Department of Education
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Free School Meal Entitlement (FSME) as an indicator of socioeconomic deprivation in Northern Ireland: Advantages, disadvantages and alternatives

Ulster University

No 67, 2024

Education & Training

RESEARCH REPORT

Northern Ireland Statistics and Research Agency

Free School Meal Entitlement (FSME) as an indicator of socioeconomic deprivation in Northern Ireland: Advantages, disadvantages and alternatives

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Executive summary

Background

- Free school meals (FSM) are a vital support for economically disadvantaged families across the UK.
- In Northern Ireland (NI), children who are eligible for free school meals, and whose parents apply for the scheme and receive an award, are referred to as 'Entitled to Free School Meals' (FSME).
- Official statistics from across the UK indicate that FSME pupils consistently have lower levels of academic achievement compared to their non-FSME peers.
- FSME status is used by the Department of Education (DE) for operational purposes, including resource allocation, e.g. the Extended Schools programme awards additional funding to schools identified as having at least 37% of pupils as FSME, or 51% or more of their pupils living in either a Neighbourhood Renewal Area (NRA) or in the 30% most deprived Super Output Areas.
- Evidence gathered as part of the 'A Fair Start' report highlighted concerns amongst schools about whether FSME is an accurate measure of deprivation within the context of education. A recommendation was made for the DE to commission an independent report that considers the strengths and limitations of FSME and other potential measures of deprivation that could be used for resource allocation purposes.
- This project was put out to public tender and was awarded to a multidisciplinary team of researchers at Ulster University in June 2022.

Methods

- The project aimed to i) assess whether FSME is fit for purpose as a proxy measure of socio-economic deprivation for the DE, and ii) assess the feasibility of supplementing or replacing FSME with alternative indicators of socio-economic status (SES), including both individual and composite proxies.
- This report consists of three sections. These were:

- **Section1:** a narrative review of the empirical literature on the reliability and validity of the most commonly used proxies of socioeconomic deprivation used in education (including FSME). This section summarised and synthesised recent research into the reliability and validity of proxies of deprivation used in the field of education.
- **Section 2:** a scoping review of deprivation measures used in other jurisdictions. This section systematically reviewed the most common measures of socio-economic deprivation used within the field of education in the UK, and internationally.
- **Section 3:** a landscape review explored the extent to which FSME is used as an indicator of socioeconomic disadvantage in eight governmental departments in NI, and ii) documented other measures of SES that are also currently in use.

Summary of Key Findings

- Strengths and limitations of FSME and alternative proxies for socioeconomic deprivation are summarised in Table 1. The review showed that FSME is a widely-used, valid, and reliable indicator of household/school-level[1] deprivation, in both research and operational[2] contexts. As a measure of low SES, it has various strengths: i) it is routinely collected annually, ii) it is easy to interpret, iii) it is reliable as it is tied to official benefits data, iv) it correlates highly with other proxies for socioeconomic deprivation, v) it has a low false positive rate (i.e. unlikely to identify a child as disadvantaged, when they are not), and vi) it predicts educational outcomes to a degree that is comparable with other indicators of low SES.
- However, like all proxy measures, it is not perfect. Socioeconomic disadvantage is a complex, multi-faceted concept, and FSME is tied to only one domain of SES (household income). Also, it does not capture the entire continuum that ranges from deprivation to affluence. Given FSME is based on benefit claims, children from families who narrowly miss the cut-off for benefits (i.e. the "working poor") may experience similar or greater levels of material

[1] Typically defined as the % of pupils who are receiving FSM
[2] E.g. the allocation of funding to schools

deprivation than some children who are receiving FSM. Indeed the current earnings ceiling set for FSME are below commonly accepted monetary poverty thresholds. In addition, many families who are eligible for FSM do not apply/take up the option and may be missing from DE estimates. Furthermore, it is worth noting that the measure also includes children who are entitled under other criteria such as having a statement of special educational need and requiring a special diet, or where a school believes a child may be in need. Some of these children may not be from economically disadvantaged backgrounds.

- If deprivation is assessed based on past-year FSME, longer term disadvantage may be missed, therefore researchers recommend assessing FSME over longer periods of time. The most commonly used approach is to classify children as deprived if they were FSME at any point over the previous 6 years (FSME-6).
- Despite these limitations, alternative indicators of SES have their own weaknesses, therefore FSME can broadly be considered equal to or superior to most other commonly used proxies of household/school-level deprivation.
- Alternative household/school-level indicators, or composite indices of SES. are most often used by institutions that have sophisticated administrative data sharing infrastructures (e.g. the Scandinavian countries). The most common alternative proxies for deprivation are levels of parent/guardian education, parent/guardian occupational status and/or household income.
- Parental education is considered to be one of the most reliable and valid indicators of SES, as it is established at an early age and remains stable over time. But it is also often self-reported information, unless drawn from official records. The feasibility of linking parental educational records to pupil-data would need to be investigated and would likely be logistically challenging as most official higher and further education records are held by the institutions which granted the awards. It was therefore broadly agreed that it would not be appropriate for DE to use parental education for operational purposes.
- Parental occupation is also a commonly used proxy for SES, however occupation classification systems can be complicated, involve imprecise cut-offs, and lack consistency across regions and time. As is the case with

parental education, it was concluded that this would be impractical and inappropriate for operational purposes due to logistical challenges in linking data.

- Household benefits and/or income, derived from official sources, would be a more reliable and valid indicator of household/school-level deprivation than FSME (and other proxies for deprivation). It would offer a more fine-grained analysis of the level of need of pupils/schools, and unlike FSME would not have a problem of a shortfall between eligibility and those who apply and become entitled. However, household income/benefits data that could be used by the DE to supplement or replace FSME are not currently accessible outside of their host departments (e.g. Department for Communities [DfC], HMRC). The Digital Economy Act 2017 allows sharing of data for research purposes, and the Data Protection Act 2018 may allow sharing for processing that meets the criteria of being a public task. However, further legislation would be required to facilitate more routine sharing of personal data across departments.
- The most widely used measure of SES across the government departments of Northern Ireland is the Northern Ireland Multiple Deprivation Measure 2017 (NIMDM). It is a comprehensive measure that draws on multiple domains of deprivation. It also has the benefit of confidentiality – it is based on aggregate area-level data meaning unique individuals cannot be identified from it. However, it is not recommended that area-level indices such as these are used as the sole proxy for household/school-level deprivation, as they measure spatial concentrations of deprived people and not all deprived people live in deprived areas. They can misidentify pupils/schools with a postcode in a deprived area as deprived when they are not deprived, and vice-versa.
- Area-level indicators such as the NIMDM add useful additional information when used in conjunction with household/school-level measures of SES.

Recommendations

- As we did not identify a clearly superior (yet equally accessible) alternative, it is *not currently* recommended that the DE replace FSME as their primary indicator of socioeconomic disadvantage.
- Expanding the scope of the measure used from FSME (past-year) to FSME (ever FSME, past 3 or 6 years) could potentially lead to more reliable and valid identification of those most in-need (i.e. it may capture those who transition in and out of eligibility, who may fall within the “working poor” group) and is therefore worthy of further investigation.
- In the hypothetical future scenario that universal FSM are introduced in NI, for example for certain year groups, the DE could explore using data on pupils who have entitlement to the uniforms grant, which has similar eligibility criteria, as a replacement.
- Using a combination of school-level and area-level information is widely recommended in the literature, therefore the DE’s strategy of using both school-level FSME, and the NIMDM to determine eligibility for the Extended Schools programme funding can be considered sensible.
- To ensure improvements in the accuracy with which disadvantaged pupils in schools are identified, it is important wherever feasible to supplement FSME with additional indicators of socioeconomic disadvantage.
- It should be a priority to further develop means of securely sharing data across governmental departments in NI, for both research and operational purposes. Changes to legislation may be required to facilitate routine cross-departmental sharing of data for operational purposes, however the Digital Economy Act 2017 has opened up possibilities for data sharing for research purposes, and the Data Protection Act 2018 may allow the sharing of personal data if it meets the criteria of a ‘public task’.

Table 1. Summary of strengths and limitations of indicators of socioeconomic deprivation

Measure	Type	Strengths	Limitations
FSME (current or past year)	Individual/household level	• Up-to-date (routinely collected annually) • Covers majority of school-age population • Widely used for both research and operational purposes • Easy to interpret • Valid and reliable in predicting educational outcomes • Tied to official benefits data • Correlates highly with other indicators of socioeconomic disadvantage • Predicts educational outcomes to a comparable degree as other indicators of disadvantage	• Not everyone who is eligible for FSM applies for it • Captures only one element of social deprivation – wealth deprivation • Binary nature means it only captures lower end of the wealth distribution • Earnings ceiling set for FSME below common monetary poverty thresholds • Households just outside eligibility may experience similar or even greater levels of material deprivation than those within eligibility • Children who are not from economically deprived backgrounds can qualify for FSME if they have special dietary requirements as part of SEN statement,
FSME (any time over past 3 or 6 years)	Individual/household level	• As above but with greater reliability and validity as more likely to pick up longer-term deprivation • FSME status over past 6 years (FSME-6) slightly more reliable than past 3 years (FSME-3) • FSME-6 currently routinely collected as part of the annual School Census, and widely used for both research and operational purposes	• As above
Parental education	Individual/household level	• Widely used (but mainly for research purposes only) • Easy to interpret • Valid and reliable in predicting educational outcomes, particularly if drawn from official administrative records • Established at an early age and relatively consistent across time	• Legal and practical challenges in linking official parental educational records (held by individual further/higher educational institutions) to school data mean it would be unsuitable as an alternative to FSME for most of DE's purposes

		• Administrative data studies suggest it is a better predictor of educational attainment than FSME – albeit only marginally	
Parental occupation	Individual/household level	• Widely used (but mainly for research purposes only) • Registry based studies suggest it is a better predictor of educational outcomes than FSME – albeit only marginally	• Legal and practical challenges in linking official records of parent occupation (e.g. from HMRC records) to school-level data, mean it would be unsuitable as an alternative to FSME for most of DE's purposes • Occupational classification systems can be complicated and involve imprecise cut-offs • Lack of comparability - occupational classification systems can vary considerably across regions and time
Housing tenure (e.g. living in social housing)	Individual/household level	• Relatively easy to interpret • Registry based studies suggest it is a better predictor of educational outcomes than FSME – albeit only marginally	• Legal and practical challenges in linking official records of housing status (e.g. housing benefits from Department for Communities) to school-level data • Not as widely used as other proxies of deprivation – would limit comparability with other regions
Information on household benefits (from official sources)	Individual/household level	• No issue with eligibility vs uptake/entitlement (a limitation of using benefits such as FSME as a proxy) • Up-to-date • Easy to interpret • Valid and reliable	• Legal and practical challenges of linking official individual/household benefits data (e.g. from Department for Communities/HRMC) across departments NI civil service departments – would require comprehensive data sharing agreements and legal basis • Legislative implications of sharing individual-level data on a more routine basis need to be explored
Information on household income (from official sources)	Individual/household level	• Direct measure of material deprivation – more reliable and valid than proxies • Strongest predictor of educational attainment	• Practical challenges of linking official individual/household income data (e.g. from Department for Communities/HRMC) across NI government departments – would require

		• Continuous nature can capture the entire gradient of deprivation	comprehensive data sharing agreements and legal basis • Legislative implications of sharing individual-level data on a more routine basis need to be explored
Multiple deprivation measures (e.g. NIMDM, Pobal)	Area-level	• Confidential as person-level data not disclosed • Widely used for both research and operational purposes, particularly across NI government departments • Comprehensive - draws on information from multiple domains • Effective for identifying and targeting policies at small geographic areas	• Problematic when used as a proxy for individual/household/school-level deprivation - can misidentify pupils/schools with a postcode in a deprived area as deprived when they are not, and vice-versa • Timeliness – e.g. current NIMDM is based on data from 5+ years ago
Self-reports (e.g. parent-completed questionnaires about income, education, occupation, household assets etc.)	Individual/household level	• Widely used (for research purposes only) • Can capture detailed information on the household • Can capture different elements of socioeconomic position	• Inappropriate for operational purposes (e.g., allocating funding) as the chance to receive additional support would likely bias reporting • Subject to conscious and unconscious reporting biases • Cost - scaling up to allow for research and/or monitoring at a regional/national level would be extremely costly • Coverage and representativeness – survey research typically carried out on a sample, not the entire population • Timeliness – if used for research/monitoring at regional/national level, frequent assessments would be required, further increasing costs

Contents

Section 1

Proxy measures of socioeconomic disadvantage in education: A narrative review of FSME and alternative indicators

Outline

This section presents a narrative review of studies that have explored the strengths and limitations of Free School Meal Entitlement (FSME) and alternative proxies of Socio-economic Status (SES). This review is based on a focused search of published literature on the reliability and validity of measures of SES in educational contexts. A specified list of key search terms was developed by the research team and reviewed by the research steering group. Searches took place in electronic databases that are relevant to education (e.g., ERIC, Scopus, Web of Science). The search focused on studies published within the past 10 years, to ensure that the review only contained relevant, up-to-date research.

Key Findings

- A considerable body of academic research has evaluated the reliability and validity of Free School Meal Entitlement (FSME) as a proxy indicator of socioeconomic deprivation in childhood. There are hundreds of published academic articles that use FSME as a proxy measure of socioeconomic disadvantage, suggesting high reliance and confidence among the research community that FSME is a reliable and valid indicator of low SES.
- There is evidence of a consistent and considerable gap in educational attainment between pupils who do and do not receive free school meals.
- Compared with other indicators of disadvantage, FSME performs well in terms of false positives (i.e. unlikely to identify a child as disadvantaged, when they are not) and false negatives (i.e. unlikely to classify a child as not disadvantaged, when they are).
- There remain several weaknesses with this proxy, including:
    - Disparities exist between poverty thresholds and FSM eligibility based on benefits – as such, some ‘working poor’ families may experience similar/greater levels of disadvantage than those who are FSME.
    - FSME only describes those households towards the bottom end of the income distribution, but it is of limited value to those who want to understand how educational outcomes may vary between children from low, medium and high socioeconomic backgrounds.

- Research has consistently highlighted that duration of disadvantage matters. Measuring FSME over longer periods (e.g. child was FSME at any point over the past 3/6 years) correlates more strongly with negative educational outcomes than current/past-year FSME status and increases the proportion of schools likely to meet criteria for additional support.
- Alternative proxies to FSME have unique strengths, but also have methodological and practical limitations of their own:
    - Parental occupation and education have been shown to be stronger predictors of child educational attainment than FSME, but only marginally so. However, without access to official data (e.g. from school/university records), it would be hugely challenging for researchers or schools to collect sufficiently reliable parent-level data for every pupil across the country. Schools could attempt to collect this information via parent self-reports, however this information could suffer from biases and missing data (e.g. parents unwilling to report their education or occupation).
    - Household income is a superior predictor of educational outcomes than FSME, when official data are used. However, official income data are highly sensitive and currently not openly shared at the individual-level, in the UK.
    - Parental education, occupation, and housing tenure, while having potential as alternative proxies to FSME, have shown only very minor superiority in terms of reliability and validity. However as there are many legal and practical challenges to using such data for operational purposes, there is little rationale for replacing FSME with one of these indicators of disadvantage.
    - Area measures of disadvantage such as the Multiple Deprivation Measures to assess household/school-level SES have been examined and come under some criticism, as they can misidentify pupils with a postcode in a deprived area as deprived when they are not deprived, and vice-versa.
- The shortcomings of FSME can be mitigated by combining it with other measures of socioeconomic status (SES).

1. Introduction

1.1. Defining Socioeconomic status (SES)

Socioeconomic status (SES) is a multifaceted concept that broadly refers to an individual's access to financial, social, cultural, and human capital resources [1]. In the western world, those of a lower SES attain lower grades, are less likely to progress to higher education, and consequently, will earn less than their better-off peers [2], and the longer a pupil has been disadvantaged, the lower their attainment [3]. As such, initiatives that encourage and enable pupils from lower socioeconomic backgrounds to succeed and progress to higher education have become a crucial policy goal in the United Kingdom [4]. To ensure the resources are targeted as effectively as possible, and achieve the goal of widening access, it has become vital to be able to accurately identify those from socioeconomically disadvantaged backgrounds.

1.2. Using Free school meal entitlement or eligibility (FSME) as a proxy for low SES

There is no "gold standard" measurement of SES in any field. Free school meal entitlement or eligibility (FSME) is used widely as a proxy for low SES or disadvantage in the UK [5], and around the world [6]. As a proxy, FSME is linked to one of the core indicators of SES - family income. There are various reasons for its widespread use: i) as a metric it is simple and easy to understand, ii) it is an objective measure (rather than based on children's or parent's subjective opinions of their SES), iii) it is routinely collected, and iv) it is updated regularly. FSME has become a valuable proxy indicator for poverty or low SES for researchers interested in factors that may impact upon educational outcomes, as well as other psychosocial outcomes [7].

The terminology used to describe FSM entitlement and uptake differs between Northern Ireland and the rest of the UK. In England Scotland and Wales, a child that has (via their guardians) claimed and been approved for FSM is described as FSM eligible. In Northern Ireland, however, a child is described as FSM entitled if they have claimed and been approved for FSM. Currently in England, all children in reception, primary 1 and primary 2 are eligible for FSM. In Wales all reception pupils get FSM and by the end of 2024 in Wales, all primary school children will be eligible for FSM.

Currently in Scotland, all pupils can get free school meals between reception and year five.

1.3. Free school meals in Northern Ireland – eligibility and policy use

The decision as to whether or not a pupil qualifies for FSM in NI is taken by the Education Authority (EA). To apply for FSM claimants who live in Northern Ireland and are in receipt of Income Support; Income Based Jobseeker's Allowance; Income Related Employment and Support Allowance; or Guarantee Element of State Pension Credit must first obtain a Proof of Benefits Letter, through the Department for Works and Pensions website, and this must be submitted using the Education Authority's online application process [8]. If a family is on Universal Credit (UC), or receive Tax Credits, they do not need to obtain a Proof of Benefits letter but must instead provide their Universal Credit Payments breakdown or their Tax Credits Award Notice or Annual Review Notice. UC was introduced in Northern Ireland in September 2017 under the Northern Ireland (Welfare Reform) Act 2015 [9]. UC gives support to help people prepare for work, start work, or earn more money. It enables people to claim one benefit (UC) instead of having to submit multiple claims for the six benefits it replaces [3]. An NI pupil attending a full-time nursery or school in NI can apply for FSME if their parents/carers receive UC, and household net earnings are not over £14,000 a year. Also, FSME can be considered if parents/carers receive support under the Immigration and Asylum Act; get Child Tax Credit or Working Tax Credit with an annual taxable income of £16,190 or less; or a child has a statement of special educational needs and is designated to require a special diet, or boards at a special school. If none of the above apply to a child yet they present at school as hungry, then the school can provide free school meals to the child on humanitarian grounds. At the time of writing, a review is being carried out by the DE into the eligibility criteria for FSM.

Schools in Northern Ireland are allocated funds through The Common Funding Scheme [10], which was established in 2005. The Targeting Social Need (TSN) component introduced in 2014, is additional money for schools to recognise that they may need more resources to teach children from socially deprived backgrounds. The allocation of TSN funds to schools is determined by percentage of FSME pupils in the school. This data is collected through the Annual School Census in October each year.

The data is held on the Schools Information Management Systems (SIMS). The School Census data is received by the DE Statistics and Research Team, who validate the data before providing it to policy leads in the Department. The budget for Targeting Social Need or disadvantage is £77million [10]. A TSN planner has been devised which schools complete alongside their school development plan, and almost every school gets some form of TSN funding.

A second example of the use of FSME for operational purposes is the Extended Schools Programme, which has been in place since 2006. This programme targets the most disadvantaged schools, identified by having at least 37% of their pupils entitled to FSM or, who live in an area classified as disadvantaged (51% or more of their pupils living in either a Neighbourhood Renewal Area (NRA) or in the 30% most deprived Super Output Areas). This is calculated using FSM and pupil residence data, gathered as part of the Annual School Census exercise, and area of disadvantage is identified using the Northern Ireland Multiple Deprivation Measure (NIMDM) [11, 36].

In Northern Ireland, in the 2020/21 academic year, 97,631 children were entitled to free school meals, which represents just over 28% of pupils [12].

2. Aims

To conduct a narrative review of studies looking at the reliability and validity of measures of SES in educational contexts. Specifically, to focus on reviewing the following:

i) The reliability and validity of FSME as a proxy for SES
ii) The reliability and validity of alternative individual proxies (parental education, parental occupation, parental income, housing value)
iii) The reliability validity and utility of area-level measures
iv) The utility of supplementing FSME with other indicators

3. Methods

3.1. Literature Search strategy

In order to identify the most relevant and rigorous literature, we conducted a systematic literature search of academic databases. A specified list of key search

terms was developed by the research team and reviewed and approved by the research steering group. The search terms were designed to ensure the extracted papers focussed specifically on the reliability/utility/validity of FSME and similar indicators as proxy measures of low SES. To ensure a manageable and up-to-date body of literature was returned, we specified our searches to return only papers published from 2012 to October 2022. The full list of search terms is available in Appendix I, and included, for example, terms such as 'free school meals', 'free school lunches', 'socioeconomic status', 'poverty', and 'low income'. Any papers not in English or with a primary focus outside of education (e.g. nutritional content of school meals) were excluded. The search returned 226 papers sourced from SCOPUS database, ERIC (Educational Resources Information Center) database and Web of Science database. After obtaining the full text versions of 77 papers, further deep screening by Drs Roy and McElroy resulted in the exclusion of 61 papers and 16 papers were retained for review. The most common cause of exclusion was that article/report in question did not address the reliability/validity/utility of FSME as a proxy for SES. A further three non-academic (e.g. governmental) reports and two academic publications providing additional information have since contributed to the review, some of which have been kindly suggested by other government departments that took part in the Landscape Review.

4.Findings

4.1. FSME as an indicator of socioeconomic disadvantage

The first question to be addressed, drawing on published research, was the extent to which FSME was a reliable and valid proxy for low SES.

Taylor (2018) [13] explicitly tested the reliability of current FSME as a measure of socio-economic disadvantage in a nationally representative sample of young people in Wales. Linking data from the UK Millennium Cohort Study to the National Pupil Database (NPD), he explored the extent to which FSME captured every child living in socio-economic disadvantage, and how FSME status related to educational outcomes at age seven and 11 compared to other measures of socio-economic disadvantage. He found that FSME pupils were six times more likely to have parents who had no qualifications, and two thirds were from single parent households. Taylor [13] also

found 75% of FSME children were living in unemployed households, whereas just over seven percent of non-FSME lived in unemployed households. His descriptive analysis supported the view that FSME captured the most deprived children, however there remained a small but significant group of children who were not FSME, but still living in poverty. Taylor [13] found that while FSME was not strongly related to educational outcomes at age seven, it was predictive at aged 11, even after accounting for other SES characteristics. At age 11, FSME explained a greater proportion of variance in educational outcomes than all other indicators of SES, bar income. Taylor [13] concluded that FSME is generally a good proxy for socio-economic disadvantage due to its overlap with other indicators, however in the context of its relationship with educational outcomes, limitations of the measure become more apparent.

Another key study sought to explicitly evaluate FSME as a proxy for pupil socio-economic deprivation [6] and drew on the Longitudinal Study of Young People in England (LSYPE1), a nationally representative sample of children in England – including over 12,000 children in their analysis. They linked data from the LSYPE1 to the NPD, and Census data, to explore the relationship between FSME (within the past 5 years) and other established proxies of SES, and determine which proxy was the 'best' predictor of educational attainment. They found that 90% of pupils living in a household with parents who were long-term-unemployed were FSME. In households with parents who had lower levels or no qualifications, 77% were FSME. When it came to housing tenure, 63% of pupils in social housing were FSME and pupils in households that were owned did better in their GCSEs than those in social housing. More than 50% of parents working in routine occupations were FSME. They found less overlap between FSME and neighbourhood-level indicators of disadvantage, with many FSM-eligible pupils not living in the most deprived neighbourhoods. Overall, these findings suggest a moderate-high level of concordance between FSME and other indicators of SES. In their predictive analysis however, they found that parental occupation levels and parental education were stronger predictors of child educational attainment, however the improvement over FSME was only marginal. However, it is hugely challenging for researchers, schools or even the department of education to collect parent-level data for every pupil in the country. Some advances in the development of enhanced data on the socioeconomic position of pupils through the Pupil Parent Matched Data (PPMD) project (more details can be found in Section 5.1)

may help greatly in this regard, making it possible to link pupils' data to their parents or guardians, via child benefits data (for research purposes only at present).

In another representative Welsh study Cook, and colleagues [14] found that pupils with a statement for special educational needs (SEN) were twice as likely to meet the criteria for FSM, compared to children with no SEN. They found that the relationship between SEN and FSME varied by type of SEN - eligibility for FSME was particularly high for pupils with behavioural, emotional and social difficulties; moderate learning difficulties; and severe learning difficulties. In addition, they found that non-FSME pupils were more likely to reach the expected levels in important subjects from Key Stage 1 to Key Stage 4. Specifically, non-FSME students were three times more likely to achieve the expected levels in English and maths when they reached Key Stage 2. When it came GCSEs, only 25.8% of FSME students managed to achieve the Level 2 threshold (five or more A*-C grades) including English and maths. In contrast, 58.4% of students who non FSME students achieved this same threshold.

Huxley, and Colleagues [15] conducted a study to consider the potential of other administrative data on socioeconomic position that could replace FSME as a predictor of educational attainment. They linked 2011 Welsh Census data to administrative education data. Their regression analyses revealed that several Census indicators (highest household qualification; approximated social grade and economic inactivity) predicted pupil attainment to a similar degree as FSME.

Boliver, Gorard and Siddiqui [16] compared various individual-level, school-level and area-level proxies of SES in identifying disadvantaged young people for the purposes of widening access to higher education. They accessed over 1.1 million records from the NPD in the years 2016/17 and 2017/18. They concluded that individual-level indicators, in particular FSME, were the most reliable and valid predictors of educational attainment.

The confidence among researchers in using FSM eligibility as a proxy measure of disadvantage can be illustrated by the many studies published that explore other research areas. Some examples are: increases in food insecurity during the Covid-19 pandemic among FSME and non-FSME children [7]; factors associated with children

with behavioural and emotional problems accessing a special school treatment programme in New York [17]; the relationship between substance use and low SES [18]; the attitudes of parents towards adolescent vaccines administered by schools in the US [19]; engagement with a National Healthy Schools Programme and fruit and vegetable consumption in primary school children [20]; the assessment of summer holidays and setback in reading and writing abilities [21]; days lost at school in US due to asthma ill-health comparing [22]; a comparison of low family income and cost of houses in California [23]. Finally, the effectiveness of teachers in schools with students from primarily low-income families compared with schools serving more advantaged students [24].

4.2. FSME: Defining the period of eligibility

The FSME status of pupils in the UK is collected annually via the school census. Some researchers have questioned whether using current/past-year FSME is the most reliable and valid method of identifying students who are disadvantaged. For instance, Gorard and Siddiqui [25] comment that using FSME status at a single point in time, may miss a small but significant group of “hidden poor” students, those who may have been previously eligible for FSM but not currently, yet who still may be suffering the long-term impacts of earlier disadvantage. As such, several studies have compared how current FSME status compares with assessments of FSME over longer periods of time when predicting academic outcomes. The most common alternatives to current-FSME are: i) whether a pupil has ever received free school meals (ever-FSME), ii) pupil has been FSME on at least one assessment in past three years (FSME-3), or iii) FSME at least once during previous six years (FSME-6). For instance, in their analysis of over a million pupils in the NPD, Boliver and colleagues [16] found that ever-FSME was a more accurate indicator of disadvantage (in terms of false positives and false negatives) compared with current FSME status of pupils in their final year of KS4 in 2016/17 or 2017/18.

Jerim [26] compared a wide array of socio-economic status proxies using data from the UK-representative Millennium Cohort Study (n=7,439), and found that number of years spent in FSME correlated to a greater degree with poverty and permanent income than past-year FSME. The differences in correlation were small to modest however, and were more pronounced for income compared to poverty.

In 2013, Teach First commissioned the Institute for Fiscal Studies (IFS) to explore alternatives to the area based measure income deprivation affecting children index (IDACI) [27]. They compared various versions of FSME (ever; current; past 3 years; past 6 years) using freely available administrative data in England. They found high concordance between the different iterations of FSME (suggesting relative stability over time). However, FSME over longer time periods correlated more highly with educational disadvantage. Furthermore they found that 90% of schools, where greater than 30% of pupils were FSME (past 3 years), met the Teach First criterion based on the IDACI), therefore it would be the best alternative to IDACI, should it no longer be available.

In summary, there appears reasonable evidence that looking at FSME over longer periods (e.g. FSME-ever, FSME-3, FSME-6) would increase, albeit to a modest degree, the accuracy with which children would be classified as socially deprived. At the school-level, this would likely lead to an increase in the proportion of schools who would normally exceed current thresholds for additional support. In some instances, changes to funding criteria have already taken place to reflect this practice. In England for example, schools with pupils known to have ever been FSME in the last six years are eligible for Pupil Premium Funding support [28], which is for low-income pupils, as well as looked-after children and pupils with special educational needs (SEN). Pupils Premium funds in England in 2023/2024 will be £1,455 for each primary school child and £1,035 for each secondary school child.

4.3. FSM: Data Quality & limitations

It is clear that FSME is a broadly reliable and valid indicator for disadvantage, as it can be verified from official records. Like every proxy of SES, however, it is not infallible. Our review of the literature highlighted two primary limitations of this: 1) missing data, and 2) limited ability to cover the entire continuum of disadvantage.

In terms of missing data, we focus our discussion only on data from official sources (missing data rates are much higher for self-report surveys, but these are likely not relevant to DE policy). It is estimated that 11% of pupils included in the annual National Pupil Database (NPD) figures in England have unknown FSME status [25]. While 7%

of this number can be accounted for by fee-paying schools, which do not have to complete the school census, this still leaves 4% of students unaccounted for [25]. It has been suggested that these missing pupils are amongst the most socially disadvantaged in society, e.g. children in special schools, travellers, recent arrivals/asylum seekers [25]. In a similar study in 2015 of the NPD in England, missing data was also flagged as an issue, as 9% of the KS4 cohort (aged 15) had unknown FSME status [29]. However, Northern Ireland has full FSME coverage. Data are validated against the Education Authority's (EA) records at individual pupil-level for primary (including reception and nursery classes), post primary, special and Education other than at school (EOTAS), and the proxy of entitlement to benefits is used for voluntary and private preschools. FSM data is also gathered in relation to pupils in independent schools, again this is at an aggregated school level only so it cannot be validated.

Almost every paper reviewed in this section highlighted the issue of comprehensiveness. In simple terms, FSME is a rather blunt measure, and its binary nature (eligible or not) only provides information on those who are at the extreme bottom end of the wealth distribution [26]. It is unable to distinguish between gradients of disadvantage, e.g. low, middle and high-income earners [26].

On a related note, due to the binary nature of the measure, as we have mentioned already in this review, there are "working poor" households who may lose out, because they are just above the eligibility threshold. Indeed, it has even been suggested that once benefits are taken into account, some FSME families can end up with higher disposable incomes than some families not deemed eligible [30]. There is evidence to support this, with Taylor [13] showing that 31% of Welsh pupils lived in equivalised poverty in 2007, and yet just over half of these children (18%) children were eligible for FSM. Similarly, Ilie and colleagues [6] estimated that only 48% of children in low-income households are eligible for FSM, more than half of children who are presumably at risk of low achievement, are still not eligible for FSM and therefore not identified as being in need of additional support. As such, FSM can be considered reliable, in that almost all children who are eligible will likely be disadvantaged. However, it is its validity and accuracy as an indicator of poverty that could be

questioned, as not being eligible for FSM, is far from a guarantee of privilege among lower earning families.

4.4. Alternative Individual Indicators

4.4.1 Parent Educational Attainment, Occupation, and Housing Tenure

Much of the research already discussed has investigated how other proxies of socio-economic position (SEP) compare to FSME in terms of their reliability and validity. In particular, most of these studies have examined how different proxies predict educational attainment/outcomes. In their analysis of the Longitudinal Study of Young People in England and matched administrative data, Ilie, and colleagues [6] found that parental occupational levels and education were better predictors of pupil attainment than FSME, but only marginally so.

More recently, Huxley et al [15] considered the potential of other administrative data on socioeconomic position that could replace FSME as a predictor of educational attainment. They linked 2011 Welsh Census data to administrative education data. Their regression analyses revealed that a highest household qualification (taken from the Census) approximated social grade and economic activity as well as FSME.

Klein, Sosu and Dare [31], explored the extent to which various dimensions of socioeconomic background predicted school absenteeism in Scottish Longitudinal Study, comprising of over 4,000 linked Census data and administrative school records. Low parental education (no qualifications) and housing tenure (living in social housing) were the strongest predictors of absenteeism, although their effects were not substantially stronger than past year FSME. Similarly, Taylor [13] also identified parental education, parental class, housing status, and neighbourhood deprivation as possible alternative/ or additional measures of SES.

Collectively, these studies suggest that, at least from a research perspective, there are various alternative family background/prestige-based indicators of SES that could perform fill a similar role to FSME. However, none of these individual indicators have been shown to consistently outperform FSME. Furthermore, practical considerations must be taken into account. Further/higher education data in the UK are primarily recorded in the institutions in which they were awarded (e.g. universities, FE colleges), and occupational data are held by HMRC. Therefore, linking parental qualifications,

occupation and/or housing data for all NI school children to School Information Management Systems would be a large task (likely involving legislative change), and the gain in predictive power over FSME would be modest. Therefore, there is no clear rationale for replacing FSME with one of these indictors for the operational purposes of the DE.

4.4.2. Household Income

One of the most consistently studied household-level proxies of SES, and one that is intrinsically linked with FSME, is household income. Low income is an individual measure of disadvantage and can be verified via official records (e.g. HMRC) [16]. A household is deemed to be socio-economically disadvantaged by the European Union [32] if their income is below the EU 'at risk of monetary poverty threshold'. This threshold is 60% of the median value (middle value) for household income in that nation. At the end of 2021 for example, the median household disposable income in the UK was £31,400, and 60% of this, is £18960, or £364 per week. In NI this 60% median value threshold was £315.60 per week or £16,411 per annum (DfC, 2022). The earnings ceiling set for FSME among those in NI in receipt of Work and Child Tax credit is £16,190. There appears to be a slight income gap between FSME, and the at risk of poverty threshold, and some households who are on low incomes, could qualify for FSM as they are disadvantaged, but do not. A study in 2013 checked HMRC household income figures and found 11% of pupils who would have qualified for FSM because of low household income were not officially registered [33]. Therefore, a plausible argument for using this proxy as a measure of SES is that families who would narrowly miss the threshold for FSME (e.g. "working poor") would not fall into the category of socially *advantaged* if income were taken into account.

Looking at how household income compares with FSME in predicting educational outcomes, Jerim [26] found a strong correlation between long-term income poverty and FSME, and he found that income provided a much more accurate prediction of attainment, which he attributed to income's ability to discriminate well between low, middle and high-income earners, something FSME cannot do. Siddiqui and Gorard [34] also investigated the predictive power of household income vs FSME on educational attainment. They linked data from Next Steps (formerly known as

Longitudinal Study of Young People in England - LSYPE) and the NPD. They found FSME, and income, both predicted educational attainment, but income was a better predictor of KS4 scores. They note, however, that income data are more likely to be missing when self-reports are used, and they emphasised the practical challenges of linking official HMRC records with education data.

Ilie, and colleagues [6] found household income was less effective than FSME at predicting attainment in the LSYPE, however they noted that income was self-reported and therefore open to missing data and reporting biases. Various other studies have come to similar conclusions – that household income can be a superior predictor of educational attainment, however only when official income records (e.g. HMRC records) are used [16]. Administrative data also has the advantage of covering entire populations – by comparison self-report surveys typically rely on only a sample of the population.

In summary, these studies indicate that household income could be considered as a potentially superior indicator of SES than FSME, at least in theory. However, most researchers acknowledge that the sharing of official income data is currently logistically challenging.

4.5. Area-level Indicators

4.5.1. Index of Multiple Deprivation (MDM) and Income Deprivation Affecting Children Index (IDACI)

In addition to individual/household-level proxies of socioeconomic deprivation, area-level proxies have also received considerable attention in the education literature. Such indicators typically rank-order geographic areas based on their relative disadvantage across a number of domains of SES. Area-level indicators are particularly popular with government departments [27], and have a number of advantages. One example is confidentiality - as they rely on aggregated data (typically from hundreds of households), it is harder to identify specific individuals [16]. Many area-based measures are also comprehensive as they draw on information from multiple domains [6].

However, researchers also note several disadvantages. For instance, Gorard, and colleagues [29] highlight the risk of 'ecological fallacy,' which refers to making inaccurate assumptions about individuals based on group data [35]. Particularly in the context of education, where pupils may frequently live in one area and attend school in another, area-level measures may produce a significant number of false negatives and false positives. Furthermore, most area-based measures are based on self-reported Census data, and therefore come with the limitations associated with self-reports, e.g. biased reporting [25]. In addition, area-based measures are often constructed over broad time periods (often 5 years +) and therefore may not be as timely as individual-level data. Finally, in the UK there is considerable heterogeneity in the area based measures that are routinely used across countries, making cross-country comparisons difficult [25,26]. Below we explore how several common area-based measures compare with FSM as a proxy for deprivation.

Two of the most commonly used area-level measures of deprivation are the Income Deprivation Affecting Children Index (IDACI), and the Multiple Deprivation Index for NI (NIMDM) [11, 36]. The NIMDM is a composite measure that encapsulates area-based summary statistics on income, employment, education, health, housing, crime and access to local services. It ranks the 890 Super Output areas (SOAs) in Northern Ireland from the most deprived (rank 1) to the least deprived (rank 890). Updates to this measure are published approximately every 3-4 years. The IDAC covers the proportion of children under 16, in any super output area in the UK, living in a low-income household, that is in receipt of income support, or income-based job-seekers allowance, or pension credit, or Child Tax credit, and income is below 60% of national median. In Northern Ireland the Index of Deprivation Affecting children (IDAC-15) measures children under 15 who are living in households whose equivalised income is below 60% of the NI median income value. The two most deprived LGDs in Northern Ireland are Belfast, and Derry and Strabane. The range is 48% in most deprived (Woodvale_3) in terms of SOAs with highest percentage of children living below the poverty threshold, to 22% (Dervock). Even so, the least deprived SOA still has 22% of their children under 15 living below the income poverty line [8].

Several studies have looked at the performance of the UK Index of Multiple Deprivation (IMD) and the IDACI and compared them with FSME. For instance, in their analysis of over 1 million pupils captured in the National Pupil Database (NPD) 2017, Boliver, and colleagues [16] found that the IMD and IDACI first quintiles (most deprived) categories failed to capture a remarkable 55 percent of pupils who were Ever FSM (false negatives). This suggests low concordance between these individual- and area-based measures.

Ilie, and colleagues [6] investigated the usefulness of IMD and IDACI to supplement FSME in their analysis of the LSYPE and linked administrative data. In terms of overlap, they found that although a large proportion of individuals living in the bottom quartile of IDACI neighbourhoods (most deprived areas) were FSME, many FSME pupils were in other quintiles. They comment that the individual and area-based measures appear to be identifying different populations of children and should not be considered interchangeable. They also noted that area-level proxies explained less variation in educational outcomes across pupils than the FSME indicator.

4.5.3. POLAR, POLAR4 and TUNDRA

Another commonly used area-based measure is the Participation of Local Areas (POLAR) classification system [37]. It measures the higher education participation rates of young people in different areas of the UK. The system is based on the postcodes of young people's home addresses and classifies them into quintiles based on the proportion of the population in their local area who enter higher education. POLAR4 (most recent iteration) [37] uses Middle Layer Output Areas (MSOAs) for England and Wales, Intermediate zones for Scotland and Super Output Areas (SOAs) for Northern Ireland. Similarly, the Tracking Under-Representation by Area (TUNDRA) [38] is a tool developed by the Office for Students (OfS) in the UK to monitor and analyse participation and progression data of students in higher education. TUNDRA [38] uses data from the Higher Education Statistics Agency (HESA) to identify areas in the UK with low participation rates in higher education and track the progress of students from these areas in terms of access, participation, retention, and outcomes. Each local area is then ranked according to its young participation rate and assigned equally across five quintiles, where quintile one areas have the lowest participation rates and quintile five areas have the highest

participation rates. TUNDRA [38] is similar to POLAR4, but follows an alternative approach, only taking into account the participation rates of students from state-funded mainstream schools.

A weakness of POLAR4 [37] and TUNDRA [38] is that they are concerned with higher education participation rate, and not directly related to many of the domains of SES. As such, a number of studies have highlighted them as poor proxies for SES [16, 25-27]. For example, in their analysis of the NPD, Boliver and colleagues [16] found that both POLAR [37] and TUNDRA [38] yield high rates of false negatives and, more importantly, high rates of false positives, making them unsuitable for use in targeting or monitoring widening access initiatives. Both measure have been shown to have low correlations with household income (r = 0.2-0.4) [26]. Jerrim [26] went as far as to suggest that POLAR4 [36] should no longer be considered in the university admission process.

4.5.4 ACORN

The ACORN classification system combines information from several public datasets (e.g. Land Registry, Census) and commercial data (e.g. market research). It classifies UK households into 6 main groups, each of which is further subdivided into 18 subgroups based on 62 different indicators. These indicators include factors such as age, income, education, housing type, occupation, and consumer behaviour (ACORN: CACI, 2018) [39]. Compared with other area-based indicators, Jerrim [26] showed that ACORN correlates well with low household income *(r*=.56*)*. In their analysis of NPD data, Boliver and colleagues [16] found that ACORN had higher concordance with FSM than any of the other area-based measures. A disadvantage of ACORN is that it is a commercial product and requires a substantial access fee.

4.5.5 Measures in development in UK

The Higher Education Statistics Agency (HESA) recently proposed a new area measure of socio-economic disadvantage for use in widening participation in third level education [40]. This measure is based on 2011 Census data at the most granular level available, which is the output area level (or ‘small areas’ in Northern Ireland). By using the smallest geographic area possible, Bermingham and colleagues [40] attempted to mitigate the issues of ‘ecological fallacy’ that plague measures at broader levels, such

as the IMD, although it is impossible to fully address this issue when using area-based measures to approximate individual circumstances. Using this data they derived two variables: 1) the proportion of residents in an output area aged 16 and over with below level 4 qualifications, and 2) the proportion of residents in an output area aged 16 to 74 in NSSEC groups 3 to 8 (those that couldn't be classified were excluded from the calculation). Based on these variables, areas that were situated within the bottom 20% of either, were classified as disadvantaged. Bermingham and colleagues [40] compared this new measure with IMD and POLAR [37] and found that their measure was more sensitive at capturing disadvantage across the UK. The authors acknowledge several limitations of the new measure (e.g. reliance on self-report Census data from 2011), and further research is needed to establish the reliability and validity of this measure.

5. Summary, conclusions, and recommendations

This narrative and focused review aimed to assess the suitability of FSME as a proxy indicator for SES and compare it with other measures of deprivation.

Overall, we found evidence that FSME is a frequently used, reliable and valid indicator of SES in the context of educational research and policy. However, the literature clearly suggests that it is important to take into account the amount of time children have spent in low SES. Assessing FSME over broader time periods (e.g. ever; any point in past 3/6 years) has been shown to be a more reliable indicators of low SES.

In terms of alternative individual/household indicators, only household income (if taken from official records) offers the potential to be a superior indicator of SES, largely due to the fact that it outperforms FSME when differentiating between low, middle, and high-earning families. In comparison, FSME has been criticised for acting as a proxy for very low SES only. However, while income data is arguably superior, practicalities must be considered before FSME is replaced with an indicator – linking official income records of families to schools – or, to department-level information systems, as this would be highly challenging. Other individual/household-level indicators of SES (e.g. parental education, occupation, housing tenure) while having potential as alternatives, have not shown clear superiority to FSME as

indicators of disadvantage. Therefore, there is little rationale for replacing FSME with another single indicator of disadvantage. If universal FSM were introduced in NI, the DE could explore the use of alternative forms of benefits-linked support as a proxy, such as the school uniforms grant which shares the same eligibility criteria as FSM (however does not apply to nursery schools).

Our review suggests that area-level indicators (IMD, IDACI, POLAR4, TUNDRA, ACORN) perform poorly in an educational context for determining low SES at a household level, particularly when compared with individual-level indicators such as FSME. This is attributed to their increased likelihood of miss-classifying individual students as dis/advantaged. However, these measures do offer information on aspects of deprivation beyond income (which solely informs FSME). Indeed, it has been suggested that combining FSME with area-level measures of SES would be more helpful to researchers and policy makers alike, than using FSME in isolation [26]. Research suggests that the ACORN measure performed best out of the most used area-based indicators. Incidentally, the combination of individual and area-level indicators already happens in NI, where eligibility for the Extended School Programme is determined based on FSME status (37% of pupils within a school eligible) and the MDM (51% or more of their pupils living in either a Neighbourhood Renewal Area (NRA) or in the 30% most deprived Super Output Areas).

Section 2

Scoping review of deprivation measures used in other jurisdictions

1. Summary and Key Findings

- This section presents a scoping review of the most common measures of socio-economic deprivation used within the field of education in the UK, and internationally.
- Systematic searches of academic and grey literature databases yielded a total of 69 papers and reports that met the inclusion criteria, 19 of which were government reports or unpublished research studies.
- Education, occupation and income are the 'Big Three' when it comes to measurement of social disadvantage in education research.
- The individual-level measure of parental education, applied either by itself, or with other measures, appeared in approximately 75% of the records.
- Income featured as an indicator of SES in 54% of studies.
- The range of measures of low SES in research, demonstrate that the focus is not just on low income, but also home resources, access to services, and the occupation and education of the parents.
- Scandinavian countries could be considered 'best-in-class' due to their comprehensive data linkage infrastructure which allows researchers and policy makers to seamlessly link administrative data across different domains (e.g. education, income, and occupation) and levels (e.g. individual, household, school).
- The legal basis to mirror such data linkages in NI would need to be investigated and may require legislative change and investment in resources – initiatives such as this are gaining momentum in other parts of the UK (for example the Small Business Enterprise and Employment Act (2015) is allowing for linkages between English educational outcome data with pay and benefits data from the HMRC. The SBEE (2015) requires changes through the NI Assembly to allow the Act to be applied in NI.
- The Administrative Data Research Northern Ireland is linking a number of datasets together for research purposes using the Digital Economy Act 2017. One of these is the Education Outcomes Linkage Dataset which links DE data on pupil characteristics, attainment and attendance and was launched in

March 2023. The next phase of the project is to link with data held in the Department for Economy on higher and further education, apprenticeships and training.

2. Aims

To conduct a scoping review of the most common measures of socio-economic deprivation used elsewhere in the UK, and internationally. This scoping review aimed to present an overview of a large and diverse body of literature relating to the measurement of socio-economic status (SES) within an educational context. As such, the focus was on the volume, nature, and characteristics of the existing research, rather than the quality of the research.

3. Background and rationale

As the usage, strengths and limitations of FSME have already been discussed in the narrative review (Section 1), this section focusses on alternative indicators of SES only. A 2005 meta-analysis [1] indicated that (aside from FSME), the three most common indicators of SES used in research were, parental education[3], parental occupation (often referred to as occupational or social class), and household income.

This scoping review focused on studies that are mainly set in an educational context, but it is worth noting that this is only a small subset of the research into socioeconomic inequalities more broadly. Socioeconomic status is one of the most widely researched variables across the social and life sciences. As it would have been unfeasible to scope the measurement of SES across multiple domains, we only describe instances where SES was measured in the context of educational outcomes. For example, we exclude studies where the main outcomes were related to physical [e.g. 2] or mental health [e.g. 3].

4. Methodology

This scoping review followed the framework outlined by Arksey and O'Malley (2005) [4], which consists of five unique steps: i) identify the research question, ii) identify relevant studies, iii) study selection, iv) charting the data, and v) collating, summarizing, and reporting the results. A key list of search terms was developed by the research associate (RA – Dr Deborah Roy) and lead consultant (LC - Dr Eoin McElroy) and reviewed by the research steering group. An Ulster University librarian

[3] Older research tended to focus on the father's education only

also advised on the search terms. This approach is described so that it is reproducible, and transparent. This synthesis of evidence, is exploratory in nature and we have mapped relevant research in appendices III and IV. We have also characterised and described the nature of the evidence, and importantly we have detailed how SES has been defined or operationalised in each study. There are also details about the source of the data and any data linkages that exist.

The information presented comes from searches within academic databases ProQuest, which includes the Education Resources Information Center (ERIC) database, and Psych-Info. An asterisk symbol was used as to find papers using different synonyms of each term (e.g. “regist*” would return key terms “registry” and “register” in the search). A rapid search of the grey literature[4] (e.g., government reports) has also been undertaken using open access web tools and searching on government websites in UK (e.g. Department of Education websites in Scotland, England and Wales). Also we searched ‘Grey Matters’, a website developed by the Canadian Agency for Drugs and Technologies in Health to identify public agency reports. Search terms used to identify papers, included, socioeconomic status, poverty, and low income (for full search histories see appendices I and II).

Initial content analysis of the papers’ abstracts allowed for the identification and exclusion of papers that did not meet the criteria (e.g. papers that focussed on physical health). Then a final set were screened for their relevance by two independent reviewers (the RA and LC). Key findings include whether or not the approaches taken in other jurisdictions could be adopted by the DE to measure social disadvantage. The searches have been iterative.

4.1. Inclusion Criteria for Academic Database Searches

- Registry data/data linkage (e.g., Census data), research that involves nationally representative longitudinal studies (e.g. the British birth cohort studies), and large international educational studies (e.g. Progress in International Reading Literacy Study [PIRLS], Trends in International

[4] Grey literature typically refers to information produced on all levels of government, academia, business and industry in electronic and print formats not controlled by commercial publishing" ie. where publishing is not the primary activity of the producing body.

Mathematics and Science Study [TIMSS] and Progress in International reading Literacy Study [PISA]).

- The primary research focused on indicators of SES or disadvantage used in an educational context.
- The measures of SES, deprivation, or poverty were clearly stated.
- Studies included a range of age categories, as long as they were mainly under 18's.
- Studies were undertaken in the last 10 years.
- Studies were in the English language.

4.2. Exclusion Criteria

- FSME is the only proxy for socioeconomic deprivation or status.
- The population exclusively contained older adults (e.g. 18+ upwards).
- The main focus was public health, and not education.

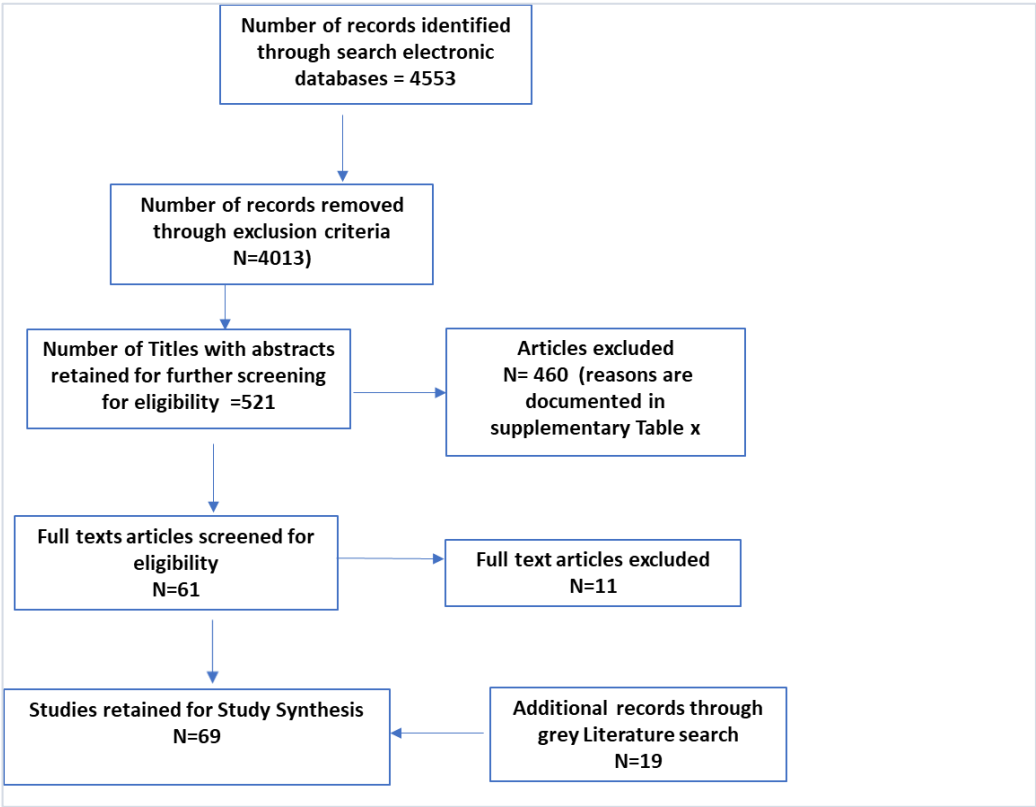

Figure 1: Flow diagram of academic literature search

4.3. Academic Database Search Results

The following electronic data bases were searched: PROQUEST (complete database search which includes ERIC), Psych INFO and grey literature. For PROQUEST the key descriptors identified 4,553 articles (Figure 1). To narrow the search further, articles that primarily used FSME as a proxy indicator were excluded, using NOT and only articles that included the terms Census or Registers were retained. This resulted in 521 papers.

Full-text versions were then obtained, and 33 PROQUEST articles remained after screening of the abstracts, excluding records that did not meet the inclusion criteria. Finally a full-text review took place of the PROQUEST records, by the lead researcher and the consultant (independent of one another), to refine the search further. A inter-rater-reliability test revealed 86% agreement on records to retain. After discussion it was agreed to remove six further PROQUEST records, leaving 24 records which are included in the Appendix III. The search in Psych INFO (via OVID) involved key word searches, combined with subject heading search, using 'OR' and then 'AND' bringing the three concepts together and 28 records were retained. A further 2 articles were removed for not meeting the criteria. This left 50 published academic articles which were reviewed and synthesised.

A search of the grey literature included a search of websites in UK and Republic of Ireland going back to 2014 using key search terms "socioeconomic status/deprivation/poverty" AND "education", in the websites of Department for Education (UK), National Foundation for Education Research (NFER), and Education Authority for Northern Ireland. 75 papers were initially selected. After scanning of full text articles, 19 papers/reports were retained for the review (see Appendix IV).

5. Grey Literature Review

The findings from a rapid search of the grey literature (reports and papers not published in academic peer reviewed journals) are provided in Appendix IV, and summarised in the sections below. Additional references to related online reports and websites have subsequently been added, for ease of reference.

5.1. Department of Education (NI and rest of UK)

The Department of Education produced a report in 2013 on improving attendance at school in deprived areas [5]. At that time, deprivation was defined as living in Neighbourhood Renewal Areas and FSME. Nelson et al (2013) [6] produced a literature review report for the Office of the First Minister and Deputy First Minister in Northern Ireland methods to overcome persistent poverty among children and young people. The report cautioned against 'point-in-time' measures of poverty as this could mislead and poverty can be transient, recurrent, persistent and severe. The report highlighted that the 75% of children who are persistently poor, are in one-parent families in Northern Ireland. Relative deprivation was described as equivalised household disposable income below 60% of national equivalised household income.

In Great Britain (GB) the Social Mobility Commission produced a research report in 2022 [9]. The report highlighted the need to improve the collection and availability of data across government and assessed the data gaps and solutions to support effective policy-making. A key message was that it is evident that there is currently a lack of administrative data on economic circumstances of children and households they live, and many rely upon FSME data. The report encouraged more cross-government administrative data sharing through the ONS Integrated Data Service (IDS). Importantly, it recommended the ONS should promote data sharing powers among academic and third-party researchers. They highlighted potential advances in the development of enhanced data on the socioeconomic position (SEP) of pupils which is through the Pupil Parent Matched Data (PPMD) project being developed by DE, DWP and HMRC in England [10]. It will identify pupils within the education system who are from a low or modest income household. Pupils' data will be linked

to their parents or guardians via child benefits data, thus linking pupils' educational achievement data to benefits, equivalised income, and geographical data. However, the legislation supporting these linkages currently only applies in Great Britain, and not in Northern Ireland. The Digital Economy Act 2017 allows for such linkages for research purposes only. However, the Data Protection Act 2018 allows for the processing of personal data for operational purposes, if the operation meets the criteria of a 'public task' (i.e. the processing must be necessary and must have a clear basis in law).

5.2. Administrative Data Research in Northern Ireland (ADRNI)

The ADRNI is a partnership between the Northern Ireland Statistics and Research Agency (NISRA), which is a credited processor under the Digital Economy Act 2017 [11], and Ulster University and Queens University Belfast [12]. It is one of four partnerships that exist across the UK and is funded by the Economic and Social Research Council (ESRC). In NI it is supported by the Health and Social Care Research and Development (HSCR&D) Unit. ADR UK has a strategic goal, which is to host administrative data from all parts of the UK and devolved government, to allow trained researchers to conduct research to inform policy and practice [13]. Priorities include; housing, health and well-being, vulnerable groups, impacts of Covid-19, education, and the world of work. ADR NI brings together NISRA Census data, the Agricultural Census data, Higher Education enrolments and qualifications, School Census data, health statistics, and data on socio economic circumstances e.g. age, sex, occupation and industry codes. Data from the Family Resources Survey [14] can also be accessed, as can the Northern Ireland Longitudinal Study (NILS) [15]. For full details, see the ADR NI prospectus [16]. ADRNI have been working with statisticians in DE to develop an Education Outcomes Linkage dataset. This links data on pupil characteristics, attainment and attendance for research purposes and was launched in March 2023. The next step is to link with data on further and higher education, apprenticeships and training. This will enable research, including looking at predictors of educational outcomes.

5.3. Northern Ireland Multiple Deprivation Measures

Ijpelaar, Power, & Green (2018) [17] and Northern Ireland Statistics Research Authority (NISRA) published the Northern Ireland Multiple Deprivation Measures

[18]. There are seven domains of deprivation, each one is used to rank the 890 Super Output Areas (SOAs) in NI. The domains are: i) income deprivation, ii) employment deprivation, iii) health deprivation and disability, iv) education skills and training, v) access to services, vi) living environment, and vii) crime and disorder. The income domain from 2016 no longer uses benefits data and its indicators are; the proportion of the population living in households whose equivalised income is below 60% of NI median; the proportion of population aged 15 and under, living in households whose equivalised income is below 60% of NI median (%). These figures strongly aligned to the accepted definition of relative poverty. The NI median income is based on a dataset of around 700,000 NI households rather than the UK. The household income data was generated through the DfC data base for Income modelling and Estimation (DIME). Income data includes employment, self-assessment, work-related pensions scheme; social security benefits, savings and tax credits etc. Household incomes is equivalised to allow for the fact that the size of households vary. For a full breakdown of the seven domains see NIMDMs (2017).

5.4. National Foundation for Education Research

Four reports contained in this review were produced by National Foundation for Educational Research (NFER). First, Bradshaw et al (2018) [19], reported on findings from the Trends in Internal Maths and Science Study (TIMMS), which occur every four years, and took place in Northern Ireland for the second time in 2015. Possessions in the home, parents' level of education and occupation background information is collected from pupils and parents, and TIMMS data are used to construct the Home Resources for Learning Scale (HRL). Bradshaw et al (2015) [19] used the HRL data to construct an index similar to the Economic, Social and Cultural Status (ESCS) indices used in PISA studies. The index scale ranged from -1.5 to +1.5, with scores closer to -1.5 reflecting greater deprivation/poverty. Primary school pupils' SES and attainment at Maths and Science were found to be strongly associated. Their new SE Index was tested against the FSME measure. While they found good correspondence between them (63% of those in lowest socioeconomic decile were FSME), they acknowledged the two measures were not based on same underlying variables.

In 2022 a study by Benson, et al (2022) [20] reported on factors during Covid-19 that affected educational attainment in the National Reference Test (NRT). This is an annual test to determine if the ability of year 11 students is equivalent to three GCSE grade boundaries in English and Maths. They used Income Deprivation Affecting Children Index (IDACI) quintiles by postcode, as well as FSME, and ever-FSM. They found being in a school with higher levels of deprivation resulted in a greater decline in mathematical performance.

A report published in 2021 with coverage of England, Wales and Northern Ireland, provided details of a study of that differentiated disadvantaged pupils who do well in Programme for International Student Assessment (PISA) scores, from those who do not [21]. Pupils were deemed to be socially disadvantaged if they fell within the bottom quarter of the Economic Social and Cultural Status Index (ESCS), which is a score that combines factors such as the education of the parents, the highest occupation of the parents, and the possessions, including books, in the household. The ESCS relies entirely on self-reports. They found the disadvantaged did not perform as well as their advantaged peers, in reading maths and science. They also found one third of pupils were resilient, and differences were found in levels of resilience between the advantaged and less advantaged.

Another NFER report was published in 2021 based on an additional PISA analysis, looking at the well-being of 15-year-olds. Again, pupils were deemed socially disadvantaged if they fell within the bottom quarter of the ESCS [22].

5.5. Department for Communities NI Anti-Poverty Strategy

There were three comprehensive reports produced in 2022 by the Department for Communities in Northern Ireland as part of the development of an Anti-Poverty Strategy for NI: An Examination of the Rates and Distribution of Poverty in Northern Ireland [23], a study of Key Sources of Poverty Data in Northern Ireland [24], and a Scoping Review of the Literature on Poverty in Northern Ireland [25]. The reports draw on the Family Resources Survey (FRS) [26], which is the main official source of statistics on household income and poverty. It is used for comparisons within OECD countries. It is used at a Northern Ireland level, due to sample size (N= 19,244 households, 2019/2020) and estimates are weighted using population totals. A

Housing Below Average Income dataset exists derived from the FRS which covers relative low income, absolute low income, income inequality and household income distributions etc. An annual report is produced by DfC called the Housing Below Average Income for Northern Ireland [27].

Across the four nations of the UK, the official government statistic on household income and poverty is equivalised disposable household income. These figures are provided before housing costs (BHC), and after housing costs (AHC). Relative poverty is living in an household with an equivalised income below 60% of the latest UK medium income figures. It is worth noting that the relative and absolute poverty are also the two main indicators of poverty in the NI Executive Child Poverty Strategy [28]. The relative poverty threshold (BHC) for a couple with no children in 2021/2022 was £339.00 pw and the absolute poverty threshold (BHC) for a couple with no children was £314.00pw. The DfC Scoping Review of the poverty literature [25] described some of the risk factors for falling into poverty as; poor educational attainment, parental qualifications, family factors, disability, low paid work, joblessness, addiction, rurality, debt, and ethnicity. The main predictor of future poverty was poor educational attainment in childhood. The family type at highest risk of being in relative poverty was single with children at 34%. It was pointed out that 22% of children were living in relative poverty in 2019/2020 and 17% were living in absolute poverty.

5.6. Measures of social disadvantage used in the Republic of Ireland

Smyth et al (2022) [32] conducted a comparison of education and training systems in Northern Ireland and the Republic of Ireland (RoI) for the Economic and Social Research Institute. In the RoI, an exam-fee must be paid for each student completing the Junior Certificate (GCSE equivalent) or Leaving Certificate (A-level equivalent) and being eligible for a waiver for this fee was used as a proxy for disadvantage for RoI pupils in this study (FSME was used for NI). Eligibility for exam fee waivers is tied to whether the parents of a pupil qualify for a medical card, which itself is based on household net income. Schools were divided into quartiles on the basis of the proportion of their students who had an exam-fee waiver. Those who were classified as disadvantaged in this study achieved considerably lower exam grades than their peers.

The RoI also has access to the 2016 Pobal HP Deprivation Index for Small Areas, which is similar in nature to the NIMDM, focussing on three area-based domains: Demographic Profile (e.g. population change, age profile), Social Class Composition (education profile, occupation, household crowding), and Labour Market Situation (unemployment rates).

5.7 Grey Literature Review - Summary

The review of the grey literature offers insight with regards to three issues; consideration is still needed as to how to improve single point-in-time measures, and take into account the disadvantage over longer periods; there are still a variety of indicators used to define social disadvantage in educational research; and there are still obstacles to some cross government data linkages as the Small Business, Enterprise and Employment Act (2015) does not apply in NI until this can be approved by the devolved government.

Point-in-time measures of poverty were described as misleading in 2013, because while some people may live in poverty for long periods of time such as the lower skilled/never worked social class [30], others may alternate between periods of low income and employment [6].

A range of indicators continue to be used to define social disadvantage in educational research. FSME is means tested, as it relies upon information as to whether a household is eligible for social security benefits. The Income domain of the NIMDM stopped using benefits data in 2016. Instead, the indicator of deprivation adopted was a household having an equivalised disposable income that is below 60% of NI median income. This is also the official government statistic used by the European Commission Joint Research Centre, and the four nations of the UK to measure household income and poverty.

As we can see from the reports produced by the NFER, the Trends in International Maths and Science Study (TIMMS), these studies create a measure of disadvantage using information on home possessions, parents' level of education and occupation [19]. Similarly, the Programme for International Student Assessment (PISA) scores,

creates the Economic Social and Cultural Status Index (ESCS) using data from pupils on parental educational attainment, occupational status and household possessions. Although such indices are useful from an educational research perspective, they would be poorly suited to operational purposes as they rely on self-reports. This would pose two primary challenges if these measures were adopted by the DE. First, with regards to coverage, it would be extremely expensive and logistically challenging to survey the parents of every school-aged child in NI. Second, if self-reports were used to influence school funding, this could bias the reporting of parents.

The 7 domains in the NIMDMs and its subset for children (IDACI), which was the subject of a report in 2022 [17,18, 20] cover income, employment, health, crime, services, education and housing. In the Republic of Ireland the 2016 Pobal Haase and Pratschke (HP) Deprivation Index for Small Areas, is similar in nature to the NIMDM, and focuses on three area-based domains: Demographic Profile (e.g. population change, age profile), Social Class Composition (education profile, occupation, household crowding), and Labour Market Situation (unemployment rates). Area based measures are strong in that they allow for the many dimensions of socio- economic disadvantage, however, they cannot provide information on the length of time any single household has been living in poverty.

Legislation exists to enable educational research data linkages to take place (Digital Economy Act, 2017). In 2022, the Social Mobility Commission report [9] indicated that administrative data was still lacking around the socio-economic position of children and households in which they live, and there is still a reliance upon FSME data. It was recommended that more cross government administrative data sharing should take place through the Office of National Statistics (ONS) Integrated Data Service (IDS). A reference was made to the Pupil Parent Matched Data (PPMD) project being developed by DE, DWP and HMRC in England [10]. That links a pupil's data to their parents or guardians via child benefits data, thus linking pupils' educational achievement data to benefits, equivalised income, and geographical data. The legislation supporting these linkages currently only applies in GB. However progress has been made in that The Digital Economy Act 2017 allows for such linkages for research purposes only. Because of this, partnerships now exist

between Statistics Authorities and Universities across the UK, one of which is in Belfast [12]. Their goal is to host UK and devolved government administrative data and enable trained researchers to access and use it [13]. An educational Outcomes Linkage dataset is also under development and in time will be linked to higher education data, so that educational outcomes may be better understood.

6. Academic Literature Review Results

6.1. Review of aims and objectives

This scoping review of the academic literature provides a comprehensive description of measures of social deprivation or poverty in other jurisdictions, extracted from large studies that used administrative data, registry data and also large cohort studies. Studies that used FSME as the main proxy for social deprivation were excluded as the goal is to identify alternative indicators of poverty or disadvantage that are used. Methodological quality has not been assessed, however the studies have all been published in peer-reviewed journals.

6.2. Findings from Academic Literature Searches

There are ten papers from USA, seven papers from Sweden, four papers from UK, six papers from Norway, five papers from Denmark, three papers from the Netherlands, three papers from Finland, two papers from Australia, one paper each from Iceland, China, Chile, Israel, Canada, Germany, India, Pakistan and Turkey respectively, and finally, one paper that had global coverage. The articles included large studies that either used census or registry data (n=32), applied the Social and Cultural Status measure (ESCS) used in PISA, population registers, longitudinal studies, birth cohort studies, registers of twins studies, and an early development census (AEDC), among others. A summary is table of the included studies is presented in Appendix III.

6.3. Studies that used Census and National Registries

In the Scandinavian countries of Norway, Denmark, Sweden, Finland, and also in the Netherlands, government agencies contain population or statistics registers (e.g. Statistics Sweden, Statistics Norway etc.) which provide a secure platform to allow researchers and policy makers to obtain data on a range of measures. A unique identifier is available for every resident to link the registers as and when needed. Examples of these studies are Barclay & Hällsten, 2021 [34]; Gustafsson and Hansen 2018 [35]; Lindberg et al 2021 [36]; Lundborg et al 2014 [37]; Acacio-Claro, et al 2017 [38]; Andersen and Andersen, 2015 [39]; Joergensen et al 2018 [40]; Haelermans et al 2022 [41]; Staer, 2016 [42]; Elstad et al 2015 [43] and Ørstavik, et al 2014 [44].

In the UK, the Office for National Statistics Postcode directory (ONSPD) may support geographical linkage. Lower Super Output Areas are official spatial reporting units, that local people may describe as neighbourhoods, and may be homogenous socio-economically, with approximately 600 households (Knies & Kumari (2022) [86].
Two studies in Australia used the Australian Early Development Census (AEDC) and because it does not contain SES data, they linked it to the Australian Curriculum Assessment and Reporting Authority [45,46]. In USA, researchers used the US Census Bureau and American Community Survey, [47-49], or took a representative sample of the Current Population Survey [50].

One Indian study [51], a Canadian study [52] and a China study [53] used National Population Census data. In Israel, the fathers' occupational status was drawn from two birth cohorts from their Census data [54].

6.4. Parent Education as a single measure, or used with other measures of SEP

One study in China used paternal education along with a geographical measure [53]. Parental education was used as a single measure of socioeconomic status in seven studies based in Sweden, Norway, Finland, Denmark and one global study [35, 37, 44, 55-58].

The use of a measure of parental education, along with a measure of occupation was used in two studies that took place in England and Sweden [34,45].
There were 12 studies which used the two measures of SES; parental education and income, which took place in Canada, USA, Denmark, Sweden, Finland, Germany, Norway and the Netherlands [37,39,40, 41,44, 48, 52,59, 60-63]
Single studies in Finland and Netherlands used parental education with a range of measures such as; housing tenure and employment status [38], household income and age of mother at birth of first child [42], two studies used parental education, household income and parental occupation [64,65]. One study in India used gender, rurality, education and marital status [51]. Mikkonen et al (2016 [66]) used educational achievement, occupational status, income and marital status in a study in Finland.

It is evident that when it comes to international education related studies, the most common individual SES measure used, apart from FSME, is parental education [67] and commonly used alongside income. The results are consistent with observations of Willms and Tramonte (2019) [68]); that education, occupation and income, are the 'Big Three' when it comes to measurement of social disadvantage in education research.

6.5. Income as a single indicator or adopted along with other non-education measures

Covarrubias (2014) [50] used family income broken down into four categories. Elstad & Bakken (2015)[43] used annual sum of two parents' pre-tax income, transformed into four categories with median income as reference category. Two studies in USA used the single measure of income using Federal Poverty Levels (Bratter & Kimbro, 2013 [69]; Morrissey & Vinopal, (2018) [70]. Ragnarsdottir et al (2017) [71] and added income, along with marital status and disability of parent.

6.6 Occupation as a single indicator or used with other non-educational measures

Bar-Haim et al (2019) [54] in Israel, used occupation status as a single measure, using the International Socioeconomic Index (ISEI). Hedeflak and Dribe (2020 [72]) in Sweden, used fathers occupation and an area-based measure using geocoding of social class. In Denmark, parental occupation and social class was also used by Foverskov et al (2019 [73]. Sturgis et al (2015 [74] selected occupation of parent and social class as the measures of SEP in their study which took place in England and Wales. Lopoo and London (2016 [75] are the only study that employed the single indicator of house- crowding ratios.

6.7 Parent Education, and Occupation and Income – Measurement Issues

A number of studies focused solely on income. Baier et al 2021 [59] quantified income as the log monthly net household incomes equivalised using the OECD scale. However 13% of the data was missing. Studies in the USA defined and measured poverty as living below the USA federal poverty threshold (FPL) [48,69,70]. Also a living wage index based on the MIT living wage calculator website and ASC section of US Census bureau website [47]. In Sweden annual disposable

income was converted using Consumer Price Index, provided by Statistics Sweden, categorised into quartiles) [36]. In a Finnish study [66], income was defined using state taxation information, log-transformed and standardised into three categories; lowest, intermediate and highest. And in Denmark, Andersen and Andsersen [39] took average yearly disposable income of parents from administrative registers.

The method by which employment status and education are measured is also worth noting. Employment levels are categorised quite differently across countries with Basten and colleagues [81] using three levels for employment status; unemployed, looking for a job, or employed or self-employed. McCartney et al. [82] defined employment status as the proportion of economically active males seeking work in occupational social class four or five, in the Registrar Generals categorisation. In a study in Sweden [36], the authors measured numbers of registered employed, and created three levels; employed/income from students grants/loan equivalent to full time study.

While parental education is commonly used as an SES indicator there is high variance in the way the measures are constructed. For example Livingstone et al. [52] created four levels (no high school, high school, college, Bachelor's or higher), Khor et al. [53] employed OECD methodology (no education, some primary school, some lower secondary school, some higher secondary school, some tertiary school 3-years college, 4 year college and postgraduate education). Richards et al. 2015 [77] created four categories of maternal education (less than high school, completed high school, up to 3 years post-secondary, 4+ years post-secondary). Lindberg et al. [36] defined levels of maternal and paternal level of education as compulsory school, upper secondary school, or university degree. Lundborg et al. [94] created a scale of parental education using the number of years of schooling of parents, based on highest education degree obtained. Andersen and Andersen [39] also created a scale [39] using parent's average length of education in years from Administrative registers. Jalovaara et al. [55] in Finland conducted one of the few studies that used a classification system for parental education which is the International Standard Classification of Education (ISCED). The highest level of education obtained by the mother at time of child's birth measured as, ISCED97 1-2. basic–(low), ISCED97 3-4 – secondary (medium) and ISCED97 5-6 – tertiary (high). This inconsistency in how

employment and parent education categories are defined, makes it difficult to determine the reliability of the measures.

A number of variables have been combined to create an Index such as; the Economic and Social and Cultural Status measure (ESCS) adopted and used in Programme for International Student Assessment (PISA) [92]. Also, the NIMDM (2017) [17,18], a scale measuring social class – the Cambridge Social Interaction and Stratification Scale (CAMSIS) [74].

Table 2: Composite Variables and Multiple Deprivation Measures

Authors	Country	Education	Income	Occupation	Social Class	Geo measure/Housing Tenure	Assets	Employment	Household (1/2 parents)
Dean et al. (2018) [46] (Index of community and SED -at school level	Australia	x		x		X			
Scherer et al. (2019) [76] Household assets Index Score (22)	Pakistan					Water and Sanitation	Land/home TV Animals		
Richards et al. (2015) [77] Neighbourhood Deprivation Index	USA	x	x And/or state benefits	x		Overcrowding		x	
Koricich et al. (2018) [78]	USA	x	x	x					

Authors	Country	Education	Income	Occupation	Social Class	Geo measure/Housing Tenure	Assets	Employment	Household (1/2 parents)
Caldwell et al. (2017) (also used FSM) [47]	USA		Living Wage						x
Boussleot (2018) [79]	USA	x	x	x					
Sheppard et al. (2020) [80] Composite	England	x	x	x					
Basten et al. (2015) [81]	England, Scotland and Wales	x	x		x	X		x	
McCartney et al. (2017) [82] Area Deprivation – Carstairs Dep.Index	Scotland England and Wales				x	Overcrowding. Privately owned.	Access to car or van	x	

Authors	Country	Education	Income	Occupation	Social Class	Geo measure/Housing Tenure	Assets	Employment	Household (1/2 parents)
Lindberg et al. (2021) [36]	Sweden	x	x	x				x	
Atac et al. (2019) [83]	Turkey	x		x	x	X		x	

6.6. Composite or Multiple Deprivation Measures

As shown in Table 2, many of the derived composite measures, and already established indices include variables for parental education and, either occupation, or income, or both [36,46, 64,77,79-82]. In Sweden, Klapp et al. [64] created a continuous index with 3 categories; 0 = low economic status, 1 = medium economic statis, and 2 = high SES using parents' educational levels, income and occupation [64]. Koricich et al. [78] created a composite indicator made up from paternal education level, maternal education level, and maternal and paternal occupation status, and family income. Each item was standardised and weighted equally. No further details are provided as to how variables were derived [78]. Dean et al. [46] created an area and school-level measure of economic status (SEIFA) and an Index of Relative Disadvantage (IRSD) broken down by deciles. The scales were created from information on parent occupation and education, geographical location, student composition of the school, and the size of school. The NIMDMs [17,18] are also formulated to cover multiple domains, and will be mentioned in more detail in section 6.10.

Richards et al. [77] measured area deprivation using a neighbourhood deprivation index (NDI) for the Census tracts in which mothers resided at birth. Using Census data from 2000, the standardised index was a function of poverty rates, household incomes, public assistance receipt, occupation, overcrowded housing, education and unemployment. Boussleot et al. [79] created a composite variable, as a function of male guardians' level of education and occupation, female guardians' level of occupation and education, and converting them to prestige scores using General Social Survey 1989. Household income was measured on a continuous scale of -3.00 to 3.00 [79].

Sheppard et al. [80] performed a principal component analysis (a statistical data simplification and reduction technique), to derive a measure based on highest educational qualification of main parent, the household income band, and occupational class of main parent. The SES variable was then divided into deciles. Basten et al. [81] is the only record found that performs an analysis in their research using a latent wealth variable based on 5 indicators; family income; family class (highest occupational social class on 6 point scale using Registrar's General Social

Classes (RGSC) 1= unskilled/manual 2= Semi-skilled manual or non-manual 3= skilled manual 4= skilled non-manual, 5= managerial and technical,6= Professional. Housing tenure (rented, owned with mortgage, owned outright). Employment status: (unemployed, looking for a job or employed or self-employed) Self-perceived financial situation measured using (finding it very difficult (1) to living very comfortably (5)).

Caldwell et al. [47] is the only record found in the review that used living wage calculated based on MIT living wage calculator website and ASC section of US Census bureau website, and a measure of household size [47]. A number of other studies have used Census data to create their scales, for example, Sturgis and Buscha [74] constructed a Social Interaction and Stratification Scale [85] derived from each Census year.

6.7. Household Assets

In a study in Pakistan, Scherer et al. [76] used aggregated data on household assets to generate a composite score as a measure of SES. Weights were added to 22 assets, typical of low and middle-income countries (LMIC).

The Organisation for Economic Co-operation and Development (OECD) [92] developed the Economic, Social and Cultural Status Index (ESCS), based on PISA questionnaire data. It has been described as *"a measure of students' access to family resources (financial capital, social capital, cultural capital and human capital) which determines the social position of the student's family household"* It is a composite score constructed from principal components analysis of 3 indicators: highest level of parental education (PARED), occupational status (HISEI) and home possessions (HOMEPOS) - the availability 25 household items that act as measurements of family wealth, including books [93]. Classick and colleagues [21] conducted research using PISA, assessing 16 years olds' reading, maths and science abilities. Pupils amongst the bottom 33% on the ESCS index are considered disadvantaged. The overlap between FSME and being amongst the bottom 33% on ESCS index: In England is 65%, in Wales is 67% and Northern Ireland is 61%.

6.8. NIMDMs

The NIMDMs [17,18] and their properties have been covered in the Grey Literature Section, but to add to this, it is worth noting that the NIMDMs, while not commonly employed in academic education research, are nevertheless employed as a deprivation measure in health-related research in NI, via the databases hosted by Open Data NI [89], maintained by the UK Open government licence for public sector information [90]. For example, determining patterns in primary care prescribing rates across deprivation areas [90] and the study of anticholinergic drug usage among Dementia sufferers in NI [91]. This body of literature is not included in this review, as its focus is on research in an education context, and not on health driven research. In Scotland, data was used from Higher Education Statistics Agency, the Growing up in Scotland Survey and Scottish Household Survey, to assess extent to which MDMs can be used as valid indicators of widening access [84]. The Scottish Government Commission on widening access report (2016) concluded *that " despite its limitation, the Scottish Index of Multiple Deprivation (SIMD) is currently most suitable measure of disadvantage for measuring progress and setting targets. However additional measures such as FSM and LPS can help with decisions about individuals".*

6.9. Summary

Parental education as an indicator of SEP, applied either by itself, or with other measures appeared in about 75% of the records. Income featured as one of the measures in 54% of studies. Parental education and household income were two of the indicators used most commonly together, or with further measures. This supports prior evidence that when it comes to global educational achievement studies, the most common individual SES measure used, is parental education [67]). The views of Willms and Tramonte [68], is that education, occupation and income are the 'Big Three' when it comes to measurement of social disadvantage. What is evident after further examination, is that the manner in which these measures are constructed is not consistent, which makes it difficult to determine the reliability of the measures. One researcher does not recommend binary indicators of parents' education [35]. According to Sirin [1], school achievements and SES are continuous in nature, and socioeconomic status of the family, was one of the strongest correlates of academic performance at the time of his meta-analysis.

Parental education was also considered to be one of the most stable aspects of SES, as it established at an early age and remains stable over time. Despite this, Sirin [1] cautioned against the use of a single component of SES, because social disadvantage or poverty, it is a multidimensional construct, leaving the possibility that any effects of SES found will be overestimated. A problem with this kind of data, which has been covered earlier in this report is that this data is often self-reported information.

Household assets are measured in several studies [82, 93] as they support a child's study activities at home. However, parents living in poverty (high poverty, high unemployment, and low education) are less likely to employ education -orientated practices with their children [87] and there is evidence that parental academic involvement increases life outcomes for their children [88].

Collecting data from students is problematic because of missing data and pupils may upgrade their parents' level of education [67]. Reporting of parent occupation is more accurate than level of education but a study showed 70% of students agreed with their parent on the occupational category when given five options [67].

7. Discussion

This Scoping Review documents the measures of social disadvantage used in educational research, taken from records found in the academic databases and the grey literature, such as research and government reports. The most common indicators of SES identified in this review were variations of parental education, parental occupation, and household income. Although these indicators were frequently employed either in isolation or as part of a composite, there was considerable variation in how they were operationalised.

For instance, looking at household income for example, studies in the USA defined and measured poverty as living below the USA federal poverty threshold (FPL) [48,69,70]. Also a living wage index was created based on the MIT living wage calculator website and ASC section of US Census bureau website [47]. In Sweden, annual disposable income was converted using Consumer Price Index, provided by Statistics Sweden [36]. In Finland income was defined using state taxation information, log-transformed and standardised into three categories; lowest, intermediate and highest [66]. Parental education is considered to be one of the most stable aspects of SES, as it established at an early age and remains stable over time.

The studies in this review suggest that the Scandinavian countries could be considered ‘best-in-class’ due to their comprehensive data linkage infrastructure which allows researchers and policy makers to seamlessly link administrative data across different domains (e.g. education, income, and occupation) and levels (e.g. individual, household, school). Attempts to mirror such data linkages in NI may require the Small Business Enterprise and Employment Act (2015) to be rolled out to NI in some cases and may also require considerable investment in resources. For example, income appears to be an individual measure of social disadvantage that shares the strengths of FSME (readily available, verifiable and directly observable), but is not publicly available in the UK to those working in Education in government. In Northern Ireland, all benefits and income data are held within the Professional Services Unit (PSU) of the DfC. Cross-departmental access to this data would provide

the DE with a more accurate picture of the schools which are most in need. A new project in England will create systems to link children's education information to their parents' income data [10]. It could then be possible to apply the measure of poverty used by the European commission and is also the official statistic for poverty in the UK i.e., below the 60% of the national median equivalised disposable income.

Section 3 - Landscape Review of the Measures of Socioeconomic Status Used in Northern Ireland's Government Departments

1.Objectives

This landscape review had two aims: i) explore the extent to which Free School Meal Entitlement (FSME) is used as an indicator of socioeconomic disadvantage within Northern Ireland (NI) governmental departments, and ii) document other measures of socio-economic status (SES) that are also currently in use.

2.Methods

A series of interviews were carried out by the research team with representatives from eight Northern Ireland governmental departments, and one local authority, Belfast City Council (BCC). To guide the interviews, a topic guide was created by the lead consultant and Research Associate. It was subsequently reviewed and approved by the Research Steering Group and Department of Education (DE) points of contact (see Appendix V). The topic guide contained questions about the use of proxy measures of SES in the relevant department (FSME and/or other indicators), the purpose and duration of use of the data, and the general advantages and disadvantages associated with the measure(s). In addition, the department representatives were asked about data sources that are routinely accessed, costs associated with access, and opportunities (and challenges) for data linkage. Finally, information was obtained about publicly available resources (e.g., reports) that could serve as examples of the proxy in use.

The DE facilitated initial contact with staff members within the departments. A Northern Ireland Statistics and Research Agency (NISRA) statistician and/or a research lead/chief data officer placed within each department were also invited to take part in the discussions. Seven meetings took place over video conferencing software, and meetings were recorded with the permission of the interviewees. The meetings took place over six weeks during March and April 2023. Detailed notes of the meetings were later transcribed and shared with participants to check for accuracy. These notes were then summarised and synthesised by the RA and lead researcher and reviewed by the wider research team (findings are presented in Section 4 below). A full draft of this

review was shared with all interviewees prior to publication to ensure accuracy of content.

3. Participants

Participants included representatives from the following departments:

1. Departments of Justice (DoJ)
2. Department for the Economy (DfE)
3. Department for Communities (DfC)
4. Department of Health (DoH)
5. The Executive Office (TEO)
6. Department for Agriculture, Environment and Rural Affairs (DAERA)
7. Department of Education (DE)[5]
8. Belfast City Council (BCC)

At least two members of staff from each department were present at each meeting, including both NISRA statisticians and departmental policy/research staff members. Those interviewed held a broad range of expertise and responsibilities.

NOTE: It must be emphasised that all of the participants that took part in the interviews were providing a perspective in terms of their own experiences, and the policy context for which they were responsible. They were not acting as official spokespeople for their entire departments.

4. Findings

Table 3 presents a summary of measures of SES discussed during the interviews.

4.1. FSME use

Although not widespread, several government departments currently use FSME for research and/or policy purposes.

[5] Members of DE who were not acting as points of contact for this project were interviewed.

Department of Education (DE): Currently FSME is used widely in both a research and policy capacity within the DE. FSME is primarily used to determine if a child should receive free school meals each day as well as a be awarded a grant to help with the cost of school uniforms. FSME was also, until recently, used as a measure to award FSM to children during the school holidays. School-level FSME is used as part of the Common Funding formula, and to award additional funding via initiatives such as Targeting Social Need (TSN). TSN funding is approximately £75 million per annum, and currently the most common usage of this money is for additional teaching and classroom assistant staff. The Extended Schools programme also uses the percentage of school population who are FSME as one of two funding criteria.

More recently a "Reducing Educational Disadvantage (RED)" programme is being developed within DE, which uses six criteria to help inform where potential RED pilots might take place, one of which is FSME. RED is a whole community, place-based, partnership approach to tackling educational disadvantage and inequalities. Piloting of RED is hoped to begin within the next 12 months. It was clarified that abandoning FSME as an indicator would leave a significant gap, because it is a validated and reliable pupil level measure and is updated annually. RED is not an opportunity to put FSME to one side, rather the idea is to combine FSME with other measures.

The Sure Start programme was also discussed. Although it is area-based (using the NIMDM to identify areas of greatest relative disadvantage to determine coverage of the programme), FSME is used as a validation check enabling comparison with other measures of disadvantage within Sure Start catchment areas to ensure the programme is targeted towards meeting the needs of the disadvantaged.

Belfast City Council (BCC): FSME is one of the agreed proxy measures of deprivation that are being used to monitor progress of the Belfast Agenda, a community plan for the development of the city by 2035. One aim of the Belfast Agenda is to reduce the education gap between those who do and do not qualify for FSME. Currently the differential between FSME and non-FSME

pupils in Belfast is 32 percentage points using the key benchmark of five or more GSCE's (A*-C), including English and maths. The aim is to reduce this inequality.

Department for the Economy (DfE): While the Education Authority supplies FSME data to Further Education (FE) Colleges in NI, DfE does not currently have direct access to FSME data. However, the interviewees stated they would welcome having an operational database that contains FSME data and would be pleased to develop a closer collaboration with DE. To this end, work is progressing to develop a research database, (LEO database development) made possible by Digital Economy Act (2017) and DfE hopes to collect FSME data through the Consolidated Data Returns (CDR) from the Colleges in 2024. This however will require discussions with the Education Authority in NI. The CDR is used to produce FE statistics for the DfE.

Department for Communities (DfC): DfC data is used by the Education Authority to identify FSME status, and interviewees note that DfC had considered using FSME by linking it to mitigation payments or discretionary support. However, this was not pursued as it was felt FSME was not precise enough at identifying those who need additional support (e.g., the 'working poor').

Department of Health (DoH): FSME has been used before with regards to the health and social care inequalities monitoring system (HSCIMS). Inequalities in obesity were explored using FSME from the school census, but it did not perform any better than information from the Multiple Deprivation Measures MDMs, and so FSME data were not used.

Other comments on FSME: Throughout the interviews, a range of views on the suitability of FSME were gathered from participants, both from departments where FSME is and is not used. Several common themes emerged.

A number of departments highlighted issues with how precise FSME is and whether it captures everyone who is struggling socially/financially. This is attributed to difficulties in defining what constitutes poverty. Both DfC and BCC noted that FSME may not always accurately reflect the levels of poverty that a particular family is experiencing. Both highlighted the relative arbitrary cut-offs used for FSME, stressing that it may exclude families who are narrowly above the income cut-offs to receive benefits, yet have significant outgoings (e.g., size of family, travel costs). For example, BCC shared anecdotes from school principals they engage with, who have stated that there are children known to be in poverty yet are not entitled to FSM. Such discrepancies were also noted by representatives of DE. Within the DfC, support is targeted not just on absolute lowest levels of income, and other criteria are considered, such as material deprivation.

An issue highlighted by a representative from DE was that children may be entitled to FSM on the grounds that they have special dietary needs, something included in their statement of special educational needs. As such, this could introduce additional bias as children who are not from low SES backgrounds, but who have dietary needs, could be misclassified as deprived.

Furthermore, given that FSME measures entitlement, it was felt unclaimed FSME is a problem that needs to be addressed as eligible pupils are missing out. This is an issue also frequently raised by BCC community partners. Work is ongoing with DE, DfC and the Education Authority (EA) to better understand factors influencing decisions about whether or not to apply for FSM.

Other departments commented more positively on FSME (DoH, DfE, DE), and felt more departments should be made aware of its potential as a deprivation measure. The most commonly stated reason for departments not using FSME was their place-based focus requiring area-level measures of SES rather than individual/household indicators. The main strengths of FSME that were highlighted were its reliability and validity, its interpretability, and the fact that its yearly updates are more frequent than many alternatives (e.g., NIMDM).

4.2 Alternatives to FSME: The Northern Ireland Measures of Multiple Deprivation (NIMDM)

The most commonly used measure of SES across all of the departments is the 2017 Northern Ireland Multiple Deprivation Measure (NIMDM). The NIMDM is a statistical tool used to measure multiple dimensions of deprivation in Northern Ireland. The measure is based on seven domains of deprivation: income, employment, health, education, access to services, crime and housing. These domains are measured using a range of indicators such as the percentage of households on low income, the percentage of people claiming benefits due to ill health, and the percentage of people without access to a car. These indicators are provided by the relevant NI government departments. It ranks all 890 Super Output Areas (SOAs) in Northern Ireland, with SOAs being small geographical areas containing an average of 2,500 people. The measure is used to identify the areas of greatest need, which can then be targeted for policy and funding interventions.

The NIMDM is used to inform the business of almost every government department. Examples include:

- **The Executive Office's** Urban Village initiative identified 5 key areas across NI where there has been a history of deprivation and community tension. Although not the sole determining factor, the NIMDM scores fed into the process of identifying the Urban Villages.
- **BCC** used the NIMDM to help distribute funds provided by DfC during the Covid-19 lockdown. The funds were to be used to help families with support to study at home such as IT support, Wi-fi connections etc. BCC also uses the NIMDM along with FSME to determine social disadvantage and monitor progress against their action plans.
- **DAERA** uses the 'Access to Services' domain and 'Employment' domain of NIMDM for the development of programs that tackle social isolation and deprivation in rural areas. DAERA representatives who took part in the interview stated, that in their own experience, they did not typically use deprivation for determining eligibility for schemes.

- Within the **DoJ**, the NIMDM rankings are broken down into quintiles to provide additional demographical context for The Safe Community Survey. There is little reliance upon deprivation indicators within the Youth Justice services, as there are no eligibility criteria; everyone can avail of the services on offer. Outreach work takes place with schools located in areas of high risk; however, it was not clear from the present interview how high risk is defined.
- **DfE** has a strategy on widening participation and access to higher education, and while the strategy is not particularly prescriptive in terms of what disadvantaged groups should be targeted by higher education providers, it does flag up socioeconomic background, and the key measure used is number of students that fall into quintile one (bottom 20%) of the NIMDM. For example, 13% of those in HE institutions, are from quintile one of the NIMDM.
- The NIMDM is used for monitoring and health inequality action plans within the **DoH**. For example, the NIMDM is used to produce statistics for children in care and care leavers. Data is provided by Super Output Area (SOA) and again scores are ranked to identify the 20% most deprived or 20% least deprived etc. This forms the building block for various additional analyses and to report findings in a larger report. The Health Inequalities Monitoring System was set up in 2002/03, drawing on the NIMDMs, for the Investing for Health strategy. Prior to the use of NIMDMs, the measure of deprivation used was Social Class (NS-SEC).
- **DfC** are not solely reliant on the NIMDM to measure deprivation, as they have ready access to benefits data (e.g., health, poverty, housing, and other social security benefits data). Because of this, their data managed by Professional Services Unit (PSU) informs the Income and Employment Domains of NIMDMs. However, teams within the department do still make use of the NIMDM. Interviewees from DfC noted that they do not always use the full NIMDM, but instead use the most appropriate domain(s) for their project/initiative. For example, the Income domain is used if targeting poverty, or the Access to Services domain is used if rurality is the issue in question.

- **DE** use NIMDMs alongside FSME to determine eligibility for the Extended Schools programme funding. DE are currently attaching student home SOA data to their records in the Schools Information Management System. In addition, the Sure Start programme targets resources on a geographical basis, which is why they use the NIMDM (targeting the most disadvantaged SOAs).

4.2.1 Comments on the NIMDM

Most interviewees commented positively on the NIMDM. However, a small number of representatives admitted they did not spend much time considering the reliability, validity or utility of the measure, and simply made use of it due to its widespread adoption across multiple departments and sub-divisions.

A key strength noted was the scope of the measure. For instance, DfC highlighted that deprivation is an incredibly broad construct, and that the 7 domains of the NIMDM allowed their department to focus on the most relevant aspect(s) of deprivation for a given initiative.

In discussing the area-based nature of the measure (i.e., it cannot be used to identify individuals), most departments commented that this was not an issue. Indeed, most policies discussed by the participants tended to be place-focussed (e.g., Urban Villages, Tackling Rural Poverty & Social Isolation), and did not have individual eligibility criteria, meaning anyone could take part if they wanted.

The timeliness of the NIMDM (i.e., how regularly it is updated) was discussed with interviewees, and most agreed it was adequate to meet the needs of their departments. Participants from the DoH are happy with the timeliness of the NIMDM. They noted that population-level health trends tend to unfold over long periods of time, and therefore they concluded that more frequent updates would be costly but would not necessarily lead to more clear and consistent trends (for their purposes). Other departments noted that, while more regular updates would be highly beneficial, they appreciated that the development of the NIMDM is a major piece of work and understood more regular updates

may not be feasible in terms of resources. It was, however, noted that improvements in administrative data linkage could lead to greater efficiencies in this area.

Several representatives noted that in the next iteration of the NIMDM the statistical geographies will be changed so the administrative and geographical boundaries align. The change is from Super Output Areas to Super Data Zones coming with the new releases in 2023/2024, which is considered to be more beneficial in the long run.

4.3. Alternatives to FSME: Other indicators and data sources

When discussing alternatives to FSME and the NIMDM during the interviews, a clear distinction emerged in the types of indicators and data sources that are available; certain data are appropriate for research purposes only (which can be used to inform future strategies), whereas other data could be suitable for research *and* operational purposes (e.g., monitoring, directing the allocation of resources). We discuss both types of data below, however given the DE currently utilise FSME in an operational capacity, we acknowledge that research data are unlikely to be a suitable supplement/replacement. Many of the data sources discussed below are covered in greater detail in a recent report from DfC (Graham, 2022). Please see Table 3 for a link to this report.

4.3.1. Potential operational alternatives to FSME

FSME is based mainly on benefits entitlement, therefore the most obvious 1:1 replacement for FSME would be household benefits data. In Northern Ireland, all benefits data are held within the Professional Services Unit (PSU) of the DfC. Focussing on household benefits data would capture the majority, but not all of those eligible for FSM but not claiming FSM. For example, as previously mentioned, pupils with special educational needs that require a special diet are entitled to FSM but may not live in a household that can receive benefits support. Also, children of asylum seekers who are supported through the National Asylum Support Service are entitled to FSM but may not qualify for benefit support. As such, cross-departmental access to this data

would provide the DE with a more accurate picture of the schools which are most in need, as parents who are eligible yet do not apply for FSM would no longer be considered to be in the not entitled category. Additional work linking FSME data with benefits could also compare eligibility with applications for FSM, to help identify those who are eligible but do not claim FSM, and why. As highlighted in the narrative review, this particular group may include the most deprived cases, and therefore could require further targeted support.

As discussed in Section 4.1 (above) and highlighted in the narrative review, an issue with FSME is that it is a crude measure that does not perfectly capture a child or family's level of material deprivation. As is the case with other benefits, qualifying for FSME does not guarantee that a child is experiencing deprivation, and not being eligible for FSME is not synonymous with affluence. It is well-documented and was raised by many of the representatives interviewed as part of this project, that many families narrowly miss the income cut-offs for FSM, yet due to their circumstance and/or outgoings, face considerable financial strain. As such, it is highly plausible that certain children in 'working poor' families face a similar or indeed greater level of deprivation than those eligible for benefits such as FSM. In order to provide the most accurate description of the levels of economic disadvantage within schools, departments such as the DE would require access to household income data, held by HMRC. If such data were available, different approaches could be adopted to identify the schools in need of the most support. A suggestion put forward during the interview with BCC representatives was to consider using the Living Wage threshold, as it may be a better proxy for poverty or disadvantage than FSME. BCC has become a Living Wage Foundation Employer, to ensure all their employees do not earn below this threshold because the minimum wage is seen to be too low.

However, as noted by most interviewees, considerable legislative and bureaucratic obstacles exist to interdepartmental sharing of personal/household-level data on social disadvantage and poverty, mainly because the departments are separate legal entities. The Digital Economy Act (2017) allows for data to be shared, however it is to be used for research

purposes only. The Data Protection Act 2018 allows for the processing of personal data for operational purposes, if the operation meets the criteria of a 'public task' (i.e. the processing must be necessary and must have a clear basis in law). Such instances however involve strict data sharing agreements. For instance, accessing HMRC data relating to income may be particularly challenging. It was noted during the interviews that HMRC data was part of the data used to inform the 2017 update to the NIMDM, however there was a very strict data sharing agreement put in place to access the necessary information. In order for more routine cross-departmental sharing of personal data for operational purposes, legislative implications would need to be explored in depth, something which cannot happen until the NI Assembly (which is not sitting as of October 2023) is restored. Regardless of these challenges, departments who have a remit to tackle poverty, reduce disadvantage and inequalities expressed interest in having a more integrated data base, to hold all the socio-economic data needed to support their shared policy aspirations.

4.3.2. Potential research alternatives to FSME

The **Family Resources Survey** (**FRS**) is a survey conducted annually in Northern Ireland, as well as in the rest of the United Kingdom, to gather information on the income, expenditure, and other economic circumstances of households. The survey is administered by the Central Survey Unit of the Northern Ireland Statistics and Research Agency (NISRA) on behalf of the Department for Communities, and it is used to produce the annual NI Poverty and Income Inequality Report (formerly known as Households Below Average Income (HBAI) Report. It collects data from a representative sample of households across Northern Ireland, using a combination of face-to-face interviews and self-completion questionnaires. The FRS covers a wide range of topics, including employment status, income sources, benefits received, housing costs, household expenditure, and savings. It also includes questions on demographic characteristics, such as age, gender, marital status, and education. It provides estimates of key measures of absolute and relative poverty at NI level. However, there are a few issues which would mean it

could not act as a robust alternative data source to FSME in an operational capacity. First, it is a survey and not verifiable against clear criteria. Also because of issues with sample size (approximately 2,000 households annually), it is limited in terms of its use for analysing sub-groups of the population and lower geographical areas.

During our interview with the DfE, the Longitudinal Educational Outcomes (LEO) Research Database was discussed. LEO is a de-identified, person-level administrative dataset that tracks the employment and earnings outcomes of students who have completed higher education courses in England, Wales, and Scotland. It is managed by the UK government's Department for Education and is updated annually. The LEO dataset brings together data from a range of sources, including higher education providers, the tax system, and the Higher Education Statistics Agency (HESA). It enables detailed analysis of the earnings and employment outcomes of graduates from different universities and courses, as well as tracking trends over time. The dataset covers graduates who completed their courses between the academic years 2002/03 and 2018/19, and it includes information on their earnings and employment outcomes up to ten years after graduation. The data is linked to information on the students' courses, qualifications, and personal characteristics, such as age, gender, and ethnicity. LEO is used for research, but also operational purposes, which was enabled by the Small Business and Education Employment Act 2015. This piece of legislation, does not currently apply to NI, meaning it is not possible for operational data to be merged. However, the DfE see the Digital Economy Act 2017 as a way to produce at least a research version of the LEO in NI, and such a longitudinal research database could allow for the impacts of duration of disadvantage to be monitored.

Work on this is already underway with NISRA colleagues within Administrative Data Research (ADR) NI and an Education Outcomes Linkage dataset, linking data on pupil characteristics, attainment and attendance was launched in March 2023. The next phase of this project is to link data from DfE on higher and further education, apprenticeships and training. The DfC maintain a Cross

Government Administrative Database created through linking administrative data from HM revenue and Customs as well as the Social Security Benefits System and Department for Work and Pensions to create a picture of household income. It has been used in the Income domain of the NIMDM (2017). There are some discussions happening with colleagues across NISRA, around how more use could be made of the data. The DfC understand there is considerable interest in linking with the Cross Government Administrative database as it contains benefits data and income data. However, they are not the owners of all of the data (e.g., HMRC data). Access to the database would be subject to gaining consent of all data providers and identifying and mitigating any data protection and data security issues. However, the PSU are working with NISRA colleagues within Administrative Data Research (ADR) NI to make a de-identified household-level dataset available within NISRA's secure Trusted Research Environment (TRE). Upon completion, accredited researchers under the Digital Economy Act (DEA) will be able to submit project applications for consideration to use the dataset for research purposes. It should be noted that that this will be a standalone dataset which cannot be linked to other datasets.

The Analytic Services Group within DoJ are currently undertaking a piece of research with NISRA's Research Support Unit (previously ADR Unit). They initiated work in April 2018, to secure access to linked data, on a number of required outcomes, including data in relation to benefits, accommodation, employment and mortality. Buy-in from data owners could not be secured however, and the scope of the project has since reduced to ex-prisoner mortality. It is hoped, from a DoJ and ADR perspective, that this would be a proof-of-concept dataset.

The Sure Start programme (DE) combines area-level and family level information to deliver targeted support to those most in need. Sure Start services are located in (at least) areas (SOAs) classified as within the 25% most deprived, based on the NIMDM. All children and families within a Sure Start catchment area can register with their Sure Start project, of which there are 38 across NI. Following registration, a family level assessment is carried

out by the Sure Start project. Applying the Progressive Universalism model, services are offered based on individual families' levels of need. Levels range from 1 (universal and preventative) to 4 (intensive with looked after support from social services).

It was discussed with representatives from DE how large international educational studies, such as Trends in Internal Maths and Science Study (TIMMS) and the Programme for International Student Assessment (PISA), conduct their own economic assessments using survey methods. Examples include questions about parental educational attainment, and the number of books currently in the household (see Chapter 2 for further details). It was noted however, that while such methods could be useful in a research context, they would only be suitable as a supplement to FSME, providing a richer picture of a school or an area, rather than as a replacement. It was noted that scaling up survey studies (e.g. PISA, TIMMS) to cover the entirety of Northern Ireland would be costly. It was also generally agreed that self-report methods would be inappropriate as sole indicators of deprivation for operational purposes (e.g., allocation of funding), as the offer of additional support would likely bias reporting. Even if official data were available on alternative individual indicators of SES via linkage, it was generally agreed that proxies such as parental education, housing tenure, and parental occupation, would be inappropriate for operational purposes, due to their low-to-moderate concordance with household income.

5. Landscape Review Summary and conclusion

In summary, our landscape review found that the most widely used measure of deprivation across the NI government is the NIMDM, which is generally considered fit for purpose across the departments interviewed. However, there is a general appetite for further data sharing and collaboration across departments, and several departments would welcome the opportunity to access information on FSME. We also conclude that there is no indicator that could serve as an immediate 1:1 replacement for FSME as an operational indicator of SES within the DE. Income and benefits data could potentially be more accurate and reliable at profiling school-level deprivation; however, these data are not currently accessible outside of their host departments (e.g., DfC, HMRC). Changes to legislation would be required to facilitate cross-departmental sharing of data for operational purposes, saying that, the Digital Economy Act 2017 is opening possibilities for data sharing for research purposes.

Table 3. Summary of measures of SES used by NI government departments						
Department	Area-level SES measures used	Individual/ household-level SES measures used	Purpose/usage of SES data (examples)	Opportunities for Data sharing	Examples of sharing/links to other databases	**Reports available containing information on disadvantage/poverty**
Department for Education	NIMDM.	FSME (School-level).	Targeting Social Need. Extended Schools programme. Reducing Educational Disadvantage (RED). Sure Start.	NA.	FSME, Multiple deprivation measure (MDM),Income deprivation affecting children (IDAC) and MDM Education domain data have been shared with CCEA to enhance the monitoring of qualification outcomes. FSME and MDM/Education domain pupil data is shared with Universities and College Admissions Service (UCAS) to assist in the contextual admissions process.	Extended Schools – https://www.education-ni.gov.uk/sites/default/files/publications/education/Extended%20schools%20criteria%20and%20funding%202018.19.pdf Engage Programme – https://www.education-ni.gov.uk/publications/engage-programme-setting-allocations-january-2023-march-2023 Qualifications and Destinations of Northern Ireland School Leavers 2021/22 – https://www.education-ni.gov.uk/sites/default/files/publications/education/Qualifications%20and%20Destinations%20of%20Northern

						%20Ireland%20School%20Leavers%202021-22.pdf Attendance at grant-aided primary, post-primary and special schools in Northern Ireland 2021/22 – https://www.education-ni.gov.uk/sites/default/files/publications/education/Attendance%20at%20grant%20aided%20primary%2C%20post%20primary%20and%20special%20schools%20in%20Northern%20Ireland%20202122%20Revised.pdf
Department for Communities	Family Resources Survey. NIMDM. Cross Government Administrative Data (CGAD).	UK Equivalised Disposable Household Income. Net income e.g. benefits data, tax credits, HMRC income data, pensions and investment income,	Income data from CGAD has informed the Income domain of the NIMDM (2017). Family Resources Survey used to produce Households Below Average	Discussions ongoing in Professional Services Unit (PSY) in DfC, NISRA, and colleagues within Administrative Data Research (ADR) NI, to create a de-	Cross-Government Administrative Database (CGAD)- contains data from HMRC and DfC.	Family Resources Survey 2020-2021 https://www.communities-ni.gov.uk/sites/default/files/publications/communities/frs-202021.pdf The Household Below Average Income Report (HBAI)

		maintenance payments etc. Equivalised disposable household income - income is adjusted for household size and composition and is a proxy for material living standards.	Income Report (HBAI).	identified household level dataset available within NISRA's secure Trusted Research Environment (TRE).		Northern Ireland Poverty and Income Inequality Report 2021-2022 https://www.communities-ni.gov.uk/system/files/publications/communities/ni-poverty-income-inequality-report-202122.pdf DfC A study of Key sources of poverty data for Northern Ireland https://www.communities-ni.gov.uk/system/files/publications/communities/dfc-study-of-key-sources-of-poverty-data-in-northern-ireland-2022.pdf https://www.communities-ni.gov.uk/system/files/publications/communities/dfc-examination-of-rates-distribution-poverty-northern-ireland-2022.pdf
Department for Agriculture Environment	NIMDM. Rurality (typically	None.	EU funded Initiatives for tackling poverty and social	NA.	An agricultural college asked DAERA to combine postcodes of students with various	The Agricultural Census in Northern Ireland (2022) https://www.daera-ni.gov.uk/sites/default/files/

and Rural Affairs.	defined as living 20 - 30 minute drive from Belfast).		isolation in rural areas. Ensure Public Authorities have due regard for people in rural areas.		parts of the NIMDM (Education and Income), to profile enrolments. Within division work only – no data sharing.	publications/daera/Agricultural%20Census%202022%20Publication.pdf Tacking Rural Poverty and Social Isolation https://www.daera-ni.gov.uk/sites/default/files/publications/dard/tackling-rural-poverty-and-social-isolation-2016-new-framework.pdf
Department of Health	The NI health and social care inequalities monitoring system (HSCIMS). NIMDM (The Child Health System informs the NIMDM)	FSME was used in past to inform Obesity Health inequalities Indicator. N-SEC, is a social class indicator from Census and is used for Smoking in the Health Inequalities Monitoring system.	Children in care and care leavers statistics. Health and Social Care Inequalities Monitoring system annual report and action plans. Local government districts (LGDs) may use health inequalities indicators to	NA.	When Nurture Units were being established by DE, the DoH shared data with them on children known to social services. DE shared prevalence of autism in school age children with DoH, because legislation required this data is provided and NHS Trusts only have incidence information.	Making Life Better Strategy https://www.health-ni.gov.uk/sites/default/files/publications/dhssps/making-life-better-strategic-framework-2013-2023_0.pdf A Life Deserved: A Strategy for Looked After Children https://www.health-ni.gov.uk/sites/default/files/publications/health/doh-lac-strategy.pdf

			support funding requests.			
Department of Justice	NIMDM.	None.	To provide demographical context for The Safe Community Survey.	N/A.	CAUSEWAY is an Integrated System supporting information sharing across the five main Criminal Justice organisations. Currently undertaking a project with NISRA's RSU. It has been ongoing for almost 5 years (originally also involved DE and DfC). Due to issues relating to data sharing etc. has had to be scaled back considerably.	Community Safety Survey https://www.justice-ni.gov.uk/sites/default/files/publications/justice/2021-22%20ni%20safe%20community%20telephone%20survey.pdf
Belfast City Council	NIMDM.	FSME is one of 5 outcomes used to monitor progress in action plans.	Belfast Agenda - FSME data drives how they measure delivery and report on outcomes	N/A.	Family Resources Survey (DfC) is shared at a District Council level, as 3 years of combined information.	The Belfast Agenda https://www.belfastcity.gov.uk/Documents/The-Belfast-Agenda Peace Monitoring Report by Peter Nolan of

			Community Plan - BCC used NIMDM to help distribute funds provided by Department for Communities during Covid-19 lockdown.		NIMDM and FSME data used for monitoring Belfast Agenda.	Community Relations Council. https://www.community-relations.org.uk/sites/crc/files/media-files/NIPMR-5.pdf
The Executive Office	NIMDM.	None.	The Urban Village initiative identified 5 key areas where there has been a history of deprivation and community tension.	NA.	NA.	Urban Villages – Executive Summary https://www.executiveoffice-ni.gov.uk/sites/default/files/publications/execoffice/uv-initiative-strategic-frameworks-executive-summary-2018.pdf
Department for the Economy	NIMDM. Traditionally relied on the Labour Force Survey to profile the	Personal characteristics such as children having been in care, or are, or have been a carer, disabled or registered as	Widening Participation and Access to Higher Education – HE providers given additional funds each year to increase numbers in	Expressed interest in accessing FSME.	Work is taking place to create a research database called Longitudinal Educational Outcomes (LEO) in DfE. However, to also have an operational dataset requires new	Widening participation in Higher Education Higher Education Statistics Authority https://www.hesa.ac.uk/insight/05-10-2021/new-measure-disadvantage-06-next-steps

	working population.	disabled student.	underrepresented groups.		legislation applied to NI. Further Education (FE) Colleges already obtain FSME data from Education authority and DfE hope to also collect FSME data through the Consolidated Data Returns (CDR) from the Colleges.	The 2019 Income Deprivation Affecting Children Index - FFT Education Datalab. https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019 Office for Students Key performance Measures. https://www.officeforstudents.org.uk/about/key-performance-measures/kpm-5-access-to-higher-education/

Section 4 - General Discussion

FSME pupils routinely have poorer educational attainment than their non-FSME peers. FSME status is used as a proxy for overall socioeconomic deprivation by the DE, for both research and operational purposes. The overall objective of this project was to determine if the DE could and should replace FSME with an alternative reliable and valid proxy indicator of SES. A summary of the strengths and weaknesses of the main proxies for SES discussed in this report are presented in Table 1.

As we have demonstrated, FSME is linked to one of the core indicators of SES - family income. There are hundreds of published academic articles that use FSME as a proxy measure of socioeconomic disadvantage, suggesting high reliance and confidence among the research community that FSME is a reliable and valid indicator of low SES. It is routinely collected, updated regularly, and has full coverage of all pupils in Northern Ireland. FSME has become a valuable proxy indicator for poverty or low SES for researchers interested in factors that may impact upon educational outcomes. FSME is means tested and a household's receipt of social security benefits is verified, making it a reliable measure. However, it has also emerged that in some instances working poor families are missing out as they are simply not *poor enough* to qualify for Universal Credit or other benefits that are available. However, at the time of writing a review of FSME eligibility criteria is currently underway by the DE – which presents an opportunity to ensure that FSME criteria are appropriate for those who are most in need.

If deprivation is evaluated solely through current/past-year FSME, there's a risk of overlooking longer-term disadvantage. To address this, researchers suggest considering whether a child has been identified as FSME at any point over a longer period of time (typically over the past 3 or 6 years).

Other proxies of SES

This review explored other measures that could be used to supplement/replace FSME. We found that education, occupation and income

are often considered the ‘Big Three’ when it comes to the measurement of social disadvantage in education research. However, it was concluded that parental education and occupation are not definitively superior to FSME and could only replace FSME if the data comes from an official source that is verifiable (e.g. HMRC records, higher and further education records). Such data would be very difficult to link to school-level data, and it was therefore concluded that these alternatives would not be appropriate for operational purposes for the DE.

Household income was shown to be a superior predictor of educational outcomes than FSME (when official data are used). Household income would be a more reliable and valid indicator of household/school-level deprivation as it would offer a more fine-grained analysis of the level of need of pupils/schools, capturing the entire continuum of socio-economic deprivation-privilege, and would be a more effective means of identifying the ‘working poor’. Furthermore, unlike FSME it would not have the problem of shortfalls between eligibility and claims made for FSM. However, while The Digital Economy Act 2017 allows sharing of data for research purposes, and the Data Protection Act 2018 may allow sharing for processing that meets the criteria of being a public task, further legislation would be required to facilitate more routine sharing of personal data across departments for operational purposes.

Area-based measures are widely used across NI governmental departments, and are strong in that they allow for the many dimensions of socio- economic disadvantage. However, they cannot provide information about an individual household’s SES, nor the length of time any single household has been living in poverty. Furthermore there is the potential for misclassifying students as dis/advantaged if they live in a deprived area but go to school in a non-deprived area, and vice versa. Nevertheless, area-level indicators such as the NIMDM add useful additional information when used in conjunction with household/school-level measures of SES.

Data Sharing Advances

The Digital Economy Act 2017 creates opportunities for more cross-government data sharing in NI. NISRA colleagues within Administrative Data Research (ADR) NI have created the Longitudinal Educational Outcomes (LEO) dataset for research purposes, linking data on pupil characteristics, attainment and attendance and it was launched in March 2023. The next phase of this project is to link data from DfE on higher and further education, apprenticeships and training. Similarly, the DfC maintain a Cross Government Administrative Database created through linking administrative data from HM revenue and Customs as well as the Social Security Benefits System and Department for Work and Pensions to create a picture of household income. It has been used in the Income domain of the NIMDM (2017). There are some discussions happening with colleagues across NISRA, around how more use could be made of the data. The DfC are not the owners of all of the data (e.g., HMRC data) and access to the database would be subject to gaining consent of all data providers and identifying and mitigating any data protection and data security issues. In the meantime a de-identified, standalone household-level dataset is being developed within NISRA's secure Trusted Research Environment (TRE) which will allow accredited researchers under the Digital Economy Act to submit project applications for consideration to use the dataset for research purposes.

Conclusion

In summary, FSME can be considered a reliable, valid, efficient, and widely-used proxy for socio-economic deprivation. However, like all proxies, it is not a perfect indicator of disadvantage. Although other proxies for disadvantage are used in other jurisdictions and contexts, we did not identify a clearly superior indicator that could easily be adapted for the day-to-day operational needs of the DE. Therefore it is not currently recommended that the DE replace FSME as their primary indicator of socioeconomic disadvantage. Expanding the scope of FSME to cover a longer period of time (e.g. any instance of FSME over past 3/6 years) should be further explored, as this would more reliably capture persistent deprivation. Furthermore, the ongoing review of by the DE offers the opportunity to revise the eligibility criteria to ensure that these

criteria are appropriate in capturing families who are truly disadvantaged, such as the ‘working poor’).

Ensuring a more precise identification of disadvantaged pupils within schools necessitates the incorporation of supplementary indicators of socioeconomic disadvantage alongside Free School Meal Eligibility (FSME) whenever possible. The literature widely advocates the utilization of a blend of school-level and area-level information for this purpose. Consequently, the strategy employed by the Department of Education (DE), which involves considering both school-level FSME and the Northern Ireland Multiple Deprivation Measure (NIMDM) to determine eligibility for Extended Schools program funding, can be deemed a sound approach. This comprehensive method enhances the accuracy of identifying and supporting students facing socioeconomic challenges within the educational system.

Access to official records of household benefits and/or income would offer small-to-modest-gains in identifying the most deprived children, however, new legislation may be required for more efficient and routine cross-departmental sharing of data for operational purposes. Although legislative changes would not be possible without a working assembly, discussions with members of the NI government departments indicated that there generally there was an appetite for further and more routine sharing of data across departments.

Appendix I

NARRATIVE REVIEW DETAILS OF LITERATURE REVIEW

SCOPUS search terms and history

Searched Abstract and Summary text of papers/articles using the search terms.

From 2012 to present including English, and references to FSME as measure of lower SES.

Date	Search terms	Inclusion and Exclusion	Records returned	After limiting to papers that consider FSM as a proxy for low SES, x retained
21.12.2022	(TITLE-ABS-KEY ("Free school meal*" AND "socioeconomic status") OR TITLE-ABS-KEY ("Free school meal*" AND "poverty") OR TITLE-ABS-KEY ("Free school meal*" AND "low income") OR TITLE-ABS-KEY ("Free school lunch*" AND "socioeconomic status") OR TITLE-ABS-KEY ("Free school lunch" AND "poverty") OR TITLE-ABS-KEY ("Free school lunch" AND "low income")) AND PUBYEAR > 2011 AND PUBYEAR >	In English. From 2012 to present. Exclude studies with focus on nutritional content of school meals.	77	6

ERIC EBSCO Search Terms and History

The ERIC (Educational Resources Information Center) database is sponsored by the U.S. Department of Education

Searched in Abstract and Summary text of papers/articles using the search terms.

From 1.1.2012 to present (Jan 2023) including English, and references to FSME as measure of lower SES.

Date	Search terms	Inclusion	Records returned	After limiting to papers that consider FSM as a proxy for low SES, x retained
16.12.2022	AB "free school lunch" OR AB "free school meals" OR AB "subsidised lunch" AND AB (socioeconomic status or poverty or low income)	Include English Include 1.1.2012 – 1.1.2023	117	8

Web of Science Search Terms and History

Searched the Abstract of papers/articles using the search terms

From 1.1.2012 to present (Jan 2023) including English, and references to FSME AND Socioeconomic Status

Date	Search terms	Inclusion	Records returned	After limiting to papers that consider FSM as a proxy for low SES, x retained
05.01.23	(((AB=(free school meal* OR free school lunch OR subsidis*)))AND	Include English	32	2

	AB=(socio* status OR low income OR poverty))	Include 1.1.2012 – 1.1.2023		

Appendix II

SCOPING REVIEW LITERATURE SEARCHES

Academic Database Search Results

The following electronic data bases were searched: PROQUEST (Complete database search which includes the Education Collection and ERIC), Psych INFO and grey literature. For PROQUEST the key descriptors identified 2663 + 1890 (4553)articles, (full details of search can be found in Supplement x). To narrow the search further, articles that primarily used FSME as a proxy indicator were excluded, using NOT and only articles that included the terms Census or Registers were retained. This resulted in 309 + 212 (521) papers.

Full text versions were then obtained, and 33 PROQUEST articles remained after screening of the abstracts, excluding records that did not meet the inclusion criteria. Finally a full text review took place of the PROQUEST records, independently by the lead researcher and the consultant, to refine the search further. A inter-rater-reliability test revealed 86% agreement on records retained. After discussion it was agreed to remove six further PROQUEST records, leaving 24 records which are included. The search in Psych INFO (via OVID) involved key word searches, combined with subject heading search, using ‘or’ and then ‘and’ bringing the three concepts together and 28 records were retained. A further 2 articles were removed for not meeting the criteria. This left 50 published academic articles.

A search of grey literature included a search of websites in UK going back to 2014 using search terms socioeconomic deprivation AND Education, in the website of Department for Education (UK), and National Foundation for Education Research, and Education Authority for Northern Ireland. In CORE search term used were socioeconomic disadvantage or socioeconomic deprivation. 75 papers were initially selected. After scanning of full text articles, 19 papers/reports were retained for the review. Overall the number of records that form this Scoping review is 69.

PROQUEST Search Terms	**Inclusion/Exclusion**	**Results**
noft(socioeconomic status OR poverty OR low income) AND noft(education attain*) NOT noft(free school meals)	In English From 2013 to 2023 Full text Peer Reviewed	2663

noft(socioeconomic status OR poverty OR low income) AND noft(education attain*) AND noft(census OR regist*) NOT noft(free school meals)	In English From 2013 to 2023 Full text Peer Reviewed	309

Full text versions were obtained, and 33 PROQUEST articles remained after screening of the abstracts to exclude records that did not meet the inclusion criteria. Finally, a full text review took place of the PROQUEST records, independently by the lead researcher and the consultant, to refine the search further. An inter-rater reliability test revealed 86% agreement on records retained. After discussion it was agreed to remove six further PROQUEST records, leaving 24 PROQUEST records. The search in Psych Info (via OVID) involved key word searches, which were then combined with subject heading searches, using ‘or’ and then ‘and’ bringing the three concepts together. The search was restricted to studies that took place between 2013-2023 which were in English, but not limited full text. Subject headings searches were mapped over the terms, to check a subject heading existed that covered the term (s).

Psych info Database via OVID

The database search involved key word searches, which were then combined with subject heading search, using ‘or’ and then ‘and’ the 3 concepts together and applied limits of 2013-2023 in English, but not limited full text. Subject headings searches mapped over the terms and checked a subject heading existed, that covers the term (s).

Search Terms	**Inclusion/Exclusion**		**Results**
1.Key word search: (socioeconomic or poverty or low income) AND (education* achiev* or education* attain*)	In English From 2013 to 2023 Not limited to full text Peer Reviewed		1890
1a)Key Word Search (socioeconomic or poverty or low income) AND (education* achiev* or education* attain*) AND (census or regist*)	In English From 2013 to 2023 Not limited to full text Peer Reviewed		133
2.Key word searches combined with subject heading searches	In English From 2013 to 2023 Not limited to full text		212

(socioeconomic or poverty or low income) combined with [socioeconomic status/ or socioeconomic factors/ or status/ or family socioeconomic level/ or income level/ or lower class/ or social class/ or economic inequality/ or poverty/] AND (education* achiev* or education* attain*) combined with [educational attainment level/ or academic achievement/] AND (census or regist*) combined with [data collection/ or data sets/ or quantitative methods/ or statistical data/ or surveys/]	Peer Reviewed		
Content analysis of abstracts	To ensure records had a significant educational context component and large, representative samples.		30

After excluding unsuitable records, 29 records remained

Articles excluded following content analysis of Abstracts (n=209)

Rationale – Papers are only to be retained that have SES in education as main focus.

Reason for exclusion (not focused on Education)	
Characteristics of LGBT	1
Epilepsy and adults	1
Depression, life expectancy, care planning etc over 65s older age group	9
Mortality	12
Small samples e.g < n=200	11
Hypoglycaemia in diabetes	1
Cardiovascular health and low SES, and ethnicity	3
Contact Family Program (CFP) evaluation	1
Neighbourhood factors and HIV	1
Obesity	2
Schizophrenia and educational attainment	2
Tobacco and social class	1
Opioid use	1

Reason for exclusion (not focused on Education)	
Overdose and cardiac arrest	1
Marriage	2
Homogamy	1
Immigrant poverty book chapter	1
Book review	1
Algebra exposure – one school	1
Standards-based grading. Test scores from one US a rural school district	1
Work disability and SES	1
Suicide and machine learning	1
Demographics and sexual orientation	1
Adverse childhood experiences	1
Housing assistance and educational attainment	1
Road safety survey	1
Impact of concussion	1
Cortisol and CHD and SES	1
Bi-polar disorder and SES	1
Methods – doing research with low income communities – book chapter	1
Ongoing Twin Study ion Texas	1
Obstetrics	1
Pregnancy related health behaviours	1
Time preference	1
The Advancement Via Individual Determination (AVID) Program	1
Cerebral and hippocampal volume and SES	2
Pregnancy and obesity	1
Self harm	1
Cancer and SES	1
Epilepsy and educational attainment	2
Marriage in China	1
Immigration assimilation	1
COVID-19 impair sustained attention	1
Sickness absence and SES in adults	1
Commentary on another paper	1
Student thesis teaching maths at an earlier age	1
Verbal test scores and poverty (used FSMe as proxy)	1
Intergenerational mobility - book chapter	1
Book review	1
Bipolar disorder and education level	1
Health status Indian Residential school (IRS) attendance	1
Early onset mental disorders and income	1

Reason for exclusion (not focused on Education)	
Eating disorders and SES	1
Spinal cord injury and MS and employment	1
Social isolation and inflammation	1
socioeconomic variables and syphilis rates	1
parental resources and disability pension	1
Substance misuse and SES	1
Mothers incomes and fast food intake in children	1
Care giving and poor health	1
educational level, marital status, obesity:	1
BMI and military conscripts	1
Household investment in Mozambique	1
Methods – measuring educational attain/neighbourhood poverty	2
alcohol use and cigarette smoking in sickness absence	1
Nutrition and poverty	1
Cultural focus and inequalities	1
Lead exposure in childhood and education	1
Socioeconomic inequality in birth weight	1
HIV	1
University students and menstrual experiences	1
Use of Behavioural health services	1
Joint custody and education	1
Community violence and academic achievement	2
Involuntary childlessness	1
Childhood adversity	1
Neighbourhood disadvantage and health	1
Mental health in childhood	1
Chemistry school teachers was sample	1
Health information availability	1
Health surveys	1
eHealth literacy	1
Health literacy	1
Access to primary care	1
Waiting times in health care	1
Tolerance of immigrants	1
Smoking	1
Homelessness and academic achievement	1
Suicide and education levels	1
Autism and CBT	1
Self-harm	1
Field of study, gender and educational attainment as outcome	2

Reason for exclusion (not focused on Education)	
Diabetes	1
CVD risk and methods – SES	1
Psychosis	1
HIV stigma	1
Suicide	1
personal life experiences on the expectations	1
Expenditure on fruit and veg	1
Mental health and covid	1
Civil engagement	1
Self-affirmation	1
Urban insecurity	1
neurocysticercosis and epilepsy	1
Adolescent childbearing	1
Externalizing disorders and depression	1
Schizophrenia	1
Association of Boarding Schools member school graduates and life outcomes	1
Stroke	1
Effect of hukou on health	1
Breast cancer	1
Correction notices	4
Married couples and gaps in education	1
social anxiety disorder	1
Teacher perceptions 3 schools	1
Over enrolment in Uganda schools	1
Oral clefts and academic performance	1
No SES indicator used	1
Gender preference and child labour	1
Twin study - genetics	1
Birth order and educational attainment	1
Used free school meals as measure or disadvantage	2
Social support	1
Educational opportunities of ethnic groups in China	1
Sex differences in education attainment and income	1
Parental alcohol-related disorders and school performance i	1
Gestational age, parent education, and education in adulthood	1
Psychotropic medication use and academic performance in adolescence	1
The impact of birthweight and adolescent health on educational attainment	1
Lone motherhood and educational outcomes	1

Reason for exclusion (not focused on Education)	
ADHD	1
Adolescent marijuana	1
One US state enrolment policies	1
One state dissertation	1
In equalities, birth weight and educational attainment	1
Health care inequality and diabetes	1

Further Content Analysis to Exclude unsuitable records

Paper	Reason not retained in search
Ahomaki	SES is not explicitly mentioned, and focus was disease and predicting employment status.
Capuno	One school in Philippines.
Claster	Adults (20+) educational attainment and being Hispanic(in Los Angeles) culture specific
Christiansen	Systematic review – SES not primary focus
Dietrichson	Systematic review
Hamad	Education and CVD – big population study but age was over 50's SES was educational attainment
Fewins-Bliss	This is a response to comment on a paper
Green	Older adults is population and education attainment used as SES
Hamad	
Johnstone	Active play intervention evaluation Education
Jain	Only one school and language used is politically inappropriate culture specific
McDevitt	Not relevant, no defining of what is meant by SES and also this is an evaluation of a education program.
Naznene	Focus is female literacy only
Psaki et al.	Focus is meta-analysis of interventions to reduce gender inequalities access to education
Radu	Discussion paper about policy, education and politics
Rislana	About ICT education as an intervention to tackle poverty – report on level of poverty in Nigeria, not an empirical study using SES as a measure

Suran Rupham	Qual study about culture and the meaning of higher education
Alpa Vilaplana-Perez	Main focus was PTSD and education, little mention of SES apart from including it as a control variable.
Von Kobyletski	An advance publication of a review protocol
Wassenaar	Potentially but need to see the supplementary data from author, to see how SES was measured

Appendix III

Academic Studies Included for Synthesis

Author(s)	Title of publication	Geo-coverage	Measure/indicators H00I8A0023202683	Data source
Sturgis P, Buscha F. **2015 [74]**	Increasing inter-generational social mobility. The British Journal of Sociology 2015;66(3):512-533.	England and Wales	Occupation of co-resident parents recorded when Longitudinal Study members were children. (96% of parent occupational data available). Categorical measure of social class - RGSC classification. Continuous measure of social class – CAMSIS Cambridge Social Interaction and Stratification scale (Prandy & Lambert, 2003) Derived from each Census year. N.B. CAMSIS is strongly correlated with earnings, education, health job satisfaction and political engagement.	ONS Longitudinal Study (1% population of England and Wales – n=289,335) linked with individual records from successive decennial censuses between 1971 and 2001.

Sheppard P, Monden C**.** **2020 [80]**	When does family size matter? Sibship size, socioeconomic status and education in England. Evolutionary Human Sciences 2020;2.	England	Principle Component Analysis to derive a measure based on: Highest educational qualification of main parent; the household income band, and occupational class of main parent. The SES component was then divided into deciles. No further details available	Wave 1 of Next Steps Cohort (Formerly Longitudinal Study of Young People in England) Linked to National Pupils Database. N=15,770 14 year olds. Enrolled in State and Independent schools. Face to face surveys with primary parent.
Basten et al. **2015 [81]**	Pre-term birth and adult wealth: Mathematics counts. Psychological Science, 26, (10) 1608-1619. 2015	England, Scotland and Wales Ditto to above	Latent wealth variable based on 5 indicators: Family income; Family class (highest occupational social class on 6-point scale using Registrar's General Social Classes (RGSC) 1= unskilled/manual 2= Semi-skilled manual or non-manual 3= skilled manual 4= skilled non-manual, 5= managerial and technical,6= Professional. Housing tenure (rented, owned with mortgage, owned outright). Employment status: (unemployed, looking for a job or employed or self-employed). Self-perceived financial situation	Two British population-based birth cohorts born 1958 and 1970 National Child Development Study (17,415) and British Cohort Study (11,535) Datafiles available at University of London.

			measured using (finding it very difficult(1) to living very comfortably(5)	

Author(s)	Title of publication	Geo-coverage	Measure/indicators	Data source
McCartney G, Popham F, Katikireddi SV, Walsh D, Schofield L. 2017 [82]	How do trends in mortality inequalities by deprivation and education in Scotland and England & Wales compare? A repeat cross-sectional study. BMJ Open 2017 Jul;7(7):e017590. Retained as UK.	Scotland England Wales	Measures of Area Deprivation – mean deprivation score is given to all individuals within a postcode area. Carstairs Deprivation Index – a range of indicators drawn from the Census. Proportion of economically active males seeking work; the proportion of people living in private households, at a density of more than one person per room; the proportion of economically active males in occupational social class four or five in the Registrar Generals categorisation; and the proportion of all persons in private households without access to a car or a van. Means score and SDs of deprivation variable, for Postcode sectors and Census wards, were ranked and divided into 10ths and population weighted. (Census wards for England and postcode scores for Scotland).	Mortality Records obtained from National Records for Scotland and ONS. Linked to Census wards and Postcode Sectors to allow allocation of Area deprivation. All people resident in Scotland England and Wales, between 1981 and 2011, aged between 35-79 years.

			For mortality inequalities - Absolute Inequalities measured by Slope Index of Inequality (SII) and relative inequalities measured using Relative Index of Inequality (RII).	

Author(s)	Title of publication	Geographical coverage	Measure/indicators	Data source
Livingstone A, Weinfeld M.2017 [52]	Black Students and High School Completion in Quebec and Ontario: A Multivariate Analysis. The Canadian review of sociology 2017 May;54(2):174-197.	Canada	**Parental Education** (No high school, high school, college, Bachelor's or higher) **Parental Incomes** (Low incomes cut-off) Family structure (2 parents, single parent, extended family status)	**2006 Canadian Census** "Public Use Micro-data file". 18-19 year olds living at home in 2006.
Baier T, Van Winkle Z. **2021 [59]**	Does Parental Separation Lower Genetic Influences on Children's School Performance? Journal of marriage and family 2021 June;83(3):898-917.	Germany	**Mothers' education** was measured as number of years in education. They used information on school and vocational degrees certificates and transformed this using the established coding scheme for Germany	TwinLife study – a population register of monozygotic and dizygotic twins and their families. Diewald et al., 2017.

			(Socio-economic panel group, DIW, Berlin, 2017). Household income was quantified as log monthly net household incomes equivalised using the **OECD scale** (13% missing data)	
Bar-Haim E, Blank C, Rotman A. 2019 [54]	Taking Their Place: Educational Expansion and Inequality of Educational Opportunities—A Gendered Perspective. High Educ Policy 2019;32(4):639-661.	Israel	**Fathers' occupational status** ranking measured by the International Socio-Economic Index ISEI (ISEI scores assigned by Central Bureau of Statistics to 3-digit occupational codes), which correlated very highly with occupational prestige.	Census Data – 2 birth cohorts, from 1995 (n=5834) and 2008 (n=14,361) censuses.

Author(s)	Title of publication	Geographical coverage	Measure/indicators	Data source
Khor N, Pang L, Liu C, Chang F, Mo D, Loyalka P, et al. 2016 [53]	China's Looming Human Capital Crisis: Upper Secondary Educational Attainment Rates and the Middle-income Trap. The China quarterly (London) 2016 Dec;228(228):905-926.	China	Human capital average level of educational attainment for entire workforce. All persons 6 years old and above asked about highest level of education. Comparison made with OECD methods (no education, some primary school, some lower secondary school, some higher secondary school,	China's 6th National Population Census (1.34billion) used to classify urban or rural.

			some tertiary school, 3-years college, 4 year college and postgraduate education). **Urban or rural** – geographical (associated with educational equality).	

Author(s)	Title of Publication	Geo-coverage	Measure/indicators	Data source
Koricich A, Chen X, Hughes RP. 2018 [78]	Understanding the Effects of Rurality and Socioeconomic Status on College Attendance and Institutional Choice in the United States. Review of Higher Education 2018;41(2):281-305.	USA	**A composite indicator made up from:** Paternal education level. Maternal education level. Maternal occupational status. Paternal occupational status. Family income. Each item was standardised and weighted equally. No details given of how variables were derived.	Educational Longitudinal Study (ELS) of 2002 which concluded in 2012, by National Centre for Education Statistics. Students who were high school sophomores in 2002 with follow up surveys in 2004, 2006,2012. Also IPEDS. A common institutional code merged ELS data with Integrated Postsecondary Education data system (IPEDS) data. (n=12,020).

Bratter J, Kimbro RT**.** 2013 [69]	Multiracial Children and Poverty: Evidence From the Early Childhood Longitudinal Study of Kindergartners. Family relations 2013 Feb;62(1):175-189.	USA	Poverty measured by <100% of federal poverty level (FPL)* and near poor (<200% of the FPL). Household size and income calculation of proportion of families under 100% FPL (poor)and under 200% FPL (near poor). *(In 2013, $23,550 for 4 person household and $11,490 for 1 person household).	Early childhood Longitudinal Study - Kindergartners (n=17,706). From Nationally representative sample of 21,409 kindergarten children in 1998-1999 across USA. Data collected by US DE.
Durkin MS, Maenner MJ, Baio J, Christensen D, Daniels J, Fitzgerald R, et al. 2017 [48]	Autism Spectrum Disorder Among US Children (2002–2010): Socioeconomic, Racial, and Ethnic Disparities. American journal of public health (1971) 2017 Nov;107(11):1818-1826.	USA – 11 states	Parent Educational attainment – area level based on % of adults aged 25 years and older who obtained a BA or higher, cut into tertiles. Dichotomous poverty indicators created using US census definition of 'poverty area'. Those in which at least 20% of children lived in households with incomes below federal poverty line SES was low, middle, or high.	Population based cross sectional surveillance data for 8 year old children by SES strata (tertiles), from Autism and Developmental Disabilities Monitoring Network (ADDM), and US Census and American Community

				Survey (ACS) for 11states.
Author(s)	**Title of publication**	**Geographical coverage**	**Measure/indicators**	**Data source**
Richards JL, Chapple-McGruder T, Williams BL, Kramer MR. [77] 2015	Does neighborhood deprivation modify the effect of preterm birth on children's first grade academic performance? Social science & medicine (1982) 2015 May;132:122-131.	Georgia, USA	Neighbourhood deprivation measured by a neighbourhood deprivation index (NDI) for the Census tracts in which mothers resided at birth, computed using Census data 2000. Function of poverty rates, household incomes, public assistance receipt, occupation, overcrowded housing, education and unemployment. NDI was standardised. Individual level indicators of poverty included maternal education (less than high school, completed high	Georgia Birth to School cohort (N=327,698).

			school, up to 3 years post-secondary, 4+ years post-secondary). If Medicaid was payor for delivery (proxy for maternal income).	
Lopoo LM, London AS. 2016 [75]	Household Crowding During Childhood and Long-Term Education Outcomes. Demography 2016 Jun 01,;53(3):699-721.	USA	**House crowding ratio** – number of people in household by number of rooms.	US longitudinal data from the Panel Study of Income Dynamics (PSID). N=4800 families. From 1968 to 1997 head of family is surveyed annually, and then bi-annually until 2011. Children that grew up and left to start their own families remained in PSID.

Author(s)	Title of publication	Geographical coverage	Measure/indicators	Data source
Morrissey TW, Vinopal KM**.** 2018 [49,70]	Neighborhood Poverty and Children's Academic Skills and Behavior in Early Elementary School. Journal of marriage and family 2018 Feb;80(1):182-197.	USA	Neighbourhood poverty rates collected from US Census Bureau's 2008-2012 ACS 5 year estimates. Percentage of residents living below Federal Poverty Threshold (FPL) - 40% is high poverty area. Household size and household incomes used to make calculation.	Census data from American Community Survey merged with 2010-2011 Early Childhood Longitudinal Study-(ECLS 2011) Kindergarten Cohort (n=15,100).
Bousselot TE. 2018 [79]	Shifting the focus to science in the early elementary years: An examination of science achievement growth in grades K-2 using a nationally representative dataset. Dissertation Abstracts International Section A: Humanities and Social Sciences 2018;79(12-A(E):Sefe.	USA	A composite variable: Male guardians level of education. Female guardians level of education. Male guardians occupation. Female guardians' occupation, converted to prestige scores using General Social survey 1989. Household income.	Early childhood longitudinal study Kindergarden class of 2010-2011 (ECLS-L:2011) national Center for Education Statistics (NCES). (N=18,174)

			A continuous variable on scale of -3.00 to 3.00.	
Caldwell DG. 2017 [47]	The Influence of Socioeconomic Factors on the Development of Early Number Concepts. 2017 -06-03.	USA Massachusetts	Living wage Index (LWI) calculate based on MIT living wage calculator website and ASC section of US Census bureau website. Percentage of lone parents. Percentage of families making under $35,000 and over $200,000. Percentage of students qualifying for free or reduced price lunch.	All Massachusetts public school districts (Public school students =954,773) MIT living Wage Website. Massachusetts Department of Elementary and Secondary Education (MDESE) American Survey Section of the US Census Bureau.

Author(s)	Title of publication	Geographical coverage	Measure/indicators	Data source
Covarrubias A, Liou DD. 2014 [50]	Asian American Education and Income Attainment in the Era of Post-Racial America.Teachers College Record (1970) 2014 Jun;116(6):1-38.	USA	Family income levels used as a proxy for class. 4 groups 1 = $0 to $49,000 2 =$50,000 to $99,000 3= $100,000 - $149,000 4= $150,000 and over	Census' 2010 Current Population Survey (CPS)- Representative sample for US population. March Supplement is Annual Social and Economic Supplement (ASEC). 77,000 households. Asian American Families.
Gustafsson J, Yang Hansen K. 2018 [35]	Changes in the Impact of Family Education on Student Educational Achievement in Sweden 1988-2014. Scandinavian journal of educational research 2018 Sep 03,;62(5):719-736.	Sweden	**Parental Education** Classified using SUN-2000. Educ 2(With or without Tertiary education)	Statistics Sweden register Data Grade 9 register – students who graduated from compulsory school from 1988-2014.

			Educ 6 (compulsory education, upper secondary education, and categories of tertiary education with different lengths) Educ 12(Finer distinctions between upper secondary and tertiary levels of education) Coding for individual students done with family as the unit according to parent education (parent with highest attainment)	

Author(s)	Title of publication	Geographical coverage	Measure/indicators	Data source
Barclay K, Hällsten M. 2021 [34]	Does the impact of parental death vary by parental socioeconomic status? A study of children's educational and occupational attainment. J of Marriage and Family 2021 -07-05;84(1):141.	Sweden	Educational attainment and occupational status by 30. Parents occupation coded to the International Socioeconomic Index of Occupational Status (ISEI). Education: Elementary, Upper secondary, Post-secondary Tertiary).	Swedish population register data on cohorts born 1973-1982 grade point average at 16.
Lindberg L, Persson M, Danielsson P, Hagman E, Marcus C. 2021 [36]	Obesity in childhood, socioeconomic status, and completion of 12 or more school years: a prospective cohort study. BMJ Open 2021;11(3).	Sweden	**Parent SES** (4 levels low, medium-low, medium high, and high) measured by composite variable using: **Maternal and paternal level of education** (compulsory school upper secondary school or university degree). I**ncome** (Annual disposable income all taxable and non taxable income	Cohort study. Using the Swedish identity number, which is unique to each resident in Sweden, data from several national registers were linked. Data on education, income and occupational status were obtained from the Longitudinal Integration Database for Health Insurance and Labour Market Studies. Information on migration

			conversion using Consumer Price Index for Sweden provided by Statistics Sweden, categorised into quartiles). **Occupation:** No occupation: (unemployed for 6 months or more, income from long term sick leave). Registered employed: (employed or an income from students grants/loan equivalent to full time study).	background for children and their parents was obtained from the Swedish Total Population Register. Both these registers are held by Statistics Sweden, a governmental agency that collects and provides official statistics (www.scb.se/en).
Hedefalk F, Dribe 2020 [72]	The social context of nearest neighbors shapes educational attainment regardless of class origin. Proceedings of the National Academy of M. Sciences PNAS 2020 Jun 30;117(26):14918-14925.	Swedish city of Landskrona	Socioeconomic status – father's occupation from demographic events, population registers and annual data from income registers. HISCLASS is a 12 category social class scheme (high, medium and low). Geographically weighted social class of closest 6-100 neighbours. Geocoding 98% of person time for 77,000 individuals.	Scanian Economic and Demographic Database (SEDD) Longitudinal and individual level data. Source of data, population registers, income and tax registers, and info on birth marriages and deaths linked to data. Analysis are performed on statistics Sweden restricted

				platform (Microdata Online Access (MONA).

Author(s)	Title of publication	Geographical coverage	Measure/indicators	Data source
Klapp A. 2018 [64]	Does academic and social self-concept and motivation explain the effect of grading on students' achievement? Eur J Psychol Educ 2018 Apr01,;33(2):355-376.	Sweden	Parent's educational level income and occupation formed a continuous index with 3 categories 0 = low economic status, 1 = medium economic statis, and 2 = high SES.	ETF Evaluation Through Follow-up Longitudinal project containing register and questionnaire data (n=8,558) for individuals born between 1946 and 2004.
Lundborg, P P, Nilsson A, Rooth D. 2014. [37]	Parental education and offspring outcomes. American Economic Journal: Applied Economics 2014;6(1):253-278.	Sweden	Parental Education - number of years of schooling of parents, based on highest education degree obtained.	Swedish Military Enlistment Register of 18 years olds. Linkages made via unique ID between parent and child - between Statistics Sweden (entire population of Sweden at 1960) and

				Swedish National Service Administration (NSA).
Lundborg P, Nilsson A, Rooth D. 2016 [94]	The health-schooling relationship: evidence from Swedish twins. J Popul Econ 2016 Oct 01,;29(4):1191-1215.	Sweden	Low SES is measured in 3 ways: Mother having primary schooling only. Father having primary schooling only. Family income is below average.	Swedish males twins born between 1950 -1979 from surveys by Swedish Twin Registry is linked to data on educational attainment Statistics Sweden from 2007 and to tests and medical exams performed at military enlistment 1969-1997, provided by NSA.

Author(s)	Title of Publication	Geographical coverage	Measure/indicators	Data source
Acacio-Claro PJ, Doku DT, Koivusilta LK, Rimpelä AH. **[38]**	How socioeconomic circumstances, school achievement and reserve capacity in adolescence predict adult education level: a three-generation study in Finland. International Journal of Adolescence and Youth 2017 -10-15;23(3):382.	Finland	Parent and Grandparents Educations levels (Low, medium and high). Housing Tenure (rented or owner-occupied or missing). Employment status (unemployed, employed, missing).	1985-1995 survey date of 12-18 year old Finns (N=41,822) linked with three generations of data from Statistics Finland (nationally representative samples of 12, 14, 16 and 18 year olds drawn from Population Register Centre). Adolescent health and Lifestyle survey collected biennially from 1985-95 Follow up date from registries for Statistics Finland contained Socioeconomic information for AHLS children, their parents and grandparents.

Jalovaara M, Andersson G.. 2018 [55]	Disparities in Children's Family Experiences by Mother's Socioeconomic Status: The Case of Finland. Population Research and Policy Review. 2018;37(5):751-768.	Finland	Maternal socioeconomic status – Mothers' levels of educational attainment. Statistics Finland Register of Degrees providing highest level of education obtained by mother at time of child's birth. ISCED97 1-2. Basic–(Low) ISCED97 3-4 – Secondary (Medium) ISCED97 5-6 – Tertiary (High)	Statistics Finland – a random 11% sample of persona born between 1940 and 1995 recorded as Finish residents between 1970 and 2010. Focus on children to women born between 1969 and 1993.N=64,162.

Author(s)	Title of Publication	Geographical coverage	Measure/indicators	Data source
Mikkonen HM, Salonen MK, Häkkinen A, Olkkola M, Pesonen A, Räikkönen K, et al. 2016 [66]	The lifelong socioeconomic disadvantage of single-mother background - the Helsinki Birth Cohort study 1934–1944. BMC Public Health 2016 -08-18;16(1).	Finland	Adult educational achievement (4 categories: basic or less, or unknown, Upper secondary, lower tertiary, upper tertiary). Occupational status (4 categories: Manual workers, self-employed, low official ,high official). Income: Based on state taxation log-transformed and standardised and (3 categories; lowest, intermediate and highest). Marriage status (ever married v never married).	Helsinki Birth Cohort Study People born 1934 - 1944 linked to information on adult socioeconomic position from Census data, from Statistics Finland from 1970 to 2000, using a unique personal identification number.
Rakshit I, Maharatha TM, Drall A, Mandal SK, Ravindran R. 2019 [51]	Educational Attainment And Child Labor Status Among Disabled Children In Tamil Nadu, India: An Econometric	District of Tamil Nadu in India	Married or never married. Education – attending or ever attending. Administrative area classified as Urban or Rural	Census data for 2001 and 2011. 5-14 years old disabled in Tamil Nadu (n=119,797).

	Analysis. The Journal of developing areas 2019;53(3):183-198.			

Author(s)	Title of Publication	Geographical coverage	Measure/indicators	Data source
Ataç E. 2019 [95]	Modelling Educational Inequalities: Class, Academic Achievement, and Regional Differences in Turkey. Education and urban society 2019 Jun;51(5):659-692.	Turkey	Class effect (family background, home assets (desk, study area, own room etc), urban effect (metropolis, city, town, small town)). Socioeconomic environment (Education level, fertility, migration, demographic composition Parents' Education classified into 7 levels using International Standard Classification of Education (ISCED); no education, primary education, lower secondary education, upper secondary education, postsecondary non tertiary education, bachelor's or equivalent level, and master's doctoral or equivalent level. Occupation of parents ISCO08 International Standard Classifications of Occupations: Workers, service sector employees, clerical and armed forces, associate professional , technicians, managers and professionals.	Program for International Student Assessment (PISA) In turkey parent questionnaires are not available) and dataset from National University Entrance Examination and Census data provided by Turkstat. UEE dataset is provided by Directorate of national Education.

Scherer E, Hagaman A, Chung E, Rahman A, O;Donnell K, Maselko J**.**2019 [76]	The relationship between responsive caregiving and child outcomes: evidence from direct observations of mother-child dyads in Pakistan. BMC Public Health 2019 Feb 28,;19(1):252.	Pakistan	Household assets summed to generate a composite score as measure of SES. Weights were added to 22 assets typical of Low and Middle Income countries (LMIC). Household assets index score includes ownership of land/home/animals, TVs, cars, access to water and sanitation etc.	Bachpan Study – a birth cohort 881 mother child dyads.

Author(s)	Title of publication	Geographical coverage	Measure/indicators	Data source
Balaj M, York HW, Sripada K, Besnier E, Vonen HD, Aravkin A, et al.2021 [56]	Parental education and inequalities in child mortality: a global systematic review and meta-analysis. The Lancet 2021 - 08;398(10300):608	Global systemic review and met-analysis of 300 studies from 92 countries.	**Parental Education:** Years of schooling, Highest educational attainment or literacy.	Systematic Review of 7 databases and extracted. 300 studies from 92 countries for meta-analyses.
O'Connor M, Chong S, Quach J, Goldfeld S. 2020 [45]	Learning outcomes of children with teacher-identified emerging health and developmental needs. Child Care Health Dev 2020 -01-15;46(2):223.	Australia	No family level socioeconomic data available in AEDC so parent education and occupation obtained from NAPLAN data at grade 3. **Maternal Education** Low (high school and below) Higher (post high school).	Australian Early Development Census (AEDC) is population census of children's development completed in their first year of school (N=42,619). National Assessment Program-Literacy and Numeracy.
Dean J. 2018 [46]	Segregation effects on Australian Indigenous primary school achievement. Asia	Australia- 3 States NSW,	**Area level SES** Measured by Socio-Economic Indexes for Areas (SEIFA) Index of	2011 Australian Census of Population and Housing available for SA2s.

	Pacific journal of education 2018 Jul 03,;38(3):361-377.	Queensland and South Australia.	relative disadvantage (IRSD) deciles (1-10). **School level SES** - % of students at each school in the top quartile of the Index of community and Socio-Economic Disadvantage (ICSEA) Calculated from information on parent occupation and education and geographical location and student composition of the school and size of school.	Combined with school data provided by Australian Curriculum Assessment and Reporting authority (ACARA). Who manage the National Assessment program – Literacy and Numeracy (NAPLAN). Matched sample of lowest 30% of SES rankings in 3 states NSW, Queensland and South Australia.

Author(s)	Title of Publication	Geographical coverage	Measure/indicators	Data source
Andersen IG, Andersen SC. **2015 [39]**	Student-centred instruction and academic achievement: linking mechanisms of educational inequality to schools' instructional strategy. British Journal of Sociology of Education 2015 -10-26;38(4):533.	Denmark	Parent's income – average yearly disposable income from administrative registers. Parent's average length of education in years from administrative registers.	Survey of all public and private school principals in Denmark (825). 56,000 students. Unique personal identifiers are used from Danish Administrative Registries
Joergensen AC, Kjaer Urhoj S, Nybo Andersen A. 2018. [40]	Primary school achievement and socioeconomic attainment in individuals affected by parental cancer in childhood or adolescence: a Danish nationwide register-	Denmark	**Educational attainment and DPI at age 30** taken from the Danish Population Education Register, available from Statistics Denmark Internal Standard Classification of Education (2011) 3 categories: ISCED 0-2 (low) ISCED 3-4 (medium)	Danish nationwide cohort born from 1978 to 1999 registered in Danish Medical Birth Registry. The unique individual personal identification number assigned to all persons permanently

	based study. Journal of Epidemiology and Community Health (1979) 2018 Nov;72(11):982-989.		ISCED 5-8 (high) Annual Disposable Personal Income (DPI) at age 30, categorised into quartiles. Data obtained from the Income Statistics Register, available at Statistics Denmark.	resident in Denmark allows linkages between children and parents and other national registries containing information on health and social issues. (N=360,054).
Foverskov E, Mortensen EL, Holm A, Pedersen LM, Osler M, Lund R. 2019 [73]	Socioeconomic Position Across the Life Course and Cognitive Ability Later in Life: The Importance of Considering Early Cognitive Ability. Journal of aging and health 2019 Jul;31(6):947-966.	Denmark	Childhood SES - Paternal Occupational Class. Five occupational social classes ranging from (i) = employments requiring long educations or imply management of large companies, to (v) = unskilled manual employments.	Longitudinal data from the Danish Metropolit cohort of men born in 1953 N=2479). Data from birth registers including paternal occupational class linked to all 11532 boys in 1965.

Author(s)	**Title of Publication**	**Geographical coverage**	**Measure/indicators**	**Data source**

Kääriälä A, Berlin M, Lausten M, Hiilamo H, Ristikari T. **–[60]**	Early school leaving by children in out-of-home care: A comparative study of three Nordic countries. Children and youth services review 2018 Oct;93:186-195.	Denmark, Finland and Sweden	Mother's education: 1) compulsory level 2) secondary education 3) post-secondary education If mother received social assistance for 2 consecutive years.	National registers of children born in 1987. Denmark: 3,056 are in care (5%) Finland: 1,884 are in care (3%) Sweden: 3,209 are in care (3%)
Hegelund ER, Flensborg-Madsen T, Dammeyer J, Mortensen EL**. 2020 [57]**	The Modifying Influence of Family Social Background on the Association Between IQ and Unsuccessful Educational and Occupational Achievement. Journal of individual differences 2020;41(3):133-143.	Denmark	Parent educational attainment: Highest educational attainment of either parent classified as i) Low: primary education, upper secondary education, vocation education and trained or ii) High: short cycle higher education vocational bachelor's program, Bachelor's, Masters and PhD programs.	Men who appeared in front of a draft board, born during 1981 and 1991 (N=277,938). Information of parents education available from Statistics Denmark since 1981.

Author(s)	Title of Publication	Geographical coverage	Measure/indicators	Data source
Haelermans C, Korthals R, Jacobs M, de Leeuw S, Vermeulen S, van Vugt L, et al. 2022. [41]	Sharp increase in inequality in education in times of the COVID-19-pandemic. PloS one 2022 Feb 02;17(2).	The Netherlands	Parent education in 3 categories: Pre-vocational secondary education, or university preparatory education (1); Degree in upper secondary vocational education level 2,3,4 (2); Degree at a university of applied sciences or higher (3). Parental income: One of parents is below minimum income level (low); Higher than minimum income level but below twice the minimum income level (middle); Income of one of the parents is higher than twice the minimum income level (high). Student migration background: Dutch or Western, v Non-Western Background.	Data was provided from School administrative systems from 2013/2014 school years and 2019/2020 N = 201,819). As part of Netherlands cohort Study on Education (NCO) project initiated by Dutch Research Council. Data held in Statistics Netherlands, a secure virtual environment.

de Zeeuw EL, Kan K, van Beijsterveldt CEM, Mbarek H, Hottenga J, Davies GE, et al. 2019 [65]	The moderating role of SES on genetic differences in educational achievement in the Netherlands. NPJ Science of Learning 2019 Sep 03,;4(1):1-8.	The Netherlands	Parental educational attainment. Income. Occupation. Current job status (currently employed, incapacitated, unemployed). SES level 1 was for unemployed parents regardless of occupation and education level. Paternal occupation classified according to Standard Classification of Occupations, or use of Erikson-Goldthorpe (EGP) classification scheme. Education was highest level attained. If someone was middle management, with higher vocational level qualifications or above, they were SES level 4. Lower qualifications – SES 3.	Twelve-year-old twins from The Netherlands Twin Register (NTR). Every 2-3 years parents of twins complete a survey until twins are 12 years old (Birth cohorts 1979 to 2002). Raw data on Parent SES extracted from NTR.

Author(s)	Title of Publication	Geographical coverage	Measure/indicators	Data source
Kraft M, Arts K, Traag T, Otten F, Bosma H. 2018 [61]	The contribution of intellectual abilities to young adult's educational differences in health care use-A prospective cohort study. Intelligence 2018;68:1-5.	The Netherlands	Parental income linked to VOC99 cohort – equalised household income of the pupil's mother expressed as percentile scores. Parental education ranged from 6 to 19 years assessed through questionnaires.	Secondary Education Pupil Cohort 1999 (VOC99) Statistics Netherlands (n=19391).
Ragnarsdottir LD, Kristjansson AL, Thorisdottir IE, Allegrante JP, Valdimarsdottir H, Gestsdottir S, et al. 2017 [71]	Cumulative risk over the early life course and its relation to academic achievement in childhood and early adolescence. Preventive Medicine 2017 Mar;96:36-41.	Iceland	Income (in bottom 15th percentile). Marital status (not married, or in registered domestic partnership). Disability of parent (either parent registered disabled).	LIFECOURSE study data of 1151 children from 2000 birth cohort in Iceland. From Icelandic Centre for Social Research and Analysis at Reykjavik University. Data derived from Primary Health Care Clinics, Child Protection Agency,

				Icelandic Directorate of Health, Statistics Bureau of Iceland, and educational testing Institute of Iceland.

Author(s)	Title of publication	Geographical coverage	Measure/indicators	Data source
Bania, E. V., Kvernmo, S. E 2016. [62]	Tertiary education and its association with mental health indicators and educational factors among Arctic young adults: the NAAHS cohort study. International Journal of Circumpolar Health 2016 - 09-27;75(1).	Norway	Adolescent self-report of family finances– financial situation as poor, average, good, very good. Parental education level - Highest accomplished year of education was obtained from Statistics Norway's Register on education. (higher (university 5+), intermediate, lower/ upper secondary and lower/secondary.	Norwegian Arctic Adolescent Health Study (2003-2005) total 5877. All 10th graders (responders n=4881) in Norway – 3 most northern counties, (Finnmark, Troms, Nordland).
Staer T. 2016 [42]	Risk and Marginalization in the Norwegian Welfare Society: a National Cohort Study of Child Welfare Involvement. Child Ind Res 2016;9(2):445-470	Norway	Household relative income poverty, either above, or below OECD poverty line. Maternal education 3 categories: No education or basic education, including secondary school drop outs; secondary education; and post=secondary education.	Norwegian longitudinal population registers Norwegian children 0-5 and 13-18 in eight birth cohorts. Linked to Child Welfare Records from 1993-2007 (N=518,106).

			Fathers education 3 categories: No education or basic education, including secondary school drop-outs; secondary education; and post=secondary education. Family Status: 2 parents, one parent, or without either of parents/in out-of-home care. Children born of the mother (1-3 and 4 or more). Age of mother at birth or first child.	Unique personal identifier makes linkages to parents and grandparents possible.

Author(s)	Title of publication	Geographical coverage	Measure/indicators	Data source
Elstad JI, Bakken A. 2015 [43]	The effects of parental income on Norwegian adolescents' school grades: A sibling analysis. Acta sociologica 2015 Aug 01,;58(3):265-282.	Norway	Income – the yearly sum of 2 parents' pre-tax income over period when children are aged between 6 and 13 years. Transformed into natural logarithms. Also, samples were stratified into 4 levels using median income in the entire sample (654k Kroner) as reference.	Statistics Norway, linking individual information from a number of public registers. Norwegian lower Secondary Schools (n=598,517)
Sivertsen B, Glozier N, Harvey AG, Hysing M.2015 [63]	Academic performance in adolescents with delayed sleep phase. Sleep medicine 2015;16(9):1084-1090.	Norway	Parental education (primary, secondary or college or university) Perceived family circumstances – asking adolescents about their financial circumstances, compared to others (1) better financial circumstances (2) approximately like most others (3) poorer financial circumstances	The youth@hordland-survey (N=8347). High school students born between1993 and 1995.

Author(s)	Title of publication	Geographical coverage	Measure/indicators	Data source
Nilsen SA, Breivik K, Wold B, Askeland KG, Sivertsen B, Hysing M, et al. 2020 [58]	Divorce and adolescent academic achievement: Heterogeneity in the associations by parental education. PLoS ONE 2020 -03-04;15(3).	Norway	Highest completed level of education of both parents when adolescent s were 16 years old. International Standard Classification of Education (ISCED) coding scheme used, obtained from NUBD. Coding scheme created 3 main measures of parental education: a combined measure of parents' education level, indicating highest level of completed education in the family by either mother or father. (1)ISCED 0-2 = both parents have no qualifications higher than low secondary education (2) ISCED 3-5 = at least one parent has qualifications equal to ISCED 3-5 (upper	Youth at Hordaland – Population based Cross Sectional Study. Adolescents aged 16-19 (N=9,166)

			secondary, post-secondary, non-tertiary, short cycle tertiary). (3) At least one parent has Bachelor's level degree or equivalent (ISCED 6) and at least one parent has attained Master's or PhD level qualification (ISCED 7-8)	
Ørstavik RE, Czajkowski N, Røysamb E, Knudsen GP, Tambs K, Reichborn-Kjennerud T. 2014 [44]	Sex Differences in Genetic and Environmental Influences on Educational Attainment and Income. Twin research and human genetics;17(6):516-525.	Norway	Education (8 categories): 0= no education to 7=doctoral degree. Income in 8 categories Upper limit for lowest category was 20k Euro and lowest limit for highest category was 74k Euro.	Norwegian Institute of Public Health Twin Panel Study N=7710 Norwegian Twins unique identification numbers linked date to Statistics Norway: Norwegian National Education database and Income Register. Income stats have been available annually since 1993 and covers most of the populations cash income.

Author(s)	Title of Publication	Geo coverage	Measure/indicators	Data source
Avvisati, F 2020 (See ESCS as an artificial composite) [93]	The measure of socioeconomic status in PISA: a review of some suggested improvements. Large Scale Assessments in Education.	International	Index of economic, cultural and social status (ESCS) to measure a students' access to family resources (financial capital, social capital, cultural and human capital). A weighted average of three indices: Parental Educational Attainment, Parental Occupation (ISEI scale) and A measure of household possessions.	Examples taken from Program of International Student Assessment 2015 data.
Moulton, V., Goodman, A., Nasim, B., Ploubidis, G.B. & Gambaro, L. 2021,[97]	Parental Wealth and Children's Cognitive Ability, Mental, and Physical Health: Evidence From the UK Millennium Cohort Study. Child development, 92,(1), 115-123.	UK	Measures of wealth – house value, mortgage, finance savings and debts. Household social class, Parent education and Household employment status.	Millenium Cohort Study (MCS) of n=19,000 children born 2000 to 2002.
Banerjee, P.A. 2016 [87]	A systematic review of factors linked to poor academic performance of disadvantaged students in science and	International	Familial (teen mother, low maternal education). Social (homelessness, maltreatment).	All major English

	maths in schools. Cogent education, 3, 1178441.		School-related and biological (inadequate pre-natal care, pre-term, low birth weight, lead exposure, malnourishment). Geographical location of residence low parental incomes, English as additional language.	language databases.

Author(s)	Title of Publication	Geo coverage	Measure/indicators	Data source
Marks, G.N. & O'Connell, M. 2021 [67]	Inadequacies in the SES–Achievement model: Evidence from PISA and other studies" Review of Education, 9 (3).	International	PISA uses Economic, Social and Cultural Status measure (ESCS). A composite Score constructed from PCA -3 Factors: Highest level of parental education (PARED), derived from International Standard Classification of Education (ISCED) which are, primary lower secondary etc. Occupational Status (HISEI) is derived from mapping students' reports of their parents' occupations on the International Socio-economic index (ISEI) Home Possessions – 25 in total (HOMEPOS) covering cultural, economic, educational and ICT resources.	Programme for International Student Assessment (PISA) Life-long learning – testing skills of 15 year-olds.

Appendix IV
Summary of Grey Literature

Author(s)	Title of Publication	Geo coverage	Measure/indicators	Data source
Department of Education 2013 **[5]** **(**RSM McClure Watters)	Research into Improving Attendance in Schools in Deprived Areas. "Education and Awareness" in Disaster Recovery, Crisis Response, and Business Continuity Apress, Berkeley, CA, pp. 115-122.	Northern Ireland	Neighbourhood Renewal catchment (Area) FSME (Household)	Survey of School staff and governors, and other stakeholders.
Nelson, J., Martin, K., & Featherstone, G Office of the First Minister and Deputy First Minister. 2013 [6]	What works in Supporting Children and Young People to overcome persistent Poverty? A Review of UK and International Literature	Northern Ireland	Intergenerational poverty – culture or worklessness or welfare dependency Relative poverty – equivalised household disposable income below 60% of national equivalised household income Persistent poverty – poor in 2of the 3 preceding years. Life course poverty – childhood and adult life	Systemic review of UK and international literature on intergenerational poverty and other forms of poverty.
Department of Education 2022 [7]	Common Funding Scheme for the Local Management of Schools 2022-2023.	Northern Ireland	Targeting Social Need and additional social deprivation factor. Free school meal entitlement (nursery children assessed against parent in receipt of	Annual School Census.

			Job Seekers Allowance Incomes Support or UC). Proportion of children entitled to FSM.	
Author(s)	**Title of Publication**	**Geo coverage**	**Measure/indicators**	**Data source**
Purdy, N. [8] Expert Panel on Educational Underachievement in NI.	A Fair Start. Final report and Action Plan 2021	Northern Ireland	FSME	Expert panel.
Social Mobility Commission. Research report. 2022 -12.	Data for social mobility: improving the collection and availability of data across government A review of data gaps and solutions to support effective policy-making Digital Economy Act 2017	Northern Ireland	Lack of administrative data on economic circumstances of children and households they live in – rely on FSME.	
Administrative Data Research in Northern	ADR Data Prospectus. Version 4.3 July 2019.	Northern Ireland	Socioeconomic circumstance/position Occupation and Industry codes	NI Census individual and household.

Ireland (ADRNI) Prospectus 2019. [16]	ADR Data Prospectus. Version 4.3 July 2019. ADR Data Prospectus. Version 4.3 July 2019.		Household care ownership https://www.nils-rsu.co.uk/app/uploads/2019/11/NILS_Metadata.pdf	
		Northern Ireland	Benefits statistics. Poverty bulletin.	Family Resources Survey [26] .Request variables from RSU or directly from DfC
		Northern Ireland	Link to list of variables with ADRC data prospectus [16]: https://www.education-ni.gov.uk/sites/default/files/publications/de/School-enrolments-Background-quality-report-june-17.pdf	School Census
		Northern Ireland	Basic demographic data. GP registration Index – can be linked to NILS (28% sample of Census) [15]	Health Data: Business Services Organisation.

			No linkage to hospital admissions data.	

Author(s)	Title of Publication	Geo coverage	Measure/indicators	Data source
NISRA [IJpelaar, J., Power, T. & Green, B. 2018 [17,18]	Northern Ireland Multiple Deprivation Measures 2017. Journal of the Statistical and Social Inquiry Society of Ireland, vol. XLVIII, pp. 163.	Northern Ireland	7 domains – each one is used to rank the 890 SOAs in NI. Income deprivation, Employment deprivation, Health Deprivation and disability, Education Skills and training, Access to Services, Living Environment, Crime & Disorder	NIMDM 2017
Bradshaw, J., De Lazzari, G & Andrade, J. 2018 [19] National Foundation for Educational Research (NFER)	Performance in TIMSS 2015 of disadvantaged pupils in Northern Ireland. Slough. NFER.	Northern Ireland	Home Resources for Learning Scale Constructing an Index of economic social and cultural status (ESCS) similar to OECD's PISA assessment. Possessions in the Home (7 core items are own computer, computer that is shared, study desk, own room, internet connection, own mobile and gaming system) -taken from student questionnaire. Parents level of Education (parent provides data).	TIMSS Home questionnaire 2015. Trends in International maths and Science Study. Age 9-10. Home Resources for Learning Data

			Parent Occupation (Parents provide data).	
Benson, L., Burge, B., Liht, J., & Mughogho, K. [20] National Foundation for Educational Research (NFER)2022	National Reference Test 2021: Factors Affecting Attainment. Research into student and school level characteristics associated with changes in performance during Covid-19 disruption. Slough: NFER. 2022.	England	FSME (Current and Ever (FSM-Ever) Income Deprivation Affecting Children Index. (IDACI) quintile by pupil postcode.	National Pupil database (NPD). Ofqual matched NRT sample data for 2020 (n=6639) and 2021 (n=4030) to data from NPD.
National Foundation for Education Research 2021 [21]	PISA 2018 additional analyses: What differentiates disadvantaged pupils who do well in PISA from those who do not? Research brief. February 2021 2021a.Dandy Booksellers.	England Wales and N Ireland	Continuous scale - Economic social and cultural status (ESCS) index. Pupils who falls within the bottom quarter of index for his her country are socially disadvantaged	PISA 2018

Author(s)	Title of Publication	Geo coverage	Measure/indicators	Data source
National Foundation for Educational Research (NFER) 2021 [22] Kuhn, L., Bradshow, S., Donkin,A., Fletcher, L., Liht, J., & Wheater,R.	PISA 2018 additional analyses: What does PISA tell us about the wellbeing of 15-year-olds? Reports on page 27 parental support in literacy activities associated with higher attainment at age 9 and 10 (Wheater et al (2020) and also well-being.	England Wales and Northern Ireland Compared to Finland, France and Korea	Economic Social and Cultural Status (ESCS) index. A socioeconomically disadvantaged pupil is in the bottom quarter of that index for this or his own country or economy.	PISA 2015 and PISA 2018 (PISA takes place every 3 years)
Department for Communities. 2022 [23]	An Examination of the Rates and Distribution of Poverty in Northern Ireland 2022c, . FRS has non response between 50% and 55%.	Northern Ireland	Household Below Average Income [27] The Household Income data came from working with DFC data base for Income modelling and Estimation (DIME).	Family Resource Survey – the main official source of statistics on household income and poverty.

	Estimates are weighted using population totals		FRS is used for international comparisons within OECD countries. [26]	
Author(s)	**Title of Publication**	**Geo coverage**	**Measure/indicators**	**Data source**
Department for Communities. 2022 [24]	A Study of the Key Sources of Poverty Data in Northern Ireland 2022d.	Northern Ireland	Housing Tenure. Income – all sources and benefits tax credits and pensions. Caring needs and responsibilities. Disability, Expenditure on housing. Employment, Education. Childcare, Family circumstances. Child maintenance, Pension participation. Savings and Investments, Adult and child social deprivation, Household food security. Covers, relative low income, absolute low income, income inequality, household income distributions etc**.** Annual report is produced. Survey on Income and Living conditions - annually (RoI) Cross Government Administrative Data has been developed by linking admin data from	Family Resources Survey DWP and DfC N=19,244 households in 2019/2020 sample. [26] FRS datasets are available for registered users at UK Data service. Housing Below Average Income Dataset, derived from FRS.

			HM Revenue and Customs and Social Security Benefits System and DWP to create a picture of household income in Northern Ireland – not publicly available – at LGD and SOA. Children in Low Income Families Local Area statistics. Derived from Registration and Population Interaction database **(**RAPID) extended to NI in 2020/2021	

Author(s)	**Title of Publication**	**Geo coverage**	**Measure/indicators**	**Data source**
Department for Communities 2022. [25]	A Scoping Review of the Literature on Poverty in Northern Ireland 2019/2020 children in relative poverty – 22% 17% in absolute poverty.	Northern Ireland	Measures of poverty – Before Housing Costs (BHC) and After Housing costs (AHC) Relative poverty is living in household with an equivalised income below 60% of UK medium income. Relative poverty threshold (BHC) couple no children and absolute poverty threshold (BHC) for couple with no children. Risk factors of falling into poverty:	Households Below Average Income for Northern Ireland Annual Report [27]

			Poor educational attainment, parental qualifications, child hood poverty, family factors, disability, low paid work, joblessness, addiction, rurality, debt, ethnicity. Main driver for future poverty is poor childhood educational attainment.	
Author(s)	**Title of Publication**	**Geo coverage**	**Measure/indicators**	**Data source**
Flisi, S., & Blasko, Z. European Commission Joint Research Centre 2019. [29]	A note on early childhood education and care (ECEC) participation by socio-economic background. Publications office of the European Union Luxemburg, 2019. JRC Science for policy report 2.	Europe	If child lives in home at risk of poverty (AROP) Or risk of poverty or social exclusion (AROPE. Equivalises disposable; income tertile – This is the total income of a household after tax and other deductions that is available for spending or saving divided by number of householder members converted into equalised adults. Maternal Education – has attained tertiary education (highest level attained at ISCED).	EU survey on incomes and living conditions (EU-SILC)

			At risk of poverty (AROP) is equivalised below the AROP threshold which is set at 60% of the national median equivalised disposable income after social transfers.	
McNamara,E., Murray, A., O'Mahony,D., O'Reilly, c., Smyth, E., Watson, D. 2018 [30]	Growing up in Ireland. National Longitudinal Study of Ireland. The Lives of 9 year olds of Cohort 2008. Government of Ireland.	Ireland	Family structure. Primary caregiver education (Junior certificate, lower degree or higher). Social class(occupation levels using Central Statistics Office Census of Population classification (semi-skilled manual, unskilled manual, and never employed). Household income levels equivalised and divided into fifths or quintiles.	Detailed interviews with 8039, nine year olds and families from 2008 cohort Child Benefits Register for sampling frame.

Author(s)	Title of Publication	Geo coverage	Measure/indicators	Data source
Billingham Mark 'Billy' Save the Children (2019) [31]	The Hard Way: Family Experiences of the Welfare system and costs of Living in Northern Ireland	Northern Ireland	Qualitative data from 24 families	
Bunting, L., McCartan, C., Davidson, G., Grant, A., McBride, O., Mulholland, C., Murphy, J., Schubotz, D., Cameron, J. & Shevlin, M. 2020. [33]	The Mental Health of Children and Young People in Northern Ireland. Executive Summary of the Youth Wellbeing Prevalence Study	Northern Ireland	Deprivation measure = in receipt of benefits.	Youth Wellbeing NI Survey N=3000 children and young people and 2800 parents and caregivers.

Appendix V
Topic Guide for Meetings

MEASURE USED AND PURPOSE

Introduction
Initially we want to get an understanding of the extent to which Free School Meal Entitlement (FSME) or other measures of Socio-Economic Deprivation (SED) are used by your department to determine which individuals/or defined areas (e.g., Super Output Areas) are disadvantaged or deprived.

And, if you or colleagues plan and/or allocate additional funding to target resources to support children/residents in need. But first of all, to set things in context, please describe your role and area of responsibility?

Can you describe the measure(s) of social deprivation used by your department to allocate resources, write policy or plans services?
Prompt -would you use Free School Meal Entitlement as a deprivation measure? If yes – What do you use FSME for? (E.g., In DoE, we understand that it is used to inform eligibility and entitlement to additional schools funding)

If FSM is not used, what are the reasons for not using FSM? *Prompt, for example, is it because you think it is not a good measure?*

Would you please give us more details about the measures of deprivation that you currently use?
Prompt – e.g., Measures of Multiple Deprivation created by NISRA?

What is the impact of using this measure? (E.g., distribution £Xm of funding to individuals/areas of need).

Are you happy with the way decision are made to allocate more money to area/schools/individuals to target disadvantage?
If no – what are your reasons? Is there an appetite to measure deprivation in a different way in your department/team?

Please describe eligibility criteria for allocating additional funds based on deprivation or disadvantage

Prompt – if they mention multiple resources – try to get them to cover each initiative/programme/policy in equal amount of detail.

How much additional funds are provided to target individuals/ sections of the population ?

CURRENT DATA SOURCES

Where does the data on deprivation/disadvantage come from? (Whether it is FSMe or 'other')
Prompt – do you have a Central Research and Statistics team or information manager who is your first port of call?

It's useful for us to know as it's important to understand the information flows.

Is there a system set up to collect the data on deprivation? **Is it an already available on an administrative database, or does it need to be collected from an external organisation for your purposes?** *Prompt - NISRA or through surveys, census etc.*
Would you request this data on social disadvantage, as a routine part of management reporting, policy writing? At what level is the data available? (Individual, household, area etc?
Accuracy/data quality (If not already covered earlier) Does the data measure what it is supposed to measure, accurately and consistently, in other words, is it fit for purpose? (Whatever they use). *Prompt – are there any advantages and disadvantages?*
Timeliness. Is the data available in a timely manner to meet your needs? (For example, in order to allocate resources within a financial year). If no, ideally when would you require the data to be available?
Resources needed If it must be collected, what is the burden of collecting it in terms of time, resources, practicality?
Duration and response rates. If used (whatever it is) – how long has this been the primary measure of SED? How often is this data collected - *prompt– e.g., annually, bi-annually every 10 years etc. and degree of coverage?*
Confidentiality How accessible would the data be for us? For example, are there any issues for sharing – linking data, and also are there any costs to access the datasets?
OTHER DATA THAT COULD SUPPORT SOCIO-ECONOMIC DEPRIVATION RESOURCES
Are there any other data that you are currently using that could supplement or replace current measures of SED?
Are there any projects that you are aware of in your department, where new measures of social deprivation/disadvantage are being developed?
In an ideal world, is there any other SED data that would be useful to you for your purposes that is not currently available (for example household income)? What level would you need this at (individual, household, area etc)?
Is it possible to link your current primary measure of SED to data that are routinely collected by the DE (e.g. school census). If not, would there be an appetite for such data linkage, and what are the barriers/challenges that would prevent data being linked?
Do you have any resources (e.g., reports, data directory), you could share that shows the SED indicator in use?

Appendix VI

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