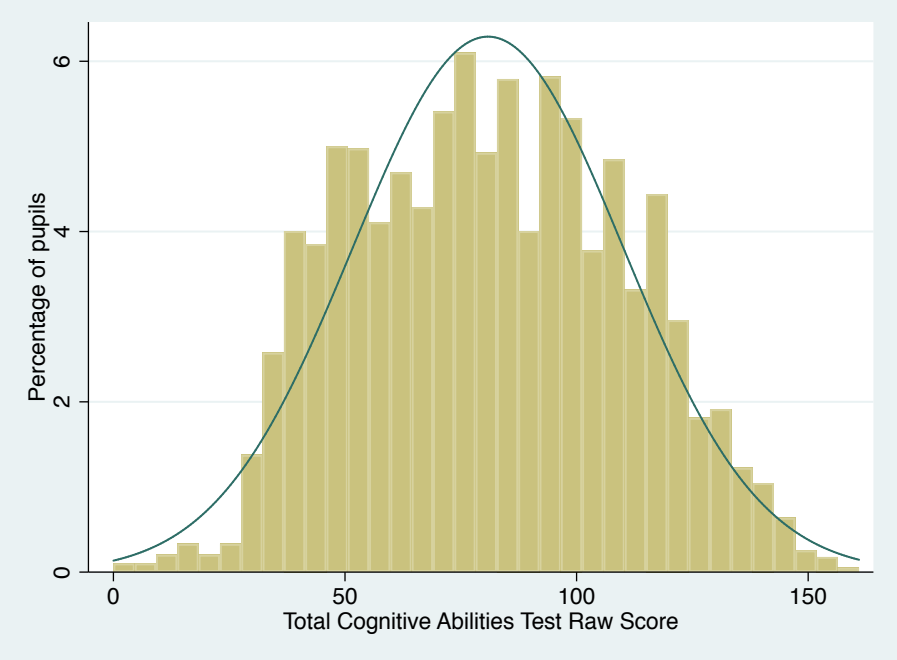


Figure 3 illustrates the distribution of raw scores in CAT for all pupils.

Independent variables

Across the subject data, the pupil level factors of gender and FSME were of key interest to this thesis. To aid an in-depth multilevel analysis, four predictor variables at the school level were computed using data from the Department of Education for the academic year of 2016/2017. The variables computed for the purposes of analysis were: school management structure, school location, the percentage of pupils in a school entitled to Free School Meals (FSM) and the percentage of pupils in a school with Special Educational Needs (SEN) (Stage 1-5). Each of the outlined variables at the pupil level and school level will be discussed in this section.

Gender

In both the English and maths data, there were a similar proportion of male and female pupils completing each of the five scripts (Table 4). There were no missing cases in the PTE and PTM data based on a pupil's gender. In the CAT data, there were cases labelled as 'null' which accounted for 0.1% of pupils completing Scripts A and B, respectively. This 'null' category was recoded as missing for analytical purposes, leaving gender to be a binary variable of male and female. Following this recode, there was a similar proportion of male and female pupils completing the CAT Level A and

Level B scripts. However, in the CAT Level C, there was a higher proportion of male pupils (54%) compared to female pupils (46%) (Table 4).

Table 4: Frequency of pupils according to gender in each subject

	Frequency of pupils (N and %)			
	Male	**Female**	**Missing**	**Total (row)**
Progress Test in English				
Script 07	508 49.5%	519 50.5%	-	1,027 100%
Script 08	577 49.3%	594 50.7%	-	1,171 100%
Script 09	622 50.7%	604 49.3%	-	1,226 100%
Script 10	583 52.2%	533 47.8%	-	1,116 100%
Script 11	483 50.6%	471 49.4%	-	954 100%
Progress Test in Maths				
Script 07	505 49.6%	514 50.4%	-	1,019 100%
Script 08	575 49.2%	593 50.8%	-	1,168 100%
Script 09	649 50.6%	634 49.4%	-	1,283 100%
Script 10	584 52.3%	532 47.7%	-	1,116 100%
Script 11	479 50.4%	471 49.6%	-	950 100%
Cognitive Abilities Test				
A	1,114 51%	1,069 48.9%	2 0.1%	2,185 100%
B	672 48.5%	711 51.4%	1 0.1%	1,384 100%
C	189 54.0%	161 46.0%	-	350 100%

Free School Meal Entitlement

Providing information on a pupil's entitlement to FSM was optional for schools who shared their data. As the answers provided by schools were not cross-checked before the data were provided for analysis, there were originally four answers in the variable: entitled to FSM, not entitled to FSM, missing and unspecified. The definition of unspecified was unclear. As a result, the categories of missing and unspecified were combined into 'missing' for analysis. Missing values for FSME at the pupil level was a key limitation of the data as they accounted for around half or just below half of the pupil sample in each subject script (Table 5). However, to ensure the greatest number of pupils were included in analysis, a control variable for the missing cases was included in the statistical models. A more sophisticated strategy to deal with missing cases such as multiple imputation could not be executed due to the limited number of variables included in the data. If such strategy had been executed, it may have led to inaccurate inferences about pupils and their attainment. In addition, the answer category of 'entitled to FSM' is likely to have referred to a mixture of free school meal entitlement and pupils who uptake their free school meals. There was no method to distinguish between these categories within the variable as it was dependent upon a school's interpretation. When considering the valid cases in the variable, a higher proportion of pupils in each subject script were entitled to FSM, compared to the proportion of the pupils not entitled to FSM (Table 5). In some scripts, this difference was marginal, whilst in others it was considerably larger. This is reflected in Table 5.

Table 5: Frequency of pupils according to their Free School Meal Entitlement status across subjects

	Frequency of pupils (N and %)			
	Entitled to FSM	**Not entitled to FSM**	**Missing**	**Total (row)**
Progress Test in English				
Script 07	296 28.8%	247 24.1%	484 47.1%	1,027 100%
Script 08	337 28.8%	289 24.7%	545 46.5%	1,171 100%
Script 09	381 31.1%	247 20.1%	598 48.8%	1,226 100%
Script 10	333 29.8%	214 19.2%	569 51.0%	1,116 100%
Script 11	339 35.5%	208 21.8%	407 42.7%	954 100%
Progress Test in Maths				
Script 07	296 29.1%	248 24.3%	475 46.6%	1,019 100%
Script 08	339 29.0%	286 24.5%	543 46.5%	1,168 100%
Script 09	381 29.7%	249 19.4%	653 50.9%	1,283 100%
Script 10	335 30.0%	215 19.3%	566 50.7%	1,116 100%
Script 11	337 35.5%	206 21.7%	407 42.8%	950 100%
Cognitive Abilities Test				
A	725 33.2%	539 24.7%	921 42.1%	2,185 100%
B	386 27.9%	296 21.4%	702 50.7%	1,384 100%
C	216 61.7%	44 12.6%	90 25.7%	350 100%

Covariates - Control variables

In the GL Assessment data, the pupil level variables of gender and FSME were of key interest to this thesis. The remaining school level variables were controlled for in the multilevel models as covariates. These variables were: school management structure, school location (Education and Library Board), the percentage of pupils in a school entitled to FSM and the percentage of pupils in a school with SEN.

School Management Structure

The names of the schools that consented to their data being shared for the purposes of this study were provided to the researcher. This allowed for a variable to be created to indicate a school's management structure based on the publically available information from the Department of Education for the academic year of 2016/2017. Table 6 outlines the number of pupil attending each management structure. Across scripts, over half of pupils in the PTE and PTM data attended Catholic maintained schools, whilst around 40% attended controlled schools. The remaining pupils attended Irish medium and integrated schools. In CAT, a slightly higher proportion of pupils completing Level A and B attended controlled schools, compared to Catholic maintained schools. However, a higher proportion of pupils completing Level C in CAT attended Catholic Maintained schools when compared to controlled schools (Table 6).

Table 6: Frequency of pupils according to school management structure

	Frequency of pupils (N and %)				
	Controlled	**Catholic Maintained**	**Irish Medium**	**Integrated**	**Total (row)**
Progress Test in English					
Script 07	433 42.2%	563 54.8%	0	31 3.0%	1,027 100%
Script 08	433 37.0%	649 55.4%	25 2.1%	64 5.5%	1,171 100%
Script 09	498 40.6%	679 55.4%	17 1.4%	32 2.6%	1,226 100%
Script 10	407 36.5%	631 56.5%	20 1.8%	58 5.2%	1,116 100%
Script 11	418 43.8%	491 51.5%	15 1.6%	30 3.1%	954 100%
Progress Test in Maths					
Script 07	434 42.6%	554 54.4%	0	31 3.0%	1,019 100%
Script 08	432 37.0%	647 55.4%	25 2.1%	64 5.5%	1,168 100%
Script 09	556 43.3%	679 52.9%	17 1.3%	31 2.5%	1,283 100%
Script 10	408 36.6%	630 56.4%	20 1.8%	58 5.2%	1,116 100%
Script 11	417 43.9%	488 51.4%	15 1.6%	30 3.1%	950 100%
Cognitive Abilities Test					
A	1,053 48.2%	1,025 46.9%	42 1.9%	65 3.0%	2,185 100%
B	746 53.9%	534 38.6%	20 1.4%	84 6.1%	1,384 100%
C	118 33.7%	217 62.0%	15 4.3%	0	350 100%

School Location

School location was measured according to the Education and Library Board a school was situated in. This information was also derived from the Department of Education data for the academic year of 2016/2017. In all subject data and across scripts, there were a similar proportion of schools in each Education and Library Board (Table 7).

Table 7: Frequency of pupils according to school location

	Belfast	North Eastern	South Eastern	Southern	Western	Total (row)
Progress Test in English						
Script 07	166 16.2%	245 23.9%	401 39.0%	119 11.6%	96 9.3%	1,027 100%
Script 08	162 13.8%	272 23.2%	505 43.1%	117 10.0%	115 9.9%	1,171 100%
Script 09	185 15.1%	299 24.4%	520 42.4%	126 10.3%	96 7.8%	1,226 100%
Script 10	136 12.2%	238 21.3%	525 47.1%	104 9.3%	113 10.1%	1,116 100%
Script 11	148 15.5%	245 25.7%	373 39.1%	140 14.7%	48 5.0%	954 100%
Progress Test in Maths						
Script 07	166 16.3%	247 24.2%	391 38.4%	119 11.7%	96 9.4%	1,019 100%
Script 08	163 14.0%	271 23.2%	503 43.1%	116 9.9%	115 9.8%	1,168 100%
Script 09	185 14.4%	300 23.4%	576 44.9%	126 9.8%	96 7.5%	1,283 100%
Script 10	136 12.2%	239 21.4%	525 47.0%	104 9.3%	112 10.1%	1,116 100%
Script 11	147 15.5%	243 25.6%	372 39.2%	140 14.7%	48 5.0%	950 100%
Cognitive Abilities Test						
A	576 26.4%	484 22.1%	661 30.3%	202 9.2%	262 12.0%	2,185 100%
B	322 23.3%	191 13.8%	572 41.3%	99 7.1%	200 14.5%	1,384 100%
C	135 38.6%	96 27.4%	103 29.4%	1 0.3%	15 4.3%	350 100%

Percentage of pupils in a school entitled to Free School Meals/with Special Educational Needs

The variables examining the percentage of pupils in schools entitled to FSM and the percentage of pupils with SEN were also created using the publically available information from the Department of Education. Table 8 highlights the average percentage of pupils in schools entitled to FSM at each script level in the respective subjects (over 30%), whilst Table 9 outlines the average percentage of pupils in schools with SEN (over 20%). As there were multiple schools with the same name in the Department of Education spreadsheet, a total of three schools in each subject dataset were excluded from these variables as it was unclear if the schools matched between the two sources. As a result, in these variables, there were 428 pupil cases missing in the PTE data, 424 pupil cases missing in the PTM data and 189 pupil cases missing in the CAT data. The proportion of missing pupil cases in each subject script are outlined in Table 8 and Table 9.

Table 8: Average percentage of pupils in schools entitled to free school meals

	N and % of pupils	Missing (N and %)	Total (row)	Mean percentage of FSME pupils in schools	Standard Deviation	Range (%)
Progress Test in English						
Script 07	924 90.0%	103 10.0%	1,027 100%	36.4%	22.52	2.8 – 81.1
Script 08	1,070 91.4%	101 8.6%	1,171 100%	37.2%	22.68	2.8 – 81.1
Script 09	1,137 92.7%	89 7.3%	1,226 100%	38.0%	21.93	2.8 – 81.1
Script 10	1,053 94.3%	63 5.7%	1,116 100%	36.7%	22.69	2.8 – 81.1
Script 11	882 92.4%	72 7.6%	954 100%	34.5%	21.55	2.8 – 81.1
Progress Test in Maths						
Script 07	916 89.9%	103 10.1%	1,019 100%	36.3%	22.49	2.8 – 81.1
Script 08	1,068 91.4%	100 8.6%	1,168 100%	37.2%	22.68	2.8 – 81.1
Script 09	1,194 93.1%	89 6.9%	1,283 100%	37.3%	21.70	2.8 – 81.1
Script 10	1,053 94.4%	63 5.6%	1,116 100%	36.7%	22.70	2.8 – 81.1
Script 11	881 92.7%	69 7.3%	950 100%	34.5%	22.58	2.8 – 81.1
Cognitive Abilities Test						
A	2,030 92.9%	155 7.1%	2,185 100%	44.2%	22.22	2.8 – 81.1
B	1,363 98.5%	21 1.5%	1,384 100%	41.8%	23.57	2.8 – 81.1
C	337 96.3%	13 3.7%	350 100%	40.3%	24.10	11.5– 80.6

Table 9: Average percentage of pupils in schools with Special Educational Needs

	N and % pupils	Missing (N and %)	Total (row)	Mean percentage of SEN pupils in schools	Standard Deviation	Range (%)
Progress Test in English						
Script 07	924 90.0%	103 10.0%	1,027 100%	22.9%	10.98	9.6 – 56.6
Script 08	1,070 91.4%	101 8.6%	1,171 100%	21.9%	10.31	9.6 – 56.6
Script 09	1,137 92.7%	89 7.3%	1,226 100%	22.6%	10.65	9.6 – 56.6
Script 10	1,053 94.3%	63 5.7%	1,116 100%	22.1%	10.46	9.6 – 56.6
Script 11	882 92.4%	72 7.6%	954 100%	21.8%	10.76	9.6 – 56.6
Progress Test in Maths						
Script 07	916 89.9%	103 10.1%	1,019 100%	23.0%	11.02	9.6 – 56.6
Script 08	1,068 91.4%	100 8.6%	1,168 100%	21.9%	10.30	9.6 – 56.6
Script 09	1,194 93.1%	89 6.9%	1,283 100%	22.1%	10.69	9.6 – 56.6
Script 10	1,053 94.4%	63 5.6%	1,116 100%	22.1%	10.49	9.6 – 56.6
Script 11	881 92.7%	69 7.3%	950 100%	21.8%	10.79	9.6 – 56.6
Cognitive Abilities Test						
A	2,030 92.9%	155 7.1%	2,185 100%	27.4%	12.65	9.6 – 56.6
B	1,363 98.5%	21 1.5%	1,384 100%	27.7%	14.11	9.6 – 56.6
C	337 96.3%	13 3.7%	350 100%	27.0%	10.00	11.5–48.1

Data Analysis

Multilevel models

Multilevel models were executed for the respective subject data, with raw score being used as the attainment measure. In each subject data, exploratory analyses with scripts included as independent factors were conducted before the final multilevel models were executed. This was to determine if there were statistically significant differences in the attainment of pupils across different age groups (scripts). As the exploratory models for each subject found statistically significant differences between the scripts, this informed the structure of the final multilevel models. In the presented multilevel models, only one script was subsequently examined in each model as this was the most accurate method to analyse the within model effects of the independent variables on different ages/year groups of pupils within the cross-sectional data.

The final multilevel models included the explanatory factors of: gender, free school meal entitlement, school management structure, school location, the percentage of pupils in a school entitled to FSM and the percentage of pupils in a school with SEN. In total, five multilevel models were respectively executed for the PTE and PTM data (Scripts 07-11), whilst three models were completed for CAT (Levels A-C). The variables of key interest in analysis were at the pupil level (gender and FSME), with school level factors included in the model as covariates. The models reported the unstandardized beta coefficient (β), its associated standard error (SE) and its statistical significance. Cohen's *d* was also calculated with 95% Confidence Intervals (CI) for the categorical variables of key interest: gender and FSME. As outlined, the results reported in the executed analysis refer to within model effects. This should be acknowledged when interpreting the presented findings.

Results

The within model effects of gender and FSME on attainment in each subject are focused upon in this section. The within model effects of the school level variables can be found in the full multilevel model tables in Appendix A2.

Gender

In all models, gender was included as a pupil level predictor, with male being the reference category (Table 10). In English, females had higher scores than males at age 7 years (Script 07) (d=0.10, 95% CI: -0.02, 0.23), age 8 years (Script 08) (d=0.12, 95% CI: -0.002, 0.24), age 9 years (Script 09), age 10 years (Script 10) (d=0.09, 95% CI: -0.03, 0.21, respectively) and age 11 years (Script 11) (d=0.07, 95% CI: -0.06, 0.20). However, across all ages, the confidence intervals of the given within model effects were not statistically significant. This suggests there was no meaningful difference in the attainment of pupils based on their gender across all ages (scripts) in English.

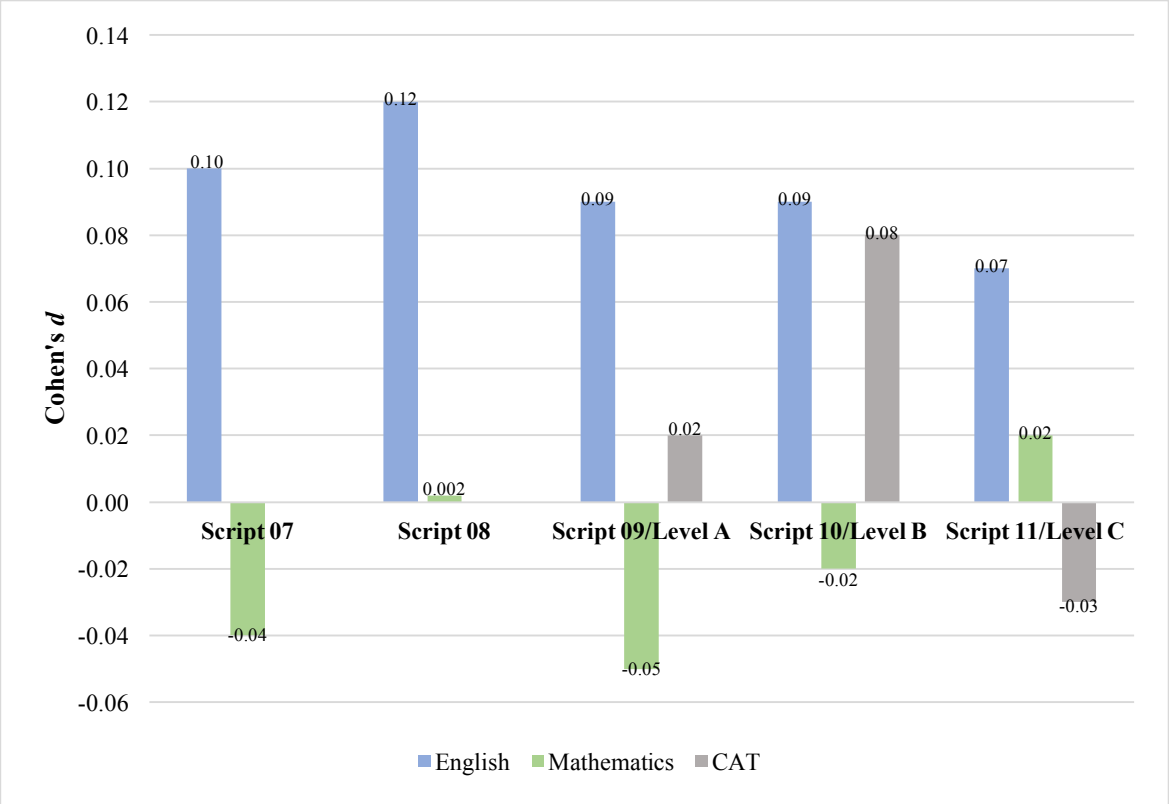
In mathematics, the gender difference in attainment was marginally in favour of female pupils at age 8 years (Script 08) (d=0.002, 95% CI: -0.12, 0.12), and age 11 years (Script 11) (d=0.02, 95% CI: -0.11, 0.15). Despite this, the effect sizes were so slight and the confidence intervals wide that they do not present anything meaningful about gender differences in mathematics attainment within the executed models. At age 7 years (Script 07) (d=-0.04, 95% CI: -0.17, 0.09), age 9 years (Script 09) (d=-0.05, 95% CI: -0.16, 0.06) and age 10 years (Script 10) (d=-0.02, 95% CI: -0.14, 0.10), female pupils had marginally lower scores than their male peers in mathematics. However, across all ages in mathematics, the confidence intervals of the given within model effects were not statistically significant. This also suggests there was no meaningful difference in the attainment of pupils based on their gender across all ages (scripts) in mathematics.

In the CAT, the within model score difference between genders at ages 8-9 years (Level A) and age 10 years (Level B) was in favour of female pupils (d=0.02, 95% CI: -0.06, 0.11 and d=0.08, 95% CI: -0.01, 0.19, respectively). At age 11 years (Level C), the direction of the score difference was opposite to that reflected in Level A and Level B, with females having marginally lower CAT scores than their male peers (d=-0.03, 95% CI: -0.24, 0.17). However, across CAT levels, the within model effects indicate that the gender differences in attainment were small in magnitude and not statistically significant.

In summary, females outperformed their male peers in English across all age groups within the executed models. In mathematics, the direction of the gender difference in

attainment varied across age groups, with the score difference in favour of females at age 8 years (Script 08) and age 11 years (Script 11). Despite such findings, across all ages in English and mathematics, the confidence intervals of the given within model effects indicated that the gender differences in attainment were not statistically significant. Finally, in CAT, there was no clear pattern in the direction of the gendered effect on attainment within the models. At age 9 years (Level A) and age 10 years (Level B), female pupils had higher attainment than their male peers, whilst at age 11 (Level C), the gender difference in attainment was in favour of males. Despite no clear pattern, the gendered attainment differences within the models were not statistically significant across the CAT scripts. Overall, across subjects and the respective scripts, analysis found no statistically significant difference in the attainment of pupils based on their gender.

Figure 4: Within model effects of gender on each subject



The score differences between genders illustrated in Figure 4 are in comparison to the reference category of male pupils who are represented by the zero line on the y axis.

Table 10: Within model effects of gender on PTE, PTM and CAT attainment across scripts

	Overall English Raw Score			Overall Maths Raw Score			Overall CAT Raw Score		
	β (SE)	Cohen's d	95% CI	β (SE)	Cohen's d	95% CI	β (SE)	Cohen's d	95% CI
Script 07									
Female	1.85 (0.57)***	0.10	-0.02, 0.23	-0.95 (0.53)	-0.04	-0.17, 0.09	-	-	-
Script 08							-	-	-
Female	2.78 (0.61)***	0.12	-0.002, 0.24	0.42 (0.69)	0.002	-0.12, 0.12			
Script 09/CAT Level A									
Female	1.69 (0.59)**	0.09	-0.03, 0.21	-1.14 (0.66)	-0.05	-0.16, 0.06	2.06 (1.14)	0.02	-0.06, 0.11
Script 10/CAT Level B									
Female	2.15 (0.64)***	0.09	-0.03, 0.21	-0.38 (0.84)	-0.02	-0.14, 0.10	5.86 (1.42)***	0.08	-0.01, 0.19
Script 11/CAT Level C									
Female	1.68 (0.77)*	0.07	-0.06, 0.20	0.55 (0.95)	0.02	-0.11, 0.15	-0.85 (2.59)	-0.03	-0.24, 0.17

Reference category: male *p≤0.05 **p≤0.01 ***p≤0.001

Free School Meal Entitlement

Across all subjects and age groups, pupils entitled to FSM had lower attainment than their peers who were not entitled to FSM. In English, the negative within model effect of being entitled to FSM was consistent in magnitude across age groups. This was reflected through the effect sizes for age 7 years (Script 07) (d=-0.17, 95% CI: -0.35, 0.01), age 8 years (Script 08) (d=-0.17, 95% CI: -0.34, 0.004), age 9 years (Script 09) (d=-0.16, 95% CI: -0.34, 0.01), age 10 years (Script 10) (d=-0.13, 95% CI: -0.31, 0.06) and age 11 years (Script 11) (d=-0.16, 95% CI: -0.34, 0.03). However, across all age groups in English, the confidence intervals of the within model effects indicated that the attainment differences between pupils based on their FSME were not statistically significant.

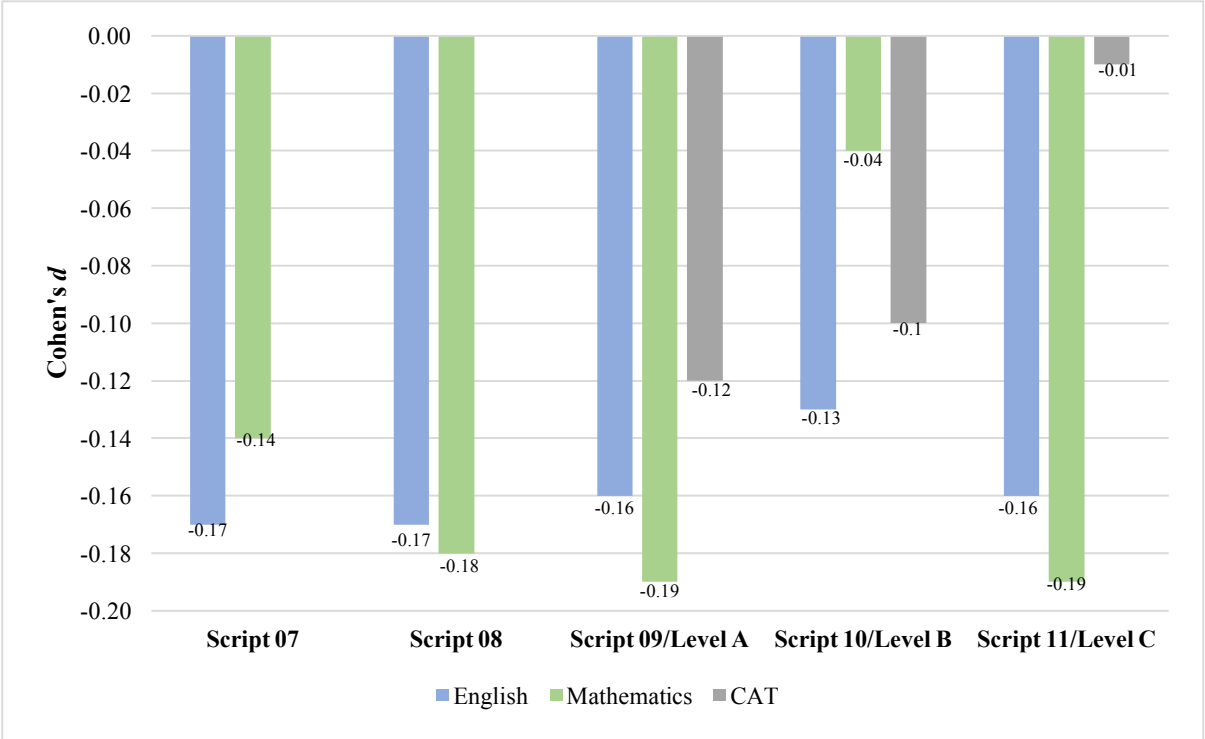
In mathematics, pupils entitled to FSM also had lower attainment than their non-entitled peers. The within model effects of FSME on mathematics attainment were relatively consistent at age 7 years (Script 07) (d=-0.14, 95% CI: -0.33, 0.04), age 8 years (Script 08) (d=-0.18, 95% CI: -0.35, -0.004), age 9 years (Script 09) (d=-0.19, 95% CI: -0.36, -0.01) and age 11 years (Script 11) (d=-0.19, 95% CI: -0.37, 0.0004). However, at age 10 years (Script 10), the attainment difference between pupils entitled to FSM and pupils not entitled to FSM was considerably lower than the other age groups (d=-0.04, 95% CI: -0.23, 0.14). The confidence intervals associated with the within model effects suggest the mathematics attainment differences between pupils based on their FSME status were statistically significant at age 8 years and age 9 years. However, the confidence intervals for the remaining age groups suggest the differences in mathematics attainment according to FSME were not statistically significant within the respective models.

In the CAT, the within model effects of FSME on attainment were relatively consistent at age 8-9 years (Level A) (d=-0.12, 95% CI: -0.24, -0.01) and age 10 years (Level B) (d=-0.10, 95% CI: -0.26, 0.05). However, at age 11 years (Level C), the negative within model effects of FSME were much lower (d=-0.01, 95% CI: -0.33, 0.31). The confidence intervals for age 10 years (Level B) and age 11 years (Level C) suggest the differences in attainment between pupils based on their FSME were not statistically significant nor practically meaningful in the respective models. However, at age 9 years (Level A), the confidence intervals of the within model effect suggest a

statistically significant difference in the CAT attainment of pupils based on their FSME status.

In summary, pupils across all age groups entitled to FSM had lower attainment in all three subjects than their peers who were not entitled to FSM. However, similar to the within model effects of gender, the negative within model effects of FSME on attainment did not increase in magnitude in older primary years in any subject. Despite such findings, across all age groups in English, the confidence intervals suggest the attainment differences between pupils based on their FSME status were not statistically significant within the respective models. In mathematics, the score difference between pupils based on their FSME status was statistically significant at age 8 years (Script 08) and age 9 years (Script 09). In CAT, the score difference between pupils based on their FSME was only statistically significant at age 8-9 years (Level A). Overall, across all subjects, there was consistency in the negative direction of the within model effect of FSME on attainment. However, the magnitude and statistical significance of such within model effect varied across subjects and scripts.

Figure 5: Within model effects of Free School Meal Entitlement on each subject



The score differences between pupils illustrated in Figure 5 are in comparison to the reference category of pupils who are not entitled to free school meals, who are represented by the zero line on the y axis.

Table 11: Within model effects of Free School Meal Entitlement on PTE, PTM and CAT attainment across scripts

	Overall English Raw Score			Overall Maths Raw Score			Overall CAT Raw Score		
	β (SE)	Cohen's d	95% CI	β (SE)	Cohen's d	95% CI	β (SE)	Cohen's d	95% CI
Script 07									
Entitled to FSM	-0.31 (0.13)*	-0.17	-0.35, 0.01	-0.23 (0.12)	-0.14	-0.33, 0.04	-	-	-
Missing	-0.76 (0.34)*	-0.16	-0.33, 0.01	-0.77 (0.31)*	-0.09	-0.26, 0.07	-	-	-
Script 08							-	-	-
Entitled to FSM	-0.43 (0.13)***	-0.17	-0.34, 0.004	-0.52 (0.17)**	-0.18	-0.35, -0.004			
Missing	-0.76 (0.36)*	-0.15	-0.31, 0.01	-1.28 (0.43)**	-0.19	-0.35, -0.03	-	-	-
Script 09/CAT Level A									
Entitled to FSM	-0.49 (0.13)***	-0.16	-0.34, 0.01	-0.69 (0.16)***	-0.19	-0.36, -0.01	-1.24 (0.26)***	-0.12	-0.24, -0.01
Missing	-0.62 (0.36)	-0.25	-0.41, -0.09	-1.35 (0.42)***	-0.17	-0.32, -0.01	-2.49 (0.59)***	-0.17	-0.29, -0.06
Script 10/CAT Level B									
Entitled to FSM	-0.65 (0.15)***	-0.13	-0.31, 0.06	-0.60 (0.21)**	-0.04	-0.23, 0.14	-0.20 (0.31)	-0.10	-0.26, 0.05
Missing	-0.08 (0.43)	-0.20	-0.37, -0.02	-0.26 (0.58)	-0.18	-0.36, -0.01	-0.68 (0.81)	-0.07	-0.21, 0.07
Script 11/CAT Level C									
Entitled to FSM	-1.17 (0.18)***	-0.16	-0.34, 0.03	-1.38 (0.23)***	-0.19	-0.37, 0.0004	-2.35 (0.43)***	-0.01	-0.33, 0.31
Missing	-1.35 (0.43)**	-0.04	-0.22, 0.13	-2.05 (0.54)***	-0.38	-0.56, -0.20	-0.47 (1.33)	-0.85	-1.23, -0.48

Reference category: not entitled to FSM *p≤0.05 **p≤0.01 ***p≤0.001

Strengths and Limitations

No existing primary school data in Northern Ireland is available for analysis. As a result, there is a current gap in educational research in Northern Ireland examining primary school attainment trends. This lack of data subsequently limits the extent to which we can understand the within model effects of pupil level socio-demographics and school level factors on primary school attainment in Northern Ireland. In addition, it limits our ability to determine whether the within model effects of these predictors increase as a pupil transitions from primary to post-primary school. It was therefore a key strength of this thesis that GL Assessment data were provided as it was the first instance in which primary school attainment data had become available for analysis in Northern Ireland. Although the consenting sample of pupils and schools provided by GL Assessment were not random nor representative of the Northern Ireland population, this analysis can begin to fill the outlined gap in the literature by examining the within model effects of individual and school level factors on English, mathematics and cognitive abilities attainment throughout primary school year groups in Northern Ireland. The results of this analysis also emphasise the importance of primary school attainment data becoming more widely available for analysis in Northern Ireland to better inform educational discourse and policies. A strength of the methodology used to execute the analysis was that multilevel modelling accounted for the clustering of pupils within schools and therefore provided the most accurate within model effects estimates.

Despite the outlined strengths of the data and analysis, there were also limitations that must be acknowledged. Firstly, the GL Assessment data provided for analysis consisted of a limited sample of pupils and schools that used GL Assessment throughout their year groups. The sample was not random and was determined by the schools that consented to their data being used for an external research project at Queen's University Belfast. As some schools did not consent and others did not reply to the request, it limited the number of pupil and school level cases included in the data for analysis. The data accounted for 32 primary schools in English and maths, and 36 primary schools in the CAT. The data were therefore not a representative indication of primary school attainment trends across Northern Ireland due to the small sample of pupils and schools. Secondly, the data were cross-sectional meaning the attainment

trends of different primary years could not be accurately compared as they did not refer to the same pupils. In addition, the range of variables included in the data were limited, subsequently restricting the scope of analysis. The restricted pupil level socio-economic status and religious affiliation indicators were also a limitation of the data as these were a key focus of this thesis. However, in contrast to the main dataset used for analysis in this study, the GL Assessment data was not linked by the providers to any external data sources such as the Census. This explains the limited variables provided for analysis as GL Assessment are likely to collect a restricted range of additional pupil and school level factors as attainment data is their primary focus. Finally, the high proportion of missing values evident in the pupil level variable measuring FSME was a key limitation, especially as this was a predictor of key interest in analysis.

Summary and Conclusion

Overall, despite the restricted sample and variables in the GL Assessment data, this analysis provided the first opportunity in Northern Ireland to examine primary school attainment trends according to a pupil's socio-demographic profile and school level factors. Analysis was presented for English and mathematics attainment in 32 primary schools and cognitive abilities attainment in 36 primary schools. Exploratory multilevel models for each subject highlighted there were statistically significant score differences between age groups (scripts), which informed the final structure of the presented multilevel models. The predictors of key interest in the multilevel models were gender and FSME. The school level factors of: school management structure, school location, the percentage of pupils entitled to free school meals in a school and the percentage of pupils with special educational needs in a school were controlled for within the models.

When examining the gendered patterns of attainment, female pupils consistently outperformed their male peers in English across all age groups (scripts). In mathematics, the attainment difference was in favour of females at age 8 years (Script 08) and age 11 years (Script 11). In the remaining age groups/scripts, male pupils had marginally higher attainment in mathematics than females. However, across all ages in English and mathematics, the confidence intervals of the given within model effects were not statistically significant. In the CAT, female pupils had higher attainment than

their male peers at age 8-9 years (Level A) and age 10 years (Level B), whilst, at age 11 years (Level C), male pupils had marginally higher performances than their female peers. However, the confidence intervals associated with effect within the CAT models also reflected that the gendered attainment differences were not statistically significant. Overall, across all subjects and the respective scripts, the analysis found no statistically significant gender differences in attainment within the executed models.

When considering the within model effects of FSME on primary school attainment, pupils entitled to FSM had lower attainment in all subjects across age groups. Despite such findings, across all age groups in English, the confidence intervals of the within model effects indicated no statistically significant differences in attainment between pupils based on their FSME status. In mathematics, the score difference between pupils based on their FSME status was statistically significant at age 8 years (Script 08) and age 9 years (Script 09). In CAT, the score difference between pupils based on their FSME was only statistically significant at age 8-9 years (Level A). Overall, across all subjects, there was consistency in the negative direction of the within model effect of FSME on attainment, however the magnitude and statistical significance of such effect varied across subjects and scripts.

To conclude, this analysis was of key importance as it provided the first opportunity to examine primary school attainment trends in Northern Ireland. This analysis also re-emphasised the importance of primary school attainment data becoming more widely available in Northern Ireland to allow the within model effects of socio-demographics and school factors to be thoroughly examined. In the future, longitudinal attainment data would provide an opportunity to examine the influence of socio-demographics and school level factors throughout the primary schooling years. If primary school attainment data became readily available for analysis within Northern Ireland, future research could examine a wider range of socio-demographic and school level factors on primary school attainment on a representative sample of the Northern Ireland population, that could effectively inform education policies.

For reference: school level variables were created for inclusion in the statistical analysis through the information provided in the following reference. Please note, the

information in the third excel link provided in the below hyperlink was used to create the school level variables in analysis.

Department of Education (2017) *School Enrolments – school level data 2016/17,* Available at: https://www.education-ni.gov.uk/publications/school-enrolments-school-level-data-201617 (Accessed: 14th October 2019).

Appendix A1: Supplementary material for Appendix A

Consent letter sent to schools on behalf of GL Assessment and Queen's University Belfast to gain permission to use their data

Name

Job title

School name

Address 1

Address 2

Postcode

June 2017

Dear Headteacher,

We would like to invite your school to take part in a research study being undertaken by GL Assessment and a team from the Centre for Evidence and Social Innovation at Queen's University Belfast.

Before you decide whether you would like to take part, we would like to inform you about why the research is being conducted and what it will involve. We would appreciate it if you could please take a few moments to read the following information carefully.

Your school has used the *Progress Test Series* and/or the *Cognitive Abilities Test* over the last few years. As part of your use of the assessments, GL Assessment holds a data set regarding pupil performance in the tests and we are proposing to undertake some analyses on this data to look at trends in populations across Northern Ireland. In particular, we are looking at patterns of pupil performance in relation to family background, gender, location of home address, type of school attended and socio-economic status. We are not looking at how your school is performing in relation to other schools and no individual school's data will be referenced as part of the project. Please note that there would be no time commitment on your part.

In order to do this, Queen's University Belfast will arrange to match Census data held by the Northern Ireland Statistical Agency (NISRA) to GL Assessment data. The Census data includes significant detail on family background going back about 40 years. Once matched the data is made available to researchers from Queen's University Belfast under strict conditions to ensure confidentiality e.g. only trained staff are allowed to work on the anonymised data set, that is available on a stand-alone computer. No mobile phones or note making are allowed in the room whilst data is being analysed and all print out must be approved by NISRA before they are handed to staff.

As participation is voluntary, your school would be free to withdraw from the study at any time up until the point that the data set is made anonymous, prior to any reports derived from the project are published. Any reports will not mention individual names or the name of schools that participated in the project. You decision to participate (or not) will not affect your relationship with GL Assessment or with Queen's University Belfast. The project will be scrutinised and ethically approval by the Queen's University Belfast School of Social Sciences, Educational & Social Work Ethics Committee.

GL Assessment 1st Floor, Vantage London, Great West Road, Brentford, TW8 9AG
Tel: +44 (0) 20 8996 3333 Fax: +44 (0) 20 8742 8767 Email: info@gl-assessment.co.uk
gl-assessment.co.uk

We are looking to undertake the analysis in the autumn of 2017 and publish the findings in the spring of 2018. We will, of course, send you a copy of our findings on publication.

If you are happy for us to access this data, please can you complete the details on the consent form below, sign it, and return to research@gl-assessment.co.uk by 31 July 2017. Note that Queen's University Belfast do not currently hold data on your school.

If you have any questions please don't hesitate to contact Prof Allen Thurston, 20 College Green, School of Social Sciences, Education & Social Work, Queen's University Belfast, Belfast, BT7 1LN / a.thurston@qub.ac.uk.

Yours sincerely,

Paul McGlade
Regional Director, Northern Ireland, Scotland and Wales, GL Assessment

School Consent Form

Please return this form to research@gl-assessment.co.uk by 30 September 2017 if you **ARE** willing for your school's Cognitive Abilities Test and Progress Test Series data to be accessed from the GL Assessment database as part of the research study being undertaken by GL Assessment and the Centre for Evidence and Social Innovation at Queen's University Belfast.

I **DO** give permission for my school's data to be accessed from the GL Assessment database.

Your School's Name .....

Your Name .....

Your Position .....

Date .....

Signature .....

GL Assessment 1st Floor, Vantage London, Great West Road, Brentford, TW8 9AG
Tel: +44 (0) 20 8996 3333 Fax: +44 (0) 20 8742 8767 Email: info@gl-assessment.co.uk
gl-assessment.co.uk

Ethical approval letter for GL Assessment data analysis from the School of Social Sciences, Education and Social Work at Queen's University Belfast

School of Social Sciences,
Education and Social Work
69/71 University Street
Belfast
BT7 1HL
TEL: +44 (0) 28 9097 3041/5941
www.qub.ac.uk

Memorandum

To	Erin Early & Gemma Cherry
From	Dirk Schubotz, SREC Chair
Date	7 August 2017
Distribution	Allen Thurston; Laura Dunne; Jannette Elwood and Sarah Miller File
Subject	Ethics Review – 'Uncovering disparities in the educational attainment of young people living in Urban and Rural locations across Northern Ireland-The influence of religion, socio-economic status and residential location on the educational attainment of primary school pupils in Northern Ireland'

The School of Social Sciences, Education and Social Work Ethics Committee has reviewed your proposed study and has granted approval for you to proceed.

- It is important to ensure that you follow the procedures outlined in your submission. Any departure from these may require additional ethical approval.

Note for the principal investigator: it is the responsibility of the investigator to add any research projects involving human participants, their material or data, to the University's Human Subjects Database for insurance purposes. (The Human Subjects Database is accessible through QOL under 'My Research').

The Committee wishes you every success with your research.

Dirk Schubotz

Chair, SSESW SREC

Appendix A2: Supplementary material for Appendix A

Full multilevel models for each GL Assessment script in PTE, PTM and CAT

Table 1: Multilevel models for each subject in Script 07

	Progress Test in English	**Progress Test in Maths**
	Number of schools: 924 Number of pupils: 26 Log likelihood: -3326.19	Number of schools: 916 Number of pupils: 26 Log likelihood: -3214.04
	β (SE)	β (SE)
Gender *(reference: male)*		
Female	1.85 (0.57)**	-0.95 (0.53)
Free School Meal Entitlement *(reference: not entitled)*		
Entitled to Free School Meals	-0.31 (0.13)*	-0.23 (0.12)
Missing	-0.76 (0.34)*	-0.77 (0.31)*
School management structure *(reference: controlled)*		
Catholic Maintained	-0.23 (1.52)	-1.19 (1.47)
Irish Medium	-	-
Integrated	-4.36 (3.71)	-2.02 (3.57)
Education and Library Board *(reference: Belfast ELB)*		
Western ELB	5.29 (2.45)*	4.73 (2.37)*
Southern ELB	-0.78 (2.61)	-3.74 (2.52)

Table 1 continued

South Eastern ELB	1.37 (1.89)	-0.02 (1.83)
North Eastern ELB	-0.36 (2.09)	-1.38 (2.02)
Percentage of pupils entitled to FSM in schools	-0.05 (0.04)	-0.06 (0.04)
Percentage of SEN pupils in schools	-0.15 (0.08)	-0.13 (0.08)
Constant	25.58 (2.83)***	32.41 (2.72)***

*p≤0.05 **p≤0.01 ***p≤0.001

Note: CAT was not included in this table as CAT Level A referred to an older age group than Script 07. The school management structure of Irish medium was not included in the PTE and PTM Script 07 models as no pupils completing Script 07 attended Irish medium schools.

Table 2: Multilevel models for each subject in Script 08

	Progress Test in English	**Progress Test in Maths**
	Number of pupils: 1,070 Number of schools: 29 Log likelihood: -3976.71	Number of pupils: 1,068 Number of schools: 29 Log likelihood: -4117.64
	β (SE)	β (SE)
Gender (reference: male)		
Female	2.78 (0.61)***	0.42 (0.69)
Free School Meal Entitlement (reference: not entitled)		
Entitled to Free School Meals	-0.43 (0.13)***	-0.52 (0.17)**
Missing	-0.76 (0.36)*	-1.28 (0.43)**
School management structure (reference: controlled)		
Catholic Maintained	2.37 (1.30)	1.75 (2.10)
Irish Medium	-3.28 (3.95)	2.95 (6.15)
Integrated	-2.04 (2.67)	-1.11 (4.19)
Education and Library Board (reference: Belfast ELB)		
Western ELB	5.00 (2.27)*	4.42 (3.66)
Southern ELB	-2.74 (2.32)	-2.65 (3.78)

Table 2 continued

South Eastern ELB	-1.16 (1.67)	-1.02 (2.76)
North Eastern ELB	-4.76 (1.82)**	-3.96 (2.94)
Percentage of pupils entitled to FSM in schools	-0.10 (0.04)**	-0.09 (0.06)*
Percentage of SEN pupils in schools	-0.04 (0.07)	-0.01 (0.12)
Constant	33.17 (2.58)***	30.06 (3.20)***

*p≤0.05 **p≤0.01 ***p≤0.001

Note: CAT is included in the next table (3) as CAT Level A referred to the same age group as Script 08 and 09.

Table 3: Multilevel models for each subject in Script 09/CAT Level A

	Progress Test in English	**Progress Test in Maths**	**Cognitive Abilities Test**
	Number of pupils: 1,137 Number of schools: 28 Log likelihood: -4226.17	Number of pupils: 1,194 Number of schools: 28 Log likelihood: -4609.33	Number of pupils: 2,028 Number of schools: 32 Log likelihood: -9480.49
	β (SE)	β (SE)	β (SE)
Gender (reference: male)			
Female	1.69 (0.59)**	-1.14 (0.66)	2.06 (1.14)
Free School Meal Entitlement (reference: not entitled)			
Entitled to Free School Meals	-0.49 (0.13)***	-0.69 (0.16)***	-1.24 (0.26)***
Missing	-0.62 (0.36)	-1.35 (0.42)***	-2.49 (0.59)***
School management structure (reference: controlled)			
Catholic Maintained	0.28 (1.40)	-1.64 (1.85)	6.01 (3.99)
Irish Medium	-5.37 (4.38)	-9.24 (5.65)	19.14 (12.02)
Integrated	2.04 (3.65)	-5.84 (4.79)	-7.58 (9.12)
Education and Library Board (reference: Belfast ELB)			
Western ELB	-0.15 (2.42)	-0.22 (3.20)	2.69 (7.04)
Southern ELB	-5.37 (2.55)*	-7.26 (3.36)*	-0.15 (6.93)

Table 3 continued

South Eastern ELB	-3.13 (1.83)	-2.26 (2.43)	3.98 (5.41)
North Eastern ELB	-4.97 (1.96)*	-7.49 (2.59)**	6.71 (5.69)
Percentage of pupils entitled to FSM in schools	-0.05 (0.04)	-0.06 (0.05)	-0.14 (0.11)
Percentage of SEN pupils in schools	-0.12 (0.08)	-0.21 (0.10)*	-0.11 (0.20)
Constant	35.25 (2.71)***	56.30 (3.55)***	84.12 (6.85)***

*p≤0.05 **p≤0.01 ***p≤0.001

Table 4: Multilevel models for each subject in Script 10/CAT Level B

	Progress Test in English	**Progress Test in Maths**	**Cognitive Abilities Test**
	Number of pupils: 1,053 Number of schools: 29 Log likelihood: -3957.25	Number of pupils: 1,053 Number of schools: 29 Log likelihood: -4253.75	Number of pupils: 1,362 Number of schools: 29 Log likelihood: -6383.74
	β (SE)	β (SE)	β (SE)
Gender (reference: male)			
Female	2.15 (0.64)***	-0.38 (0.84)	5.86 (1.42)***
Free School Meal Entitlement (reference: not entitled)			
Entitled to Free School Meals	-0.65 (0.15)***	-0.60 (0.21)**	-0.20 (0.31)
Missing	-0.08 (0.43)	0.26 (0.58)	-0.68 (0.81)
School management structure (reference: controlled)			
Catholic Maintained	0.23 (1.73)	0.87 (2.69)	4.08 (3.38)
Irish Medium	-8.23 (5.19)	-3.45 (7.92)	18.91 (10.07)
Integrated	-3.00 (3.41)	0.02 (5.25)	10.34 (7.04)
Education and Library Board (reference: Belfast ELB)			
Western ELB	2.41 (2.99)	3.64 (4.64)	10.69 (5.38)*
Southern ELB	1.70 (3.22)	4.54 (4.96)	-3.57 (5.77)

Table 4 continued

South Eastern ELB	0.30 (2.30)	2.39 (3.58)	7.84 (4.26)
North Eastern ELB	-4.53 (2.46)	-3.32 (3.80)	4.15 (4.64)
Percentage of pupils entitled to FSM in schools	-0.02 (0.05)	-0.08 (0.08)	-0.22 (0.10)*
Percentage of SEN pupils in schools	-0.17 (0.10)	0.003 (0.15)	-0.05 (0.16)
Constant	35.28 (3.36)***	41.82 (5.15)***	90.61 (5.47)***

*p≤0.05 **p≤0.01 ***p≤0.001

Table 5: Multilevel models for each subject in Script 11/CAT Level C

	Progress Test in English	**Progress Test in Maths**	**Cognitive Abilities Test**
	Number of pupils: 882 Number of schools: 27 Log likelihood: -3407.51	Number of pupils: 881 Number of schools: 27 Log likelihood: -3590.35	Number of pupils: 350 Number of schools: 12 Log likelihood: -1610.21
	β (SE)	β (SE)	β (SE)
Gender (reference: male)			
Female	1.68 (0.77)*	0.55 (0.95)	-0.85 (2.59)
Free School Meal Entitlement (reference: not entitled)			
Entitled to Free School Meals	-1.17 (0.18)***	-1.38 (0.23)***	-2.35 (0.43)***
Missing	-1.35 (0.43)**	-2.05 (0.54)***	-0.47 (1.33)
School management structure (reference: controlled)			
Catholic Maintained	-1.89 (2.05)	-1.64 (2.83)	12.32 (2.96)***
Irish Medium	-4.75 (6.19)	-8.05 (8.44)	19.86 (6.80)**
Integrated	3.24 (4.86)	5.48 (6.74)	-
Education and Library Board (reference: Belfast ELB)			
Western ELB	-4.17 (4.13)	-1.65 (5.64)	-
Southern ELB	-3.35 (3.52)	-3.97 (4.89)	-

Table 5 continued

South Eastern ELB	-1.21 (2.58)	0.79 (3.60)	-
North Eastern ELB	-3.16 (2.77)	-4.40 (3.83)	-
Percentage of pupils entitled to FSM in schools	-0.10 (0.06)	-0.15 (0.08)	-
Percentage of SEN pupils in schools	-0.25 (0.11)*	-0.20 (0.16)	-
Constant	49.09 (3.98)***	61.80 (5.43)***	88.41 (4.15)***

*p≤0.05 **p≤0.01 ***p≤0.001

Note: the school management structure of integrated was not included for CAT as no pupils attending integrated schools completed CAT Level C. A small number of pupils in the Western ELB completed CAT Level C which was subsequently omitted from the model. These factors were therefore excluded from the CAT Level C model. In addition, the factors of Education and Library Board and the percentage of pupils entitled to FSM/with SEN at the school level caused error with calculation of school level random effects parameters. These were subsequently excluded from the model to ensure accurate estimates for the remaining factors were provided.

Appendix B: Methodology

Ethical Approval Letter from School of Medicine, Health and Life Sciences at Queen's University Belfast

Date:	12 September 2019
To:	Dr John Moriarty
Faculty REC Reference Number:	PREC 16.05 – Amendment 1
Full Title:	Administrative Data Research Network Project 081: Educational Attainment in Northern Ireland: Key Predictors and Outcomes at the Individual, School and Regional Level
Decision:	**AMENDMENT 1 - APPROVED**

Thank you for your request for an amendment to the above study, received on 05 September 2019.

The Chair of the Medicine, Health and Life Sciences Research Ethics Committee has considered your proposed amendment and is content to give an approval.

The following study documents have been reviewed as part of this amendment and **approved** for use:

Documentation Received	Version	Date
Notification of Amendment Form – Amendment 1		Received 05 September 2019
Research Protocol		Received 05 September 2019

If you would like to discuss this further please contact the Research Ethics Officer, Mr Stefan Curran, at facultyrecmhls@qub.ac.uk or by telephone on 028 90972529.

Yours sincerely

pp Dr Michelle McKinley
Chair, MHLS Faculty REC

Ethical Approval Letter from School of Social Sciences, Education and Social Work at Queen's University Belfast

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Memorandum

REF

To Erin Early

From Dina Belluigi, SREC Chair

Date 23 October 2019

Distribution File

Subject: **Ethics Review –.** Administrative Data Research Network Project 081: Educational Attainment in Northern Ireland: Key Predictors and Outcomes at the Individual, School and Regional

REF:

We note your communication (dated 13 September 2019), wherein you include the approval and subsequent amendments to a research project approved by The Chair of the Medicine, Health and Life Sciences Research Ethics Committee. As an ethics committee recognised by our institutional governance body has given approval, we are satisfied that that approval is sufficient.

Dina Belluigi
Chair, SSESW SREC

Table 1: Correlation matrix of independent variables

	Cohort 2	Cohort 3	Female	Protestant	Other religion	No religion	No stated religion	FSME	Property value: <=£100,000	Property value: £101-£150,000	Property value: £151-£200,000	No value provided
Cohort 2	1.00											
Cohort 3	-0.50	1.00										
Female	-0.01	0.003	1.00									
Protestant	-0.01	0.01	0.001	1.00								
Other religion	0.001	-0.001	0.004	-0.19	1.00							
No religion	-0.01	-0.000	-0.01	-0.22	-0.08	1.00						
No stated religion	-0.000	0.001	0.002	-0.18	-0.06	-0.08	1.00					
FSME	0.001	0.002	0.01	-0.10	-0.05	-0.02	0.11	1.00				
Property value: <=£100,000	-0.003	0.004	-0.005	0.04	-0.02	0.01	0.05	0.22	1.00			
Property value: £101-£150,000	0.001	-0.003	0.01	-0.06	-0.04	-0.01	0.03	0.12	-0.34	1.00		
Property value: £151-£200,000	0.003	-0.002	-0.000	0.02	0.01	-0.01	-0.03	-0.13	-0.25	-0.38	1.00	
No value provided	0.002	-0.004	-0.003	-0.01	0.005	-0.01	-0.01	-0.04	-0.09	-0.14	-0.11	1.00

Table 1 continued

	Cohort 2	Cohort 3	Female	Protestant	Other religion	No religion	No stated religion	FSME	Property value: <=£100,000	Property value: £101-£150,000	Property value: £151-£200,000	No value provided
Privately owned property	-0.003	-0.01	-0.01	0.05	0.02	-0.03	-0.05	-0.49	-0.28	-0.13	0.17	0.01
Privately rented property	0.006	0.01	0.01	-0.04	0.01	0.04	0.03	0.21	0.01	0.12	-0.03	0.001
Other housing tenure	0.003	-0.005	0.002	-0.004	0.01	0.01	0.01	0.04	0.02	0.02	-0.03	0.07
No mother data	0.003	-0.01	-0.01	-0.02	-0.01	0.01	0.07	0.08	0.04	0.01	-0.02	0.03
No father data	0.001	0.003	0.001	-0.05	-0.05	0.05	0.07	0.34	0.20	0.14	-0.12	-0.03
Mother education: none	0.01	-0.02	0.005	-0.02	-0.05	-0.04	-0.002	0.31	0.18	0.09	-0.10	-0.02
Mother education: school	-0.01	0.02	0.004	0.05	0.02	-0.01	-0.01	-0.08	-0.04	0.06	0.04	0.003
Mother education: other	0.004	-0.002	-0.001	-0.02	-0.000	0.004	0.005	-0.01	0.02	0.03	-0.01	-0.002
Father education: none	-0.004	-0.02	0.001	0.004	-0.02	-0.05	-0.02	0.05	0.04	0.05	-0.02	0.02

Table 1 continued

	Cohort 2	Cohort 3	Female	Protestant	Other religion	No religion	No stated religion	FSME	Property value: <=£100,000	Property value: £151-£200,000	Property value: £151-£200,000	No value provided
Father education: school	0.002	0.004	-0.02	0.05	0.02	-0.02	-0.02	-0.16	-0.10	-0.02	0.08	0.01
Father education: other	0.01	-0.002	-0.003	0.004	0.01	-0.02	-0.02	-0.09	-0.06	0.01	0.04	0.02
Mother occupation: intermediate	-0.005	0.005	-0.005	0.04	0.03	0.001	-0.01	-0.16	-0.10	-0.06	0.06	0.01
Mother occupation: routine	-0.000	-0.004	0.005	0.01	-0.02	-0.01	-0.01	0.09	0.13	0.13	-0.07	-0.02
Mother occupation: unemployed	0.005	-0.001	0.005	-0.06	-0.03	-0.01	0.01	0.35	0.11	0.07	-0.06	-0.02
Father occupation: intermediate	0.002	-0.002	-0.003	0.002	0.03	-0.03	-0.04	-0.20	-0.14	-0.11	0.07	0.05
Father occupation: routine	0.000	-0.001	-0.01	0.03	-0.01	-0.03	-0.02	-0.06	0.02	0.09	0.01	-0.01

Table 1 continued

	Cohort 2	Cohort 3	Female	Protestant	Other religion	No religion	No stated religion	FSME	Property value: <=£100,000	Property value: £151-£200,000	Property value: £151-£200,000	No value provided
Father occupation: unemployed	0.003	-0.005	0.002	-0.04	-0.02	-0.01	0.01	0.16	0.05	0.03	-0.02	-0.005
NI-MDM income	0.001	0.005	-0.006	0.20	0.11	0.09	-0.07	-0.31	-0.26	-0.19	0.13	0.02
Grammar school	0.02	-0.03	0.02	0.01	0.04	0.04	-0.08	-0.24	-0.17	-0.16	0.07	-0.002
Controlled schools	-0.01	0.01	0.01	0.51	0.15	0.08	-0.004	-0.04	0.06	-0.02	0.01	-0.01
Catholic Maintained schools	-0.001	0.002	0.01	-0.43	-0.15	-0.15	0.05	0.22	0.03	0.13	-0.04	0.01
Integrated schools	0.003	-0.003	-0.01	0.02	0.01	0.11	0.02	0.02	0.05	0.02	-0.01	-0.01
Other Maintained schools	0.004	-0.000	0.001	-0.04	-0.01	-0.01	0.02	0.02	-0.01	0.04	-0.01	-0.01

Table 1 continued

	Privately owned property	Privately rented property	Other housing tenure	No mother data	Mother education: none	Mother education: school	Mother education: other	No father data	Father education: none	Father education: school	Father education: other
Privately owned property	1.00										
Privately rented property	-0.60	1.00									
Other housing tenure	-0.22	-0.04	1.00								
No mother data	-0.08	0.04	0.06	1.00							
Mother education: none	-0.25	0.08	0.02	-0.11	1.00						
Mother education: school	0.07	-0.02	-0.03	-0.24	-0.44	1.00					
Mother education: other	-0.06	0.09	-0.000	-0.05	-0.08	-0.18	1.00				
No father data	0.41	0.23	0.04	0.03	0.15	0.001	0.01	1.00			

Table 1 continued

	Privately owned property	Privately rented property	Other housing tenure	No mother data	Mother education: none	Mother education: school	Mother education: other	No father data	Father education: none	Father education: school	Father education: other
NI-MDM income	0.31	-0.06	-0.02	-0.05	-0.24	0.02	-0.03	-0.25	-0.08	0.09	0.04
Grammar school	0.26	-0.14	-0.02	-0.07	-0.23	-0.04	-0.05	-0.19	-0.14	0.06	-0.02
Controlled schools	-0.02	0.03	-0.003	0.01	0.01	0.07	-0.002	0.01	0.02	0.04	0.01
Catholic maintained schools	-0.15	0.06	0.01	0.03	0.16	-0.02	0.03	0.10	0.10	-0.05	0.01
Integrated schools	-0.07	0.04	0.01	0.03	0.01	0.01	0.02	0.07	-0.01	-0.02	-0.001
Other Maintained schools	-0.01	-0.01	0.001	0.003	0.01	0.003	0.003	0.03	-0.01	-0.003	-0.01

Table 1 continued

	Privately owned property	Privately rented property	Other housing tenure	No mother data	Mother education: none	Mother education: school	Mother education: other	No father data	Father education: none	Father education: school	Father education: other
Father education: none	0.01	-0.03	-0.01	0.04	0.22	-0.06	-0.02	-0.28	1.00		
Father education: school	0.19	-0.11	-0.02	-0.02	-0.14	0.15	-0.03	-0.39	-0.24	1.00	
Father education: other	0.08	-0.02	-0.02	-0.001	-0.07	0.03	0.12	-0.23	-0.14	-0.20	1.00
Mother occupation: intermediate	0.17	-0.08	-0.03	-0.15	-0.18	0.23	-0.01	-0.10	-0.04	0.07	0.03
Mother occupation: routine	-0.14	0.08	-0.004	-0.17	0.26	0.12	0.09	0.09	0.09	-0.01	0.004
Mother occupation: unemployed	-0.26	0.12	0.02	-0.08	0.28	-0.06	0.003	0.18	0.04	-0.10	-0.04
Father occupation: intermediate	0.22	-0.12	-0.003	-0.03	-0.09	0.02	-0.01	-0.39	0.10	0.17	0.12
Father occupation: routine	0.06	-0.03	-0.01	0.01	0.05	0.04	0.04	-0.36	0.25	0.20	0.18
Father occupation: unemployed	-0.08	0.03	0.002	0.08	0.07	-0.04	-0.003	-0.12	0.19	0.01	0.005

Table 1 continued

	Mother occupation: intermediate	Mother occupation: unemployed	Mother occupation: routine	Father occupation: intermediate	Father occupation: routine	Father occupation: unemployed	NI-MDM income
Mother occupation: intermediate	1.00						
Mother occupation: unemployed	-0.19	1.00					
Mother occupation: routine	-0.43	-0.22	1.00				
Father occupation: intermediate	0.11	-0.10	-0.07	1.00			
Father occupation: routine	-0.03	-0.04	0.11	-0.31	1.00		
Father occupation: unemployed	-0.05	0.10	-0.002	-0.10	-0.09	1.00	
NI-MDM income	0.13	-0.18	-0.16	0.14	-0.04	-0.07	1.00
Grammar school	0.12	-0.14	-0.21	0.10	-0.10	-0.06	0.28

Table 1 continued

	Mother occupation: intermediate	Mother occupation: unemployed	Mother occupation: routine	Father occupation: intermediate	Father occupation: routine	Father occupation: unemployed	NI-MDM income
Controlled schools	0.01	-0.03	0.06	0.003	0.05	-0.03	0.14
Catholic maintained schools	-0.08	0.14	0.09	-0.05	0.04	0.08	-0.32
Integrated schools	-0.03	0.003	0.05	-0.04	0.01	0.004	-0.07
Other Maintained schools	-0.01	0.02	0.01	-0.01	-0.01	0.004	-0.07

Table 1 continued

	Grammar school	Controlled schools	Catholic Maintained schools	Integrated schools	Other Maintained schools
Grammar school	1.00				
Controlled schools	-0.15	1.00			
Catholic maintained schools	-0.50	-0.44	1.00		
Integrated schools	-0.25	-0.22	-0.19	1.00	
Other Maintained schools	-0.04	-0.04	-0.03	-0.02	1.00

Note: values in Table 1 are provided to 2 decimal places. However, when 2 decimal places = 0.00, values are provided to 3 decimal places to provide a greater level of detail.

Table 2: Interaction model description (gender and religion)

Dependent variable	Independent variable	Categories
Overall GCSE score	Free School Meal Entitlement	• Entitled to free school meals • Not entitled to free school meals **(reference category)**
	Housing Tenure	• Privately owned • Private rental • Rented from the Northern Ireland Housing Association/Housing Executive **(reference category)**
	Property Value	• Less than or equal to £100,000 • Between £101-£150,000 • Between £151-£200,000 • More than £200,000 **(reference category)**
	Mother's Education	• No qualifications • School level qualifications • Other qualifications • Degree level qualifications **(reference category)**
	Father's Education	• No qualifications • School level qualifications • Other qualifications • Degree level qualifications **(reference category)**
	Mother's Occupation	• Professional **(reference category)** • Intermediate • Routine • Not employed
	Father's Occupation	• Professional **(reference category)** • Intermediate • Routine • Not employed

Table 2 continued

Dependent variable	Independent variable	Categories
Overall GCSE score	NI-MDM (2010) for Income	• Scale: 1-10
	Religion	• Catholic • Protestant **(reference category)**
	Gender	• Female • Male **(reference category)**
	School Type	• Grammar • Non-grammar **(reference category)**
	School Management Structure	• Controlled • Catholic Maintained • Integrated • Voluntary **(reference category)**
	Controls	• Cohort 1 **(reference category)** • Cohort 2 • Cohort 3
		• Other housing tenure **(reference category: rented from Northern Ireland Housing Association/Executive)**
		• No property value provided **(reference: more than £200,000**
		• No mother data **(reference: mother data provided)**

Table 2 continued

Dependent variable	Independent variable	Categories
Overall GCSE score		• No father data **(reference: father data provided)** • Other maintained management structure **(reference: voluntary)**
	Gender and Religion Interaction	• Female and Catholic • Female and Protestant • Male and Protestant **(reference category)** • Male and Catholic

Table 3: Interaction model description (gender and father's education)

Dependent variable	Independent variable	Categories
Overall GCSE score	Free School Meal Entitlement	• Entitled to free school meals • Not entitled to free school meals **(reference category)**
	Housing Tenure	• Privately owned • Private rental • Rented from the Northern Ireland Housing Association/Housing Executive **(reference category)**
	Property Value	• Less than or equal to £100,000 • Between £101-£150,000 • Between £151-£200,000 • More than £200,000 **(reference category)**
	Mother's Education	• No qualifications • School level qualifications • Other qualifications • Degree level qualifications **(reference category)**
	Father's Education	• Some level of qualifications • No qualifications **(reference category)**
	Mother's Occupation	• Professional **(reference category)** • Intermediate • Routine • Not employed
	Father's Occupation	• Professional **(reference category)** • Intermediate • Routine • Not employed

Table 3 continued

Dependent variable	Independent variable	Categories
Overall GCSE score	NI-MDM (2010) for Income	• Scale: 1-10
	Religion	• Catholic **(reference category)** • Protestant • Other religion • No religion
	Gender	• Female • Male **(reference category)**
	School Type	• Grammar • Non-grammar **(reference category)**
	School Management Structure	• Controlled • Catholic Maintained • Integrated • Voluntary **(reference category)**
	Controls	• Cohort 1 **(reference category)** • Cohort 2 • Cohort 3
		• Religion not stated **(reference category: Catholic)**
		• Other housing tenure **(reference category: rented from Northern Ireland Housing Association/Executive)**
		• No property value provided **(reference: more than £200,000)**

Table 3 continued

Dependent variable	Independent variable	Categories
Overall GCSE score		• No mother data **(reference: mother data provided)** • No father data **(reference: father data provided)** • Other maintained management structure **(reference: voluntary)**
	Gender and Father's Education	• Female and some level of qualifications **(reference category)** • Female and no qualifications • Male and some level of qualifications • Male and no qualifications

Table 4: Interaction model description (gender and school type)

Dependent variable	Independent variable	Categories
Overall GCSE score	Free School Meal Entitlement	• Entitled to free school meals • Not entitled to free school meals **(reference category)**
	Housing Tenure	• Privately owned • Private rental • Rented from the Northern Ireland Housing Association/Housing Executive **(reference category)**
	Property Value	• Less than or equal to £100,000 • Between £101-£150,000 • Between £151-£200,000 • More than £200,000 **(reference category)**
	Mother's Education	• No qualifications • School level qualifications • Other qualifications • Degree level qualifications **(reference category)**
	Father's Education	• No qualifications • School level qualifications • Other qualifications • Degree level qualifications **(reference category)**
	Mother's Occupation	• Professional **(reference category)** • Intermediate • Routine • Not employed
	Father's Occupation	• Professional **(reference category)** • Intermediate • Routine • Not employed

Table 4 continued

Dependent variable	Independent variable	Categories
Overall GCSE score	NI-MDM (2010) for Income	• Scale: 1-10
	Religion	• Catholic **(reference category)** • Protestant • Other religion • No religion
	Gender	• Female • Male **(reference category)**
	School Type	• Grammar • Non-grammar **(reference category)**
	School Management Structure	• Controlled • Catholic Maintained • Integrated • Voluntary **(reference category)**
	Controls	• Cohort 1 **(reference category)** • Cohort 2 • Cohort 3
		• Religion not stated **(reference category: Catholic)**
		• Other housing tenure **(reference category: rented from Northern Ireland Housing Association/Executive)**
		• No property value provided **(reference: more than £200,000)**

Table 4 continued

Dependent variable	Independent variable	Categories
Overall GCSE score		• No mother data **(reference: mother data provided)** • No father data **(reference: father data provided)** • Other maintained management structure **(reference: voluntary)**
	Gender and School Type	• Female and grammar **(reference category)** • Female and non-grammar • Male and grammar • Male and non-grammar

Table 5: Interaction model description (other religion and school type)

Dependent variable	Independent variable	Categories
Overall GCSE score	Free School Meal Entitlement	• Entitled to free school meals • Not entitled to free school meals **(reference category)**
	Housing Tenure	• Privately owned • Private rental • Rented from the Northern Ireland Housing Association/Housing Executive **(reference category)**
	Property Value	• Less than or equal to £100,000 • Between £101-£150,000 • Between £151-£200,000 • More than £200,000 **(reference category)**
	Mother's Education	• No qualifications • School level qualifications • Other qualifications • Degree level qualifications **(reference category)**
	Father's Education	• No qualifications • School level qualifications • Other qualifications • Degree level qualifications **(reference category)**
	Mother's Occupation	• Professional **(reference category)** • Intermediate • Routine • Not employed
	Father's Occupation	• Professional **(reference category)** • Intermediate • Routine • Not employed

Table 5 continued

Dependent variable	**Independent variable**	**Categories**
Overall GCSE score	NI-MDM (2010) for Income	• Scale: 1-10
	Religion	• Other religion • Else **(reference category)**
	Gender	• Female • Male **(reference category)**
	School Type	• Grammar • Non-grammar **(reference category)**
	School Management Structure	• Controlled • Catholic Maintained • Integrated • Voluntary **(reference category)**
	Controls	• Cohort 1 **(reference category)** • Cohort 2 • Cohort 3
		• Other housing tenure **(reference category: rented from Northern Ireland Housing Association/Executive)**
		• No property value provided **(reference: more than £200,000)**
		• No mother data **(reference: mother data provided)**

Table 5 continued

Dependent variable	Independent variable	Categories
Overall GCSE score		• No father data **(reference: father data provided)** • Other maintained management structure **(reference: voluntary)**
	Gender-School Type	• Other religion and grammar **(reference category)** • Other religion and non-grammar • Else and grammar • Else and non-grammar

Table 6: Interaction model description (FSME and school type)

Dependent variable	Independent variable	Categories
Overall GCSE score	Free School Meal Entitlement	• Entitled to free school meals • Not entitled to free school meals **(reference category)**
	Housing Tenure	• Privately owned • Private rental • Rented from the Northern Ireland Housing Association/Housing Executive **(reference category)**
	Property Value	• Less than or equal to £100,000 • Between £101-£150,000 • Between £151-£200,000 • More than £200,000 **(reference category)**
	Mother's Education	• No qualifications • School level qualifications • Other qualifications • Degree level qualifications **(reference category)**
	Father's Education	• No qualifications • School level qualifications • Other qualifications • Degree level qualifications **(reference category)**
	Mother's Occupation	• Professional **(reference category)** • Intermediate • Routine • Not employed

Table 6 continued

Dependent variable	Independent variable	Categories
Overall GCSE score	Father's Occupation	• Professional **(reference category)** • Intermediate • Routine • Not employed
	NI-MDM (2010) for Income	• Scale: 1-10
	Religion	• Catholic **(reference category)** • Protestant • Other religion • No religion
	Gender	• Female • Male **(reference category)**
	School Type	• Grammar • Non-grammar **(reference category)**
	School Management Structure	• Controlled • Catholic Maintained • Integrated • Voluntary **(reference category)**
	Controls	• Cohort 1 **(reference category)** • Cohort 2 • Cohort 3 • Religion not stated **(reference category: Catholic)**

Table 6 continued

Dependent variable	Independent variable	Categories
Overall GCSE score		• Other housing tenure **(reference category: rented from Northern Ireland Housing Association/Executive)** • No property value provided **(reference: more than £200,000)** • No mother data **(reference: mother data provided)** • No father data **(reference: father data provided)** • Other maintained management structure **(reference: voluntary)**
	FSME-School Type Interaction	• Entitled and grammar **(reference category)** • Entitled and non-grammar • Not entitled and grammar • Not entitled and non-grammar

Appendix C: Results

Table 1: Mean GCSE attainment according to Free School Meal Entitlement

	Frequency of pupils (N and %)	Mean number of GCSEs A*-C (SD)	Mean GCSE score A*-U (SD)
Cohort 1 (2010/2011)			
Entitled to FSM	3,701 (17.6%)	3.84 (3.60)	35.95 (22.48)
Not entitled to FSM	17,347 (82.4%)	6.75 (3.44)	54.74 (22.30)
Total	21,048 (100%)	6.24 (3.64)	51.43 (23.45)
Cohort 2 (2011/2012)			
Entitled to FSM	3,662 (17.8%)	3.90 (3.53)	36.48 (22.51)
Not entitled to FSM	16,889 (82.2%)	6.83 (3.37)	55.59 (21.52)
Total	20,551 (100%)	6.30 (3.58)	52.19 (22.90)
Cohort 3 (2012/2013)			
Entitled to FSM	3,534 (17.9%)	3.64 (3.56)	34.20 (23.04)
Not entitled to FSM	16,240 (82.1%)	6.83 (3.41)	55.42 (22.15)
Total	19,774 (100%)	6.26 (3.64)	51.62 (23.75)

Table 2: Mean GCSE attainment according to housing tenure

	Frequency of pupils (N and %)	Mean number of GCSEs A*-C (SD)	Mean GCSE score A*-U (SD)
Cohort 1 (2010/2011)			
Privately owned	16,159 (76.8%)	6.94 (3.37)	55.91 (21.81)
Private rental	2,012 (9.6%)	4.43 (3.56)	39.91 (22.42)
Rented from Northern Ireland Housing Association/Housing Executive	2,553 (12.1%)	3.40 (3.44)	33.31 (21.72)
Other	324 (1.5%)	5.02 (3.81)	42.40 (25.83)
Total	21,048 (100%)	6.24 (3.64)	51.43 (23.45)
Cohort 2 (2011/2012)			
Privately owned	15,623 (76.0%)	7.02 (3.28)	56.71 (21.02)
Private rental	2,164 (10.5%)	4.49 (3.59)	40.55 (22.78)
Rented from Northern Ireland Housing Association/Housing Executive	2,444 (11.9%)	3.50 (3.38)	34.40 (21.57)
Other	320 (1.6%)	5.37 (3.83)	45.88 (25.97)
Total	20,551 (100%)	6.30 (3.58)	52.19 (22.90)
Cohort 3 (2012/2013)			
Privately owned	14,985 (75.8%)	6.98 (3.34)	56.41 (21.83)
Private rental	2,132 (10.8%)	4.48 (3.68)	39.90 (23.53)
Rented from Northern Ireland Housing Association/Housing Executive	2,377 (12.0%)	3.39 (3.45)	32.62 (22.15)
Other	280 (1.4%)	5.31 (3.74)	46.19 (24.33)
Total	19,774 (100%)	6.26 (3.64)	51.62 (23.75)

Table 3: Mean GCSE attainment according to property value

	Frequency of pupils (N and %)	Mean number of GCSEs A*-C (SD)	Mean GCSE score A*-U (SD)
Cohort 1 (2010/2011)			
Less than or equal to £100,000	3,763 (17.9%)	4.40 (3.74)	40.10 (24.20)
Between £101-£150,000	7,232 (34.4%)	5.53 (3.63)	46.61 (22.52)
Between £151-£200,000	4,630 (22.0%)	7.02 (3.27)	56.21 (21.15)
More than £200,000	4,596 (21.8%)	8.01 (2.86)	63.30 (19.62)
No value provided	827 (3.9%)	6.59 (3.54)	52.64 (23.40)
Total	21,048 (100%)	6.24 (3.64)	51.43 (23.45)
Cohort 2 (2011/2012)			
Less than or equal to £100,000	3,640 (17.7%)	4.51 (3.73)	40.81 (23.92)
Between £101-£150,000	7,046 (34.3%)	5.55 (3.58)	47.25 (22.09)
Between £151-£200,000	4,576 (22.3%)	7.11 (3.18)	57.11 (20.17)
More than £200,000	4,482 (21.8%)	8.07 (2.75)	63.89 (19.18)
No value provided	807 (3.9%)	6.63 (3.37)	53.66 (21.55)
Total	20,551 (100%)	6.30 (3.58)	52.19 (22.90)
Cohort 3 (2012/2013)			
Less than or equal to £100,000	3,577 (18.1%)	4.45 (3.78)	40.03 (24.49)
Between £101-£150,000	6,721 (34.0%)	5.44 (3.66)	46.00 (22.96)
Between £151-£200,000	4,341 (22.0%)	7.10 (3.21)	56.69 (20.68)
More than £200,000	4,395 (22.2%)	8.10 (2.77)	64.35 (19.49)
No value provided	740 (3.7%)	6.67 (3.55)	53.51 (23.83)
Total	19,774 (100%)	6.26 (3.64)	51.62 (23.75)

Table 4: Frequency of pupils (N and %) per cohort according to maternal data

	Mother in household – maternal data provided	Mother not in household – no maternal data provided	Total
Cohort 1 (2010/2011)	19,758 (93.9%)	1,290 (6.1%)	21,048 (100%)
Cohort 2 (2011/2012)	19,326 (94.0%)	1,225 (6.0%)	20,551 (100%)
Cohort 3 (2012/2013)	18,694 (94.5%)	1,080 (5.5%)	19,774 (100%)

Table 5: Frequency of pupils (N and %) per cohort according to paternal data

	Father in household – paternal data provided	Father not in household – no paternal data provided	Total
Cohort 1 (2010/2011)	14,559 (69.2%)	6,489 (30.8%)	21,048 (100%)
Cohort 2 (2011/2012)	14,148 (68.9%)	6,403 (31.1%)	20,551 (100%)
Cohort 3 (2012/2013)	13,590 (68.7%)	6,184 (31.3%)	19,774 (100%)

Table 6: Overall frequency of pupils (N and %) according to maternal and paternal data

	Father in household – data provided	Father not in household – no data provided	Row Totals
Mother in household – data provided	40,003 (65.2%)	17,775 (29.0%)	57,778 (94.1%)
Mother not in household – no data provided	2,294 (3.7%)	1,301 (2.1%)	3,595 (5.9%)
Column Totals	42,297 (68.9%)	19,076 (31.1%)	61,373 (100%)

Table 7: Mean GCSE attainment according to mothers' qualifications

	Frequency of pupils (N and %)	Mean number of GCSEs A*-C (SD)	Mean GCSE score A*-U (SD)
Cohort 1 (2010/2011)			
Degree (all levels)	5,242 (24.9%)	8.10 (2.87)	64.37 (20.22)
School level qualifications: GCSEs/AS level/A Level or equivalent	9,990 (47.5%)	6.36 (3.44)	51.81 (21.46)
Other qualifications: Apprenticeship/vocational/work-related	686 (3.3%)	5.44 (3.58)	46.09 (21.86)
No professional/academic qualifications	3,840 (18.2%)	4.06 (3.61)	37.32 (22.46)
No maternal data	1,290 (6.1%)	-	-
Total	21,048 (100%)		
Cohort 2 (2011/2012)			
Degree (all levels)	5,286 (25.7%)	8.18 (2.72)	64.88 (19.15)
School level qualifications: GCSEs/AS level/A Level or equivalent	9,661 (47.0%)	6.36 (3.42)	52.18 (21.07)
Other qualifications: Apprenticeship/vocational/work-related	704 (3.4%)	5.43 (3.52)	46.70 (21.83)
No professional/academic qualifications	3,675 (17.9%)	4.16 (3.56)	38.43 (22.17)
No maternal data	1,225 (6.0%)	-	-
Total	20,551 (100%)		
Cohort 3 (2012/2013)			
Degree (all levels)	5,157 (26.1%)	8.19 (2.78)	65.26 (19.61)
School level qualifications: GCSEs/AS level/A Level or equivalent	9,697 (49.0%)	6.25 (3.49)	51.09 (21.94)
Other qualifications: Apprenticeship/vocational/work-related	642 (3.2%)	5.13 (3.71)	44.55 (23.18)
No professional/academic qualifications	3,198 (16.2%)	3.93 (3.56)	36.25 (22.62)
No maternal data	1,080 (5.5%)	-	-
Total	19,774 (100%)		

Table 8: Mean GCSE attainment according to fathers' qualification

	Frequency of pupils (N and %)	Mean number of GCSEs A*-C (SD)	Mean GCSE score A*-U (SD)
Cohort 1 (2010/2011)			
Degree (all levels)	3,792 (18.0%)	8.52 (2.58)	67.45 (18.82)
School level qualifications: GCSEs/AS level/A Level or equivalent	5,301 (25.2%)	6.92 (3.28)	55.45 (20.72)
Other qualifications: Apprenticeship/vocational/work-related	2,113 (10.1%)	6.41 (3.38)	52.05 (20.83)
No professional/academic qualifications	3,353 (15.9%)	5.39 (3.60)	45.56 (22.31)
No paternal data	6,489 (30.8%)	-	-
Total	21,048 (100%)		
Cohort 2 (2011/2012)			
Degree (all levels)	3,675 (17.9%)	8.53 (2.53)	67.76 (18.35)
School level qualifications: GCSEs/AS level/A Level or equivalent	5,277 (25.7%)	6.94 (3.20)	55.76 (19.78)
Other qualifications: Apprenticeship/vocational/work-related	2,175 (10.6%)	6.50 (3.35)	52.92 (20.80)
No professional/academic qualifications	3,021 (14.7%)	5.31 (3.60)	45.65 (22.11)
No paternal data	6,403 (31.1%)	-	-
Total	20,551 (100%)		
Cohort 3 (2012/2013)			
Degree (all levels)	3,702 (18.7%)	8.54 (2.53)	67.83 (18.58)
School level qualifications: GCSEs/AS level/A Level or equivalent	5,108 (25.8%)	6.89 (3.30)	55.52 (21.11)
Other qualifications: Apprenticeship/vocational/work-related	2,009 (10.2%)	6.53 (3.37)	53.04 (21.10)
No professional/academic qualifications	2,771 (14.0%)	5.18 (3.63)	44.18 (22.60)
No paternal data	6,184 (31.3%)	-	-
Total	19,774 (100%)		

Table 9: Mean GCSE attainment according to mothers' occupational status

	Frequency of pupils (N and %)	Mean number of GCSEs A*-C (SD)	Mean GCSE score A*-U (SD)
Cohort 1 (2010/2011)			
Higher managerial, administrative and professional occupations	5,177 (24.6%)	7.78 (3.02)	61.74 (20.71)
Intermediate occupations	5,730 (27.2%)	7.13 (3.26)	57.04 (21.30)
Routine and manual occupations	7,047 (33.5%)	5.23 (3.61)	44.83 (22.08)
Never worked/long term unemployed/full time students	1,804 (8.6%)	4.07 (3.73)	37.45 (23.87)
No maternal data	1,290 (6.1%)	-	-
Total	21,048 (100%)		
Cohort 2 (2011/2012)			
Higher managerial, administrative and professional occupations	5,145 (25.0%)	7.80 (2.92)	62.05 (19.73)
Intermediate occupations	5,528 (26.9%)	7.18 (3.18)	57.66 (20.57)
Routine and manual occupations	6,822 (33.2%)	5.31 (3.59)	45.71 (22.04)
Never worked/long term unemployed/full time students	1,831 (8.9%)	4.22 (3.67)	38.91 (23.42)
No maternal data	1,225 (6.0%)	-	-
Total	20,551 (100%)		
Cohort 3 (2012/2013)			
Higher managerial, administrative and professional occupations	5,017 (25.3%)	7.78 (3.01)	62.20 (20.75)
Intermediate occupations	5,452 (27.6%)	7.15 (3.24)	57.26 (21.24)
Routine and manual occupations	6,506 (32.9%)	5.19 (3.64)	44.44 (22.56)
Never worked/long term unemployed/full time students	1,719 (8.7%)	4.02 (3.69)	36.73 (24.13)
No maternal data	1,080 (5.5%)	-	-
Total	19,774 (100%)		

Table 10: Mean GCSE attainment according to fathers' occupational status

	Frequency of pupils (N and %)	Mean number of GCSEs A*-C (SD)	Mean GCSE score A*-U (SD)
Cohort 1 (2010/2011)			
Higher managerial, administrative and professional occupations	4,008 (19.0%)	8.09 (2.85)	64.09 (19.64)
Intermediate occupations	5,227 (24.8%)	7.22 (3.23)	57.67 (21.23)
Routine and manual occupations	4,669 (22.2%)	5.81 (3.51)	48.37 (21.60)
Never worked/long term unemployed/full time students	655 (3.1%)	5.02 (3.74)	43.19 (23.58)
No paternal data	6,489 (30.8%)	-	-
Total	21,048 (100%)		
Cohort 2 (2011/2012)			
Higher managerial, administrative and professional occupations	3,823 (18.6%)	8.10 (2.79)	64.26 (19.26)
Intermediate occupations	5,128 (25.0%)	7.24 (3.15)	58.05 (20.35)
Routine and manual occupations	4,547 (22.1%)	5.88 (3.50)	49.34 (21.42)
Never worked/long term unemployed/full time students	650 (3.2%)	5.09 (3.79)	44.06 (23.85)
No paternal data	6,403 (31.1%)	-	-
Total	20,551 (100%)		
Cohort 3 (2012/2013)			
Higher managerial, administrative and professional occupations	3,757 (19.0%)	8.15 (2.74)	64.59 (19.45)
Intermediate occupations	4,892 (24.7%)	7.22 (3.24)	58.04 (21.34)
Routine and manual occupations	4,357 (22.0%)	5.84 (3.57)	48.67 (22.23)
Never worked/long term unemployed/full time students	584 (3.0%)	4.97 (3.77)	42.88 (24.60)
No paternal data	6,184 (31.3%)	-	-
Total	19,774 (100%)		

Table 11: Mean GCSE attainment according to NI-MDM (2010) income deciles

	Frequency of pupils (N and %)	Mean number of GCSEs A*-C (SD)	Mean GCSE score A*-U (SD)
Cohort 1 (2010/2011)			
1 (most deprived)	1,937 (9.2%)	4.30 (3.70)	39.02 (23.39)
2	2,023 (9.6%)	5.08 (3.74)	43.67 (23.68)
3	1,953 (9.3%)	5.45 (3.69)	46.43 (23.24)
4	2,044 (9.7%)	6.00 (3.67)	49.81 (23.24)
5	2,190 (10.4%)	6.21 (3.58)	50.63 (22.97)
6	2,317 (11.0%)	6.62 (3.51)	53.64 (22.39)
7	2,350 (11.2%)	6.56 (3.42)	53.17 (22.18)
8	2,230 (10.6%)	6.92 (3.41)	56.00 (22.17)
9	2,053 (9.7%)	7.12 (3.32)	57.45 (21.33)
10 (least deprived)	1,951 (9.3%)	7.89 (3.02)	63.16 (20.68)
Total	21,048 (100%)	6.24 (3.64)	51.43 (23.45)
Cohort 2 (2011/2012)			
1 (most deprived)	1,856 (9%)	4.40 (3.63)	40.12 (23.06)
2	1,876 (9.1%)	5.20 (3.69)	44.76 (23.37)
3	1,894 (9.2%)	5.51 (3.73)	47.21 (23.68)
4	2,075 (10.1%)	5.98 (3.62)	49.64 (22.91)
5	2,097 (10.2%)	6.27 (3.53)	51.97 (22.10)
6	2,305 (11.2%)	6.54 (3.43)	53.50 (21.78)
7	2,314 (11.3%)	6.66 (3.37)	54.34 (21.59)
8	2,161 (10.5%)	7.00 (3.29)	56.92 (20.97)
9	2,141 (10.4%)	7.24 (3.21)	58.15 (20.77)

Table 11 continued

10 (least deprived)	1,832 (9.0%)	7.94 (2.96)	63.36 (20.16)
Total	20,551 (100%)	6.30 (3.58)	52.19 (22.90)
Cohort 3 (2012/2013)			
1 (most deprived)	1,737 (8.8%)	4.34 (3.69)	38.60 (23.95)
2	1,868 (9.4%)	5.02 (3.78)	43.26 (24.16)
3	1,855 (9.4%)	5.33 (3.81)	45.50 (24.55)
4	2,011 (10.2%)	6.00 (3.68)	49.41 (23.53)
5	1,943 (9.8%)	6.30 (3.57)	51.87 (22.69)
6	2,164 (10.9%)	6.52 (3.52)	53.52 (22.66)
7	2,211 (11.2%)	6.59 (3.39)	53.47 (22.03)
8	2,034 (10.3%)	6.87 (3.40)	55.92 (22.27)
9	2,059 (10.4%)	7.30 (3.22)	58.77 (20.98)
10 (least deprived)	1,892 (9.6%)	7.94 (2.97)	63.22 (20.85)
Total	19,774 (100%)	6.26 (3.64)	51.62 (23.75)

Table 12: Mean GCSE attainment according to religious affiliation

	Frequency of pupils (N and %)	Mean number of GCSEs A*-C (SD)	Mean GCSE score A*-U (SD)
Cohort 1 (2010/2011)			
Catholic	9,484 (45.1%)	6.62 (3.57)	53.77 (23.14)
Protestant	7,118 (33.8%)	5.93 (3.63)	49.42 (23.11)
Other religion	1,328 (6.3%)	6.64 (3.49)	54.10 (22.48)
No religion	1,919 (9.1%)	6.32 (3.56)	52.58 (22.82)
Not stated	1,199 (5.7%)	4.45 (3.86)	40.08 (25.42)
Total	21,048 (100%)	6.24 (3.64)	51.43 (23.45)
Cohort 2 (2011/2012)			
Catholic	9,380 (45.6%)	6.65 (3.47)	54.47 (22.42)
Protestant	6,968 (33.9%)	6.03 (3.62)	50.40 (22.80)
Other religion	1,311 (6.4%)	6.92 (3.34)	56.05 (21.74)
No religion	1,722 (8.4%)	6.16 (3.60)	51.32 (22.67)
Not stated	1,170 (5.7%)	4.70 (3.80)	41.61 (24.67)
Total	20,551 (100%)	6.30 (3.58)	52.19 (22.90)
Cohort 3 (2012/2013)			
Catholic	8,720 (44.1%)	6.59 (3.62)	53.75 (23.97)
Protestant	6,949 (35.1%)	6.01 (3.62)	50.06 (23.15)
Other religion	1,245 (6.3%)	6.73 (3.37)	55.11 (21.88)
No religion	1,726 (8.7%)	6.17 (3.61)	51.09 (23.01)
Not stated	1,134 (5.8%)	4.82 (3.90)	41.84 (25.32)
Total	19,774 (100%)	6.26 (3.64)	51.62 (23.75)

Table 13: Mean GCSE attainment according to gender

	Frequency of pupils (N and %)	Mean number of GCSEs A*-C (SD)	Mean GCSE score A*-U (SD)
Cohort 1 (2010/2011)			
Male	10,711 (50.9%)	5.74 (3.74)	48.12 (23.92)
Female	10,337 (49.1%)	6.74 (3.46)	54.87 (22.44)
Total	21,048 (100%)	6.24 (3.64)	51.43 (23.45)
Cohort 2 (2011/2012)			
Male	10,587 (51.5%)	5.83 (3.67)	49.12 (23.22)
Female	9,964 (48.5%)	6.81 (3.40)	55.45 (22.08)
Total	20,551 (100%)	6.30 (3.58)	52.19 (22.90)
Cohort 3 (2012/2013)			
Male	10,054 (50.8%)	5.72 (3.72)	48.00 (23.86)
Female	9,720 (49.2%)	6.81 (3.48)	55.37 (23.04)
Total	19,774 (100%)	6.26 (3.64)	51.62 (23.75)

Table 14: Mean GCSE attainment according to school type attended

	Frequency of pupils (N and %)	Mean number of GCSEs A*-C (SD)	Mean GCSE score A*-U (SD)
Cohort 1 (2010/2011)			
Grammar	8,543 (40.6%)	8.95 (1.89)	69.31 (14.83)
Non-Grammar	12,505 (59.4%)	4.38 (3.38)	39.22 (20.18)
Total	21,048 (100%)	6.24 (3.64)	51.43 (23.45)
Cohort 2 (2011/2012)			
Grammar	8,483 (41.3%)	8.95 (1.80)	69.35 (13.87)
Non-Grammar	12,068 (58.7%)	4.44 (3.34)	40.12 (20.13)
Total	20,551 (100%)	6.30 (3.58)	52.19 (22.90)
Cohort 3 (2012/2013)			
Grammar	7,538 (38.1%)	9.03 (1.72)	70.40 (13.76)
Non-Grammar	12,236 (61.9%)	4.55 (3.46)	40.06 (21.07)
Total	19,774 (100%)	6.26 (3.64)	51.62 (23.75)
Frequency of schools (N and %)	**School level frequency**		
Grammar	68 (31.3%)		
Non-Grammar	149 (68.7%)		
Total	217 (100%)		

Table 15: Mean GCSE attainment according to school management structure

	Mean number of GCSEs A*-C (SD)	Mean GCSE score A*-U (SD)
Cohort 1 (2010/2011)		
Controlled	5.28 (3.67)	45.08 (23.03)
Catholic Maintained	4.89 (3.46)	42.10 (20.98)
Integrated	4.51 (3.31)	40.41 (19.11)
Voluntary	9.05 (1.86)	70.27 (14.54)
Other Maintained	4.36 (2.49)	41.05 (15.43)
Total	6.24 (3.64)	51.43 (23.45)
Cohort 2 (2011/2012)		
Controlled	5.42 (3.68)	46.31 (22.91)
Catholic Maintained	4.97 (3.38)	43.13 (20.62)
Integrated	4.33 (3.20)	40.04 (18.77)
Voluntary	9.01 (1.78)	70.08 (13.84)
Other Maintained	6.09 (2.43)	49.19 (15.85)
Total	6.30 (3.58)	52.19 (22.90)
Cohort 3 (2012/2013)		
Controlled	5.42 (3.68)	46.13 (23.15)
Catholic Maintained	4.88 (3.51)	41.75 (21.83)
Integrated	4.37 (3.36)	39.14 (19.78)
Voluntary	9.10 (1.67)	71.07 (13.52)
Other Maintained	5.47 (2.51)	47.35 (14.22)
Total	6.26 (3.64)	51.6 (23.7)

Table 16: Attendance of controlled and Catholic Maintained schools according to pupils' religion and their mean GCSE attainment (A*-C)

Cohort 1 (2010/2011)	School Management Structure	
	Controlled	**Catholic Maintained**
Catholic		
N (Column %)	222 (3.1%)	5,061 (89.2%)
Mean	5.86	5.04
SD	3.60	3.45
Protestant		
N (Column %)	4,847 (67.7%)	52 (0.9%)
Mean	5.25	3.15
SD	3.64	2.72
Other religion		
N (Column %)	826 (11.5%)	25 (0.4%)
Mean	6.03	4.36
SD	3.61	3.51
No religion		
N (Column %)	873 (12.2%)	100 (1.8%)
Mean	5.39	4.35
SD	3.67	3.27
Not stated		
N (Column %)	391 (5.5%)	434 (7.7%)
Mean	3.44	3.44
SD	3.59	3.33
Column totals		
N of pupils	7,159	5,672
% of pupils from Cohort 1	34.0%	26.9%
Overall columns total		
N (% of Cohort 1)	12,831 (61.0%)	
Excluded from table (voluntary, integrated and other maintained) N (%)	8,217 (39.0%)	
Total (including missing)		
N (%)	21,048 (100%)	

Table 16 continued

Cohort 2 (2011/2012)		
Catholic		
N (Column %)	230 (3.4%)	4,980 (89.9%)
Mean	6.29	5.10
SD	3.43	3.36
Protestant		
N (Column %)	4,609 (67.3%)	35 (0.6%)
Mean	5.37	4.14
SD	3.66	3.32
Other religion		
N (Column %)	806 (11.8%)	25 (0.5%)
Mean	6.39	4.80
SD	3.51	3.11
No religion		
N (Column %)	815 (11.9%)	83 (1.5%)
Mean	5.27	4.31
SD	3.73	2.87
Not stated		
N (Column %)	386 (5.6%)	415 (7.5%)
Mean	3.89	3.55
SD	3.63	3.35
Column totals		
N of pupils	6,846	5,538
% of pupils from Cohort 2	33.3%	27.0%
Overall column totals		
N (% of Cohort 2)	12,384 (60.3%)	
Excluded from table (voluntary, integrated and other maintained) N (%)	8,167 (39.7%)	
Total (including missing)		
N (%)	20,551 (100%)	
Cohort 3 (2012/2013)		
Catholic		
N (Column %)	214 (3.1%)	4,806 (89.4%)
Mean	6.26	4.98
SD	3.52	3.49

Table 16 continued

Cohort 3 (2012/2013)		
Protestant		
N (Column %)	4,719 (68.7%)	35 (0.7%)
Mean	5.36	3.66
SD	3.67	3.25
Other religion		
N (Column %)	767 (11.2%)	30 (0.6%)
Mean	6.41	4.27
SD	3.46	2.96
No religion		
N (Column %)	786 (11.4%)	83 (1.5%)
Mean	5.23	4.88
SD	3.68	3.58
Not stated		
N (Column %)	386 (5.6%)	422 (7.8%)
Mean	3.97	3.93
SD	3.74	3.58
Column totals		
N of pupils	6,872	5,376
% of pupils from Cohort 3	34.7%	27.2%
Overall column totals		
N (% of Cohort 3)	12,248 (61.9%)	
Excluded from table (voluntary, integrated and other maintained) N (%)	7,526 (38.1%)	
Total (including missing)		
N (%)	19,774 (100%)	

N (%) – frequency and percentage of pupils
Mean – mean GCSE attainment A*-C
SD – standard deviation

Note: voluntary, integrated and other maintained school management structures were not included in the above table as these school management structures were not a key focus to the question this table aims to explore: *does school management structure provide a school level proxy for religion?*

Table 17: GCSE English Full Model

	Number of pupils: 61,373 Number of schools: 217
Log likelihood = -117940.3	
Variable	**β (SE)**
Free School Meal Entitlement (reference: not entitled to Free School Meals)	-0.33 (0.02)***
Property Value (reference: >£200,000)	
≤ £100,000	-0.23 (0.02)***
£101-£150,000	-0.13 (0.02)***
£151-£200,000	-0.002 (0.02)
Housing Tenure (reference: rented from the Northern Ireland Housing Association/Executive)	
Privately owned (outright/mortgage)	0.41 (0.02)***
Privately rented	0.07 (0.03)*
Mother Qualifications (reference: degree level)	
No qualifications	-0.50 (0.03)***
School level qualifications	-0.13 (0.02)***
Other qualifications	-0.37 (0.04)***
Father Qualifications (reference: degree level)	
No qualifications	-0.27 (0.03)***
School level qualifications	-0.12 (0.02)***
Other qualifications	-0.22 (0.03)***
Mother Occupation (reference: professional occupation)	
Intermediate occupations	0.02 (0.02)
Routine occupations	-0.08 (0.02)***
Unemployed	-0.26 (0.03)***

Table 17 continued

Father Occupation (reference: professional occupation)	
Intermediate occupations	-0.005 (0.02)
Routine occupations	-0.05 (0.02)
Unemployed	-0.09 (0.04)*
NI-MDM (Income)	0.01 (0.003)***
Religion (reference: Catholic)	
Protestant	0.03 (0.03)
Other religion	0.18 (0.04)***
No religion	0.09 (0.03)**
Gender (reference: male)	
Female	0.78 (0.01)***
School Type (reference: non-grammar)	
Grammar	1.84 (0.13)***
School Management Structure (reference: Voluntary)	
Controlled	-0.29 (0.13)*
Catholic Maintained	0.20 (0.15)
Integrated	0.17 (0.18)
Controls	
Cohort (reference: Cohort 1)	
Cohort 2	-0.05 (0.02)***
Cohort 3	-0.07 (0.02)***
Religion not stated (reference: Catholic)	-0.40 (0.03)***
Property value: no value provided (reference: >£200,000)	-0.18 (0.04)***

Table 17 continued

Housing tenure: other (reference: rented from the Northern Ireland Housing Association/Executive)	0.03 (0.06)
No mother data (reference: mother data provided)	-0.59 (0.03)***
No father data (reference: father data provided)	-0.40 (0.02)***
Other Maintained (reference: voluntary)	0.92 (0.49)

*** *p≤0.001, **p≤0.01, *p≤0.05*

Table 18: GCSE Maths Full Model

	Number of pupils: 61,373 Number of schools: 217
Log likelihood = -118463.6	
Variable	**β (SE)**
Free School Meal Entitlement (reference: not entitled to Free School Meals)	-0.36 (0.02)***
Property Value (reference: >£200,000)	
≤ £100,000	-0.26 (0.03)***
£101-£150,000	-0.16 (0.02)***
£151-£200,000	-0.04 (0.02)*
Housing Tenure (reference: rented from the Northern Ireland Housing Association/Executive)	
Privately owned (outright/mortgage)	0.40 (0.03)***
Privately rented	0.04 (0.03)
Mother Qualifications (reference: degree level)	
No qualifications	-0.56 (0.03)***
School level qualifications	-0.17 (0.02)***
Other qualifications	-0.31 (0.04)***
Father Qualifications (reference: degree level)	
No qualifications	-0.34 (0.03)***
School level qualifications	-0.16 (0.02)***
Other qualifications	-0.23 (0.03)***
Mother Occupation (reference: professional occupation)	
Intermediate occupations	0.04 (0.02)*
Routine occupations	-0.09 (0.02)***
Unemployed	-0.29 (0.03)***

Table 18 continued

Father Occupation (reference: professional occupation)	
Intermediate occupations	0.04 (0.02)*
Routine occupations	-0.04 (0.02)
Unemployed	-0.06 (0.04)
NI-MDM (Income)	0.01 (0.003)***
Religion (reference: Catholic)	
Protestant	0.07 (0.03)*
Other religion	0.15 (0.04)***
No religion	0.12 (0.03)***
Gender (reference: male)	
Female	0.18 (0.01)***
School Type (reference: non-grammar)	
Grammar	2.19 (0.13)***
School Management Structure (reference: Voluntary)	
Controlled	-0.09 (0.13)
Catholic Maintained	0.22 (0.16)
Integrated	0.04 (0.18)
Controls	
Cohort (reference: Cohort 1)	
Cohort 2	0.01 (0.02)
Cohort 3	0.003 (0.02)
Religion not stated (reference: Catholic)	-0.5 (0.03)***
Property value: no value provided (reference: >£200,000)	-0.12 (0.04)***
Housing tenure: other (reference: rented from the Northern Ireland Housing Association/Executive)	0.08 (0.06)

Table 18 continued

No mother data (reference: mother data provided)	-0.68 (0.03)***
No father data (reference: father data provided)	-0.47 (0.02)***
Other Maintained (reference: voluntary)	-0.05 (0.50)

*** *p≤0.001, **p≤0.01, *p≤0.05*

Table 19: GCSE/Equivalents A*-G Full Model

	Number of pupils: 61,373 Number of schools: 217
Log likelihood = -125713.3	
Variable	**β (SE)**
Free School Meal Entitlement (reference: not entitled to Free School Meals)	-0.33 (0.02)***
Property Value (reference: >£200,000)	
≤ £100,000	-0.1 (0.03)***
£101-£150,000	-0.08 (0.02)***
£151-£200,000	-0.02 (0.02)
Housing Tenure (reference: rented from the Northern Ireland Housing Association/Executive)	
Privately owned (outright/mortgage)	0.40 (0.03)***
Privately rented	0.05 (0.03)
Mother Qualifications (reference: degree level)	
No qualifications	-0.36 (0.03)***
School level qualifications	-0.08 (0.02)***
Other qualifications	-0.15 (0.05)**
Father Qualifications (reference: degree level)	
No qualifications	-0.12 (0.03)***
School level qualifications	-0.05 (0.03)
Other qualifications	-0.10 (0.03)**
Mother Occupation (reference: professional occupation)	
Intermediate occupations	0.04 (0.02)
Routine occupations	-0.004 (0.03)
Unemployed	-0.13 (0.03)***

Table 19 continued

Father Occupation (reference: professional occupation)	
Intermediate occupations	-0.01 (0.02)
Routine occupations	-0.005 (0.03)
Unemployed	-0.10 (0.05)*
NI-MDM (Income)	0.01 (0.004)***
Religion (reference: Catholic)	
Protestant	0.006 (0.03)
Other religion	0.06 (0.04)
No religion	0.02 (0.04)
Gender (reference: male)	
Female	0.3 (0.02)***
School Type (reference: non-grammar)	
Grammar	1.43 (0.21)***
School Management Structure (reference: Voluntary)	
Controlled	-0.19 (0.21)
Catholic Maintained	0.34 (0.25)
Integrated	0.13 (0.28)
Controls	
Cohort (reference: Cohort 1)	
Cohort 2	0.2 (0.02)***
Cohort 3	0.4 (0.02)***
Religion not stated (reference: Catholic)	-0.45 (0.04)***
Property value: no value provided (reference: >£200,000)	-0.19 (0.04)***
Housing tenure: other (reference: rented from the Northern Ireland Housing Association/Executive)	-0.07 (0.07)

Table 19 continued

No mother data (reference: mother data provided)	-0.50 (0.04)***
No father data (reference: father data provided)	-0.34 (0.03)***
Other Maintained (reference: voluntary)	0.46 (0.79)

*** *p≤0.001, **p≤0.01, *p≤0.05*

Table 20: Comparison of within model effects across male and female models

	Number of pupils: 31,352 Number of schools: 197 Log likelihood: -131213.4			Number of pupils: 30,021 Number of schools: 204 Log likelihood: -124002.1		
	Male Model			**Female Model**		
	β (SE)	**Cohen's d**	**95% Confidence Intervals**	**β (SE)**	**Cohen's d**	**95% Confidence Intervals**
Free School Meal Entitlement (reference: not entitled to Free School Meals)	-3.43 (0.30)***	-0.15	-0.17 -0.13	-4.11 (0.29)***	-0.18	-0.21 -0.16
Property Value (reference: >£200,000)						
≤ £100,000	-2.44 (0.34)***	-0.11	-0.14 -0.09	-2.67 (0.34)***	-0.12	-0.15 -0.10
£101-£150,000	-1.86 (0.28)***	-0.09	-0.11 -0.06	-1.90 (0.27)***	-0.09	-0.11 -0.07
£151-£200,000	-0.57 (0.28)*	-0.03	-0.05 -0.004	-0.50 (0.27)	-0.02	-0.05 -0.001

Table 20 continued

Housing Tenure (reference: rented from the Northern Ireland Housing Association/Executive)							
Privately owned (outright/mortgage)	3.58 (0.36)***	0.16	0.14	0.19	4.28 (0.34)***	0.20	0.17	0.22
Privately rented	0.67 (0.41)	0.03	-0.004	0.06	0.91 (0.39)*	0.04	0.007	0.07
Mother Qualifications (reference: degree level)							
No qualifications	-5.64 (0.36)***	-0.27	-0.29	-0.25	-5.84 (0.35)***	-0.28	-0.30	-0.25
School level qualifications	-2.32 (0.26)***	-0.11	-0.13	-0.09	-1.95 (0.25)***	-0.09	-0.11	-0.07
Other qualifications	-3.10 (0.55)***	-0.15	-0.20	-0.11	-3.71 (0.54)***	-0.18	-0.23	-0.14
Father Qualifications (reference: degree level)							
No qualifications	-5.21 (0.38)***	-0.25	-0.28	-0.23	-2.88 (0.36)***	-0.14	-0.17	-0.11
School level qualifications	-2.60 (0.31)***	-0.13	-0.15	-0.11	-1.57 (0.30)***	-0.08	-0.10	-0.05
Other qualifications	-3.50 (0.39)***	-0.18	-0.21	-0.15	-2.25 (0.38)***	-0.11	-0.15	-0.08

Table 20 continued

Mother Occupation (reference: professional occupation)							
Intermediate occupations	0.35 (0.27)	-0.02	-0.005	0.04	-0.01 (0.26)	-0.001	-0.02	0.02
Routine occupations	-0.89 (0.29)**	-0.04	-0.06	-0.02	-1.59 (0.28)***	-0.07	-0.09	-0.05
Unemployed	-2.30 (0.42)***	-0.11	-0.14	-0.08	-3.41 (0.40)***	-0.16	-0.19	-0.13
Father Occupation (reference: professional occupation)							
Intermediate occupations	-0.45 (0.29)	-0.02	-0.05	0.002	0.15 (0.28)	0.01	-0.02	0.03
Routine occupations	-0.88 (0.32)**	-0.04	-0.07	-0.02	-0.92 (0.31)**	-0.04	-0.07	-0.02
Unemployed	-1.37 (0.59)*	-0.08	-0.12	-0.02	-0.40 (0.57)	-0.02	-0.07	0.03
Religion (reference: Catholic)							
Protestant	0.50 (0.39)	0.02	0.004	0.04	-0.06 (0.38)	-0.002	-0.02	0.01
Other religion	1.39 (0.50)**	0.06	0.03	0.09	1.37 (0.48)**	0.06	0.02	0.09
No religion	0.87 (0.43)*	0.04	0.01	0.07	-0.04 (0.43)	-0.002	-0.03	0.03
School Type (reference: non-grammar)							
Grammar	25.51 (1.79)***	1.40	1.38	1.42	23.04 (1.94)***	1.26	1.25	1.28

Table 20 continued

School Management Structure (reference: Voluntary)							
Controlled	-4.12 (1.86)*	-0.21	-0.23	-0.19	-3.15 (2.04)	-0.16	-0.18	-0.14
Catholic Maintained	1.26 (2.18)	0.07	0.05	0.09	2.74 (2.42)	0.15	0.13	0.17
Integrated	-1.39 (2.43)	-0.09	-0.12	-0.06	-1.43 (2.74)	-0.09	-0.12	-0.06
Controls								
Cohort 2 (reference: Cohort 1)	0.52 (0.22)*	0.01	-0.006	0.03	0.47 (0.21)*	0.01	-0.01	0.03
Cohort 3 (reference: Cohort 1)	0.07 (0.22)	0.002	-0.02	0.02	0.45 (0.21)*	0.01	-0.01	0.03
Religion not stated (reference: Catholic)	-3.87 (0.43)***	-0.16	-0.20	-0.13	-4.62 (0.41)***	-0.20	-0.23	-0.16
Housing tenure: other (reference: Rented from the Northern Ireland Housing Association/Executive)	1.3 (0.8)	0.06	-0.01	0.13	1.14 (0.75)	0.05	-0.02	0.12
Property value: none provided (reference: >£200,000)	-1.22 (0.50)*	-0.06	-0.10	-0.02	-1.66 (0.50)***	-0.08	-0.13	-0.04
No mother data (reference: mother data provided)	-6.87 (0.44)***	-0.29	-0.33	-0.26	-7.91 (0.43)***	-0.34	-0.37	-0.31

Table 20 continued

No father data (reference: father data provided)	-6.65 (0.34)***	-0.29	-0.31	-0.28	-5.29 (0.33)***	-0.23	-0.25	-0.22
Other Maintained (reference: voluntary)	8.30 (6.43)	0.59	0.44	0.74	7.97 (7.41)	0.57	0.42	0.72
NI-MDM (Income)	0.19 (0.04)***				0.12 (0.04)**			

*** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.05$

Note: Cohen's d is not calculated for the independent variable of NI-MDM (income) as this is a continuous variable and it did not make conceptual sense to calculate Cohen's d that is the comparison of two means.

Table 21: Mean GCSE attainment according to pupils' gender and religion

	Frequency of pupils (N and %)	Mean number of GCSEs A*-C (SD)	Mean GCSE score A*-U (SD)	Frequency of pupils (N and %)	Mean number of GCSEs A*-C (SD)	Mean GCSE score A*-U (SD)
	Male			**Female**		
Cohort 1 (2010/2011)						
Catholic	4,809 (22.9%)	6.12 (3.74)	50.40 (24.05)	4,675 (22.2%)	7.14 (3.31)	57.24 (21.62)
Protestant	3,625 (17.2%)	5.39 (3.68)	45.83 (23.16)	3,493 (16.6%)	6.49 (3.50)	53.15 (22.47)
Other Religion	671 (3.2%)	6.16 (3.55)	50.72 (22.47)	657 (3.1%)	7.14 (3.35)	57.55 (21.98)
No Religion	1,018 (4.8%)	5.96 (3.60)	50.13 (23.04)	901 (4.3%)	6.74 (3.47)	55.35 (22.25)
Not Stated	588 (2.8%)	4.05 (3.92)	37.15 (26.17)	611 (2.9%)	4.83 (3.75)	42.91 (24.37)
Column Total	10,711 (50.9%)	-	-	10,337 (49.1%)	-	-
Cohort 2 (2011/2012)						
Catholic	4,830 (23.5%)	6.15 (3.64)	51.26 (23.08)	4,550 (22.1%)	7.18 (3.21)	57.88 (21.18)
Protestant	3,580 (17.4%)	5.52 (3.67)	47.20 (22.93)	3,388 (16.5%)	6.57 (3.48)	53.74 (22.17)
Other Religion	654 (3.2%)	6.45 (3.45)	52.79 (21.90)	657 (3.2%)	7.40 (3.16)	59.30 (21.11)

Table 21 continued

Cohort 2 (2011/2012)						
No Religion	936 (4.5%)	5.88 (3.65)	49.20 (22.97)	786 (3.8%)	6.49 (3.52)	53.84 (22.07)
Not Stated	587 (2.9%)	4.31 (3.78)	39.01 (24.30)	583 (2.9%)	5.09 (3.79)	44.24 (24.79)
Column Total	10,587 (51.5%)	-	-	9,964 (48.5%)	-	-
Cohort 3 (2012/2013)						
Catholic	4,378 (22.1%)	6.01 (3.78)	49.73 (24.71)	4,342 (22.0%)	7.18 (3.34)	57.80 (22.50)
Protestant	3,526 (17.8%)	5.51 (3.63)	46.77 (22.77)	3,423 (17.3%)	6.52 (3.53)	53.45 (23.06)
Other Religion	627 (3.2%)	6.13 (3.39)	50.93 (21.44)	618 (3.1%)	7.35 (3.23)	59.35 (21.52)
No Religion	923 (4.7%)	5.77 (3.69)	48.49 (23.21)	803 (4.1%)	6.63 (3.45)	54.08 (22.43)
Not Stated	600 (3.0%)	4.38 (3.81)	38.87 (24.71)	534 (2.7%)	5.31 (3.94)	45.19 (25.61)
Column Total	10,054 (50.8%)	-	-	9,720 (49.2%)	-	-

Table 22: Mean GCSE attainment (A*-C) according to pupils' gender and fathers' qualifications

		Frequency of pupils (N and %), Mean number of GCSEs A*-C, Standard Deviation	
		Male	**Female**
Cohort 1 (2010/2011)			
Degree (all levels)	N (%)	1,899 (9.0%)	1,893 (9.0%)
	Mean	8.28	8.76
	SD	2.83	2.27
School level qualifications: GCSEs/AS level/A Level or equivalent	N (%)	2,777 (13.2%)	2,524 (12.0%)
	Mean	6.34	7.55
	SD	3.46	2.94
Other qualifications: Apprenticeship/vocational/work-related	N (%)	1,062 (5.0%)	1,051 (5.0%)
	Mean	5.88	6.95
	SD	3.49	3.18
No professional/academic qualifications	N (%)	1,716 (8.2%)	1,637 (7.8%)
	Mean	4.69	6.12
	SD	3.59	3.47
No paternal data	N (%)	3,257 (15.5%)	3,232 (15.3%)
Column Total	N (%)	10,711 (50.9%)	10,337 (49.1%)
Cohort 2 (2011/2012)			
Degree (all levels)	N (%)	1,889 (9.2%)	1,786 (8.7%)
	Mean	8.29	8.78
	SD	2.71	2.30
School level qualifications: GCSEs/AS level/A Level or equivalent	N (%)	2,807 (13.6%)	2,470 (12.0%)
	Mean	6.44	7.51
	SD	3.35	2.92
Other qualifications: Apprenticeship/vocational/work-related	N (%)	1,149 (5.6%)	1,026 (5.0%)
	Mean	5.93	7.14
	SD	3.46	3.11

Table 22 continued

Cohort 2 (2011/2012)			
No professional/academic qualifications	N (%)	1,512 (7.4%)	1,509 (7.3%)
	Mean	4.53	6.09
	SD	3.56	3.44
No paternal data	N (%)	3,230 (15.7%)	3,173 (15.5%)
Column Total	N (%)	10,587 (51.5%)	9,964 (48.5%)
Cohort 3 (2012/2013)			
Degree (all levels)	N (%)	1,872 (9.5%)	1,830 (9.3%)
	Mean	8.21	8.88
	SD	2.79	2.17
School level qualifications: GCSEs/AS level/A Level or equivalent	N (%)	2,651 (13.4%)	2,457 (12.4%)
	Mean	6.30	7.54
	SD	3.42	3.02
Other qualifications: Apprenticeship/vocational/work-related	N (%)	1,038 (5.2%)	971 (4.9%)
	Mean	5.86	7.24
	SD	3.49	3.08
No professional/academic qualifications	N (%)	1,431 (7.2%)	1,340 (6.8%)
	Mean	4.56	5.85
	SD	3.60	3.54
No paternal data	N (%)	3,062 (15.5%)	3,122 (15.8%)
Column Total	N (%)	10,054 (50.8%)	9,720 (49.2%)

Table 23: Mean GCSE attainment (A*-C) according to pupils' gender and school type attended

		Frequency of pupils (N and %), Mean number of GCSEs A*-C, Standard Deviation	
		Male	**Female**
Cohort 1 (2010/2011)			
Grammar	N (%)	4,253 (20.2%)	4,290 (20.4%)
	Mean	8.72	9.18
	SD	2.15	1.57
Non-Grammar	N (%)	6,458 (30.7%)	6,047 (28.7%)
	Mean	3.79	5.02
	SD	3.24	3.40
Column Total	N (%)	10,711 (50.9%)	10,337 (49.1%)
Cohort 2 (2011/2012)			
Grammar	N (%)	4,270 (20.8%)	4,213 (20.5%)
	Mean	8.74	9.17
	SD	2.06	1.46
Non-Grammar	N (%)	6,317 (30.7%)	5,751 (28%)
	Mean	3.86	5.09
	SD	3.19	3.39
Column Total	N (%)	10,587 (51.5%)	9,964 (48.5%)
Cohort 3 (2012/2013)			
Grammar	N (%)	3,712 (18.8%)	3,826 (19.4%)
	Mean	8.81	9.25
	SD	1.94	1.44
Non-Grammar	N (%)	6,342 (32.0%)	5,894 (29.8%)
	Mean	3.92	5.23
	SD	3.31	3.50
Column Total	N (%)	10,054 (50.8%)	9,720 (49.2%)

Table 24: Mean GCSE attainment (A*-C) according to pupils' religion and school type attended

		Frequency of pupils (N and %), Mean number of GCSEs A*-C, Standard Deviation				
		Catholic	**Protestant**	**Other Religion**	**No Religion**	**Not stated**
Cohort 1 (2010/2011)						
Grammar	N (%)	3,749 (17.8%)	2,941 (14.0%)	644 (3.1%)	913 (4.3%)	296 (1.4%)
	Mean	9.16	8.79	8.89	8.75	8.63
	SD	1.86	1.82	1.86	1.99	2.47
Non-Grammar	N (%)	5,735 (27.2%)	4,177 (19.8%)	684 (3.3%)	1,006 (4.8%)	903 (4.3%)
	Mean	4.96	3.91	4.53	4.12	3.08
	SD	3.44	3.21	3.34	3.22	3.18
Column Total	N (%)	9,484 (45.0%)	7,118 (33.8%)	1,328 (6.4%)	1,919 (9.1%)	1,199 (5.7%)
Cohort 2 (2011/2012)						
Grammar	N (%)	3,687 (17.9%)	3,024 (14.7%)	675 (3.3%)	784 (3.8%)	313 (1.5%)
	Mean	9.14	8.78	8.96	8.83	8.64
	SD	1.74	1.82	1.75	1.87	2.02
Non-Grammar	N (%)	5,693 (27.7%)	3,944 (19.2%)	636 (3.1%)	938 (4.6%)	857 (4.2%)
	Mean	5.03	3.92	4.77	3.93	3.26
	SD	3.36	3.21	3.27	3.16	3.24
Column Total	N (%)	9,380 (45.6%)	6,968 (33.9%)	1,311 (6.4%)	1,722 (8.4%)	1,170 (5.7%)

Table 24 continued

Cohort 3 (2012/2013)						
Grammar	N (%)	3,293 (16.7%)	2,676 (13.6%)	550 (2.8%)	758 (3.8%)	261 (1.3%)
	Mean	9.35	8.79	8.88	8.69	8.86
	SD	1.56	1.71	1.85	2.00	1.95
Non-Grammar	N (%)	5,427 (27.4%)	4,273 (21.6%)	695 (3.5%)	968 (4.9%)	873 (4.4%)
	Mean	4.92	4.27	5.04	4.20	3.61
	SD	3.48	3.40	3.34	3.35	3.50
Column Total	N (%)	8,720 (44.1%)	6,949 (35.2%)	1,245 (6.3%)	1,726 (8.7%)	1,134 (5.7%)

Table 25: Mean GCSE attainment (A*-C) according to pupils' FSME and school type attended

		Frequency of pupils (N and %), Mean number of GCSEs A*-C, Standard Deviation	
		Entitled to FSM	**Not Entitled to FSM**
Cohort 1 (2010/2011)			
Grammar	N (%)	567 (2.7%)	7,976 (37.9%)
	Mean	8.22	9.00
	SD	2.44	1.84
Non-Grammar	N (%)	3,134 (14.9%)	9,371 (44.5%)
	Mean	3.05	4.83
	SD	3.18	3.32
Column Total	N (%)	3,701 (17.6%)	17,347 (82.4%)
Cohort 2 (2011/2012)			
Grammar	N (%)	538 (2.6%)	7,945 (38.7%)
	Mean	8.20	9.00
	SD	2.37	1.74
Non-Grammar	N (%)	3,124 (15.2%)	8,944 (43.5%)
	Mean	3.16	4.89
	SD	3.15	3.29
Column Total	N (%)	3,662 (17.8%)	16,889 (82.2%)
Cohort 3 (2012/2013)			
Grammar	N (%)	455 (2.3%)	7,083 (35.8%)
	Mean	8.16	9.09
	SD	2.33	1.66
Non-Grammar	N (%)	3,079 (15.6%)	9,157 (46.3%)
	Mean	2.98	5.08
	SD	3.21	3.4
Column Total	N (%)	3,534 (17.9%)	16,240 (82.1%)