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THE RELIABILITY OF FREE SCHOOL MEAL ELIGIBILITY AS A MEASURE OF SOCIO-ECONOMIC DISADVANTAGE: EVIDENCE FROM THE MILLENNIUM COHORT STUDY IN WALES

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ABSTRACT: Over the last 20 years, the use of administrative data has become central to understanding pupil attainment and school performance. Of most importance has been its use to robustly demonstrate the impact of socio-economic status (SES) on pupil attainment. Much of this analysis in England and Wales has relied on whether pupils are eligible for free school meals (eFSM). However, very little is known about the validity of this measure as a proxy for SES. Using a recent major birth cohort study, this paper examines the relationship between pupils' eFSM and their more detailed socio-economic circumstances.

Keywords: free school meals, socio-economic status, educational attainment, Pupil Deprivation Grant, wales, millennium cohort study.

1. INTRODUCTION

Eligibility for free school meals (eFSM) is widely used as a proxy for socio-economic status (SES) amongst academic research and within Government policy in England and Wales. For example, eFSM has been successfully used to demonstrate the systematic underachievement of children (Cook *et al.*, 2014; Department for Children, Schools and Families, 2009). It is also widely used as a tool for accountability and performance management (Burgess *et al.*, 2013). Indeed, the National School Categorisation System in Wales, designed to identify schools in most need of support, now includes the achievement of eFSM pupils as a key measure of performance (alongside attendance, overall levels of achievement and pupil progress) (Welsh Government, 2015).

Free school meals have also become a policy tool in a wide range of other countries, including Sweden, Finland, the US, Japan and India. In some of these, eligibility for free school lunches has been extensively used as a proxy for socio-economic disadvantage in analyses of educational outcomes.

Not only is eFSM an important metric for research and analysis but now it is also being used as a mechanism for funding schools. In 2011 in England and a year later in Wales, schools started receiving additional funding via the Pupil

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Premium and the Pupil Deprivation Grant, respectively. For every child who is eFSM, primary and secondary schools receive additional funding in addition to their main delegated budgets from government. In 2015–2016, all maintained primary schools in England received an additional £1320 for every eFSM child. Maintained secondary schools in England received £935 per eFSM pupil. In Wales, all maintained schools (primary and secondary) received an additional £1050 for every eFSM pupil. This support is also directed at looked-after children. The primary objective of both interventions is to close the relative achievement gap between eFSM children and other children.

However, when it has come to using this categorisation of ‘need’ head teachers in both England and Wales have found it problematic. For example, many schools report facing a ‘moral dilemma’ when deciding which pupils should benefit from the Pupil Premium or Pupil Deprivation Grant (Carpenter *et al.*, 2013; Pye *et al.*, 2015). Teachers and head teachers will often report that there are other children who they believe are deserving of such support despite not formally being eFSM.

These concerns are not entirely new. For example, Harwell and LeBeau (2010) review the eligibility for free lunches in the US National School Lunch Program as a measure of SES. They concluded, ‘Despite its frequent use, however, the free lunch variable possesses important deficiencies that suggest that other measures of SES should be considered’ (2010, p. 128). In England, there have been a small number of important critiques of the indicator. Some of these concerns are about the measure itself, and others raise concerns about how it is used as a proxy for socio-economic disadvantage. Most recently Ilie *et al.* (2017) used the Longitudinal Study of Young People in England (LYSPE) to test whether eFSM was a good proxy for socio-economic disadvantage. However, studies using older children (i.e., aged 15) can be critiqued for not taking into account the cumulative ‘compensatory’ benefits of receiving eFSM on children’s educational outcomes. The aim of this paper, therefore, is to contribute to this debate through an analysis of *younger* Wales-domiciled pupils who are taking part in the UK-wide Millennium Cohort Study (MCS). This study is a major birth cohort study of children born in 2000–2001 across the UK and provides robust and detailed information about the children and their families. The paper assesses the reliability of eFSM as a measure of socio-economic disadvantage in three main ways:

- (1) To what extent does being eFSM capture every child living in socio-economic disadvantage
- (2) To what extent are all children eFSM share similar socio-economic characteristics
- (3) To what extent is being eFSM related to educational outcomes at age 7 and 11 compared to other measures of socio-economic disadvantage

The paper is organised in four parts. First, it briefly discusses the history, development and use of free school meals as a policy and as a measure of SES before outlining previous critiques of the indicator. Then the paper explores the

relationship between being eFSM and measures of income and poverty for children in Wales. This shows that eFSM pupils are almost exclusively from low-income families. However, not all pupils from low-income families are identified as being eFSM. This is followed by a similar analysis of the relationship between being eFSM and other characteristics of socio-economic disadvantage. This also finds that eFSM children tend to share similar socio-economic characteristics but that there are a significant proportion of children who could be described as disadvantaged who are not recorded as eFSM. The final section of the paper contrasts the relationship between eligibility for free school meals and educational attainment at age 7 and at age 11 with other measures of socio-economic characteristics. By modelling these relationships, the paper finds that being eFSM is not strongly related to educational outcomes at age 7 but is at age 11 after controlling for other socio-economic characteristics. But even where there is a strong relationship, other socio-economic factors continue to be related to educational achievement. Whilst not entirely conclusive, these results suggest that being eFSM is a good proxy for socio-economic disadvantage and is, in some cases, strongly related to levels of educational attainment. However, the analysis also suggests that there is a small but significant group of children who could be described as socio-economically disadvantaged and who have low levels of attainment but, for whatever reasons, are not recorded as eFSM. The paper concludes by briefly considering the implications of this in the use of eFSM as a tool for policy intervention and accountability of schools.

2. FREE SCHOOL MEAL ELIGIBILITY

Free school meals have been available to some of the poorest children in England and Wales for over one hundred years. But it was only in 1937 when Wal Hannington, President of the National Unemployed Workers Movement, recommended that *all* children with unemployed parents should be entitled to free school lunches (Welshman, 1997). Since that time there has been a gradual increase in the number of children who were given free school lunches. But it was not until the 1980 Education Act that it became a statutory duty for local authorities to provide free school meals for all children whose parents were in receipt of State supplementary benefit or income support (although the later 1986 Social Security Act removed the benefit of free school meals to thousands of children).

Of course, free school meals were originally introduced as a policy intervention – to ensure that children from disadvantaged backgrounds had access to a meal during the school day. This was designed to provide children with a nutritious diet and help improve their concentration. There is some evidence that school meals help improve concentration (Golley *et al.*, 2010; Storey *et al.*, 2011). There is also some recent evidence that providing free school meals was associated with increased educational attainment, particularly those from the most disadvantaged backgrounds (Kitchen *et al.*, 2013).

With the development of a standard and relatively stable definition for claiming free school meals across England and Wales, there has been an almost exponential rise in the use of the indicator in educational research. As an analytical tool there have been five general ways the indicator has been used: (i) to determine the demographics of school intakes, (ii) to compare educational outcomes (e.g., attendance, attainment and progression) of socio-economically disadvantaged and advantaged learners, (iii) as a covariate in models of educational and other social outcomes (including child well-being, participation in out-of-school activities, etc.), (iv) to statistically match pupils for experimental studies and (v) as the basis for comparing the performance of schools.

As a result, significant inroads have been made in the past 15 years to our understanding of educational processes and issues, particularly the ability to evidence the existence of structural inequalities in educational attainment and the efficacy of interventions designed to mitigate these structural inequalities. But as our understanding has increased so too have concerns about the reliability of the measure.

The first main concern is that not all children who may be eFSM have formally applied for free school meals. Currently, parents (or children) in receipt of any of the following benefits are deemed eligible to apply for free school meals for their children:

- Income Support
- Income-based Jobseekers Allowance
- Income-related Employment and Support Allowance
- Support under Part VI of the Immigration and Asylum Act 1999
- The guaranteed element of State Pension Credit
- Child Tax Credit (provided you're not also entitled to Working Tax Credit and have an annual gross income of no more than £16,190)
- Working Tax Credit run-on – paid for 4 weeks after you stop qualifying for Working Tax Credit
- Universal Credit

Source: <https://www.gov.uk/apply-free-school-meals>

Parents are required to apply for eFSM but there are some estimates that many do not. For example, 15 years ago, Storey and Chamberlin (2001) found that 11% of parents interviewed across 13 schools should have been eligible, but were neither aware that they could be eligible nor knew how to apply. Later reports in England suggested that between 17% and 20% of children entitled for free school meals may not registered as eligible (Halse and Ledger, 2007; London Economics, 2008; Sahota *et al.*, 2014). However, there are now numerous strategies to improve registration of eligibility. Despite this there will still be children who had not applied for their entitlement.

The second critique is that the criteria for entitlement do not necessarily capture all children living in poverty. Of course, the definition of poverty is not

unproblematic. For example, the European Union's 'at-risk poverty threshold' is set at 60% of national median equivalised disposable income. This relative measure of poverty is different to an absolute measure of poverty. Furthermore, being eFSM and being in poverty are not comparable since approximately only 18% of the pupil population in Wales are eFSM compared with 31% of the population living in equivalised poverty. But as Gorard (2012) argues, eFSM is more of a measure of state dependency than of income or poverty. Gorard also points out 'FSM pupils may not always be the poorest once other welfare benefits are accounted for' (2012, p. 1015), since receiving the benefits that entitled someone to free school meals may improve a household's economic circumstances relative to other households not receiving benefits. A detailed analysis of the income distribution of households eFSM has been undertaken by Hobbs and Vignoles (2010) using 2004/2005 data from the Family Resources Survey (Figure 1). This demonstrated that eFSM children were more likely to be in low-income households than non-FSM children. However, their analysis also showed that a large proportion of eFSM children (between 50% and 75%) were not in the lowest income households. Hobbs and Vignoles argue that this is very likely to be due to the benefit of receiving means-tested benefits and tax credits on their household income.

The third criticism of eFSM is that it does not capture the multidimensional nature of socio-economic disadvantage. As discussed above, it is largely an income-related measure (although it is not a perfect measure of income). Alternative measures of socio-economic disadvantage, such as social class or parents' education, are perhaps better at reflecting other dimensions of disadvantage, but are much

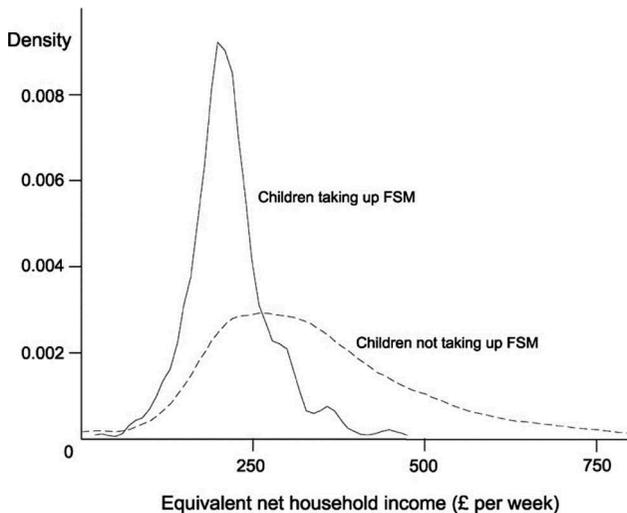


Figure 1. Household income distributions by children's FSM take-up status
Source: (Hobbs and Vignoles, 2010), p. 679.

harder to assess and obtain. All are important determinants of educational attainment and inequalities. Halse and Ledger (2007) used the LYSPE to demonstrate that 'FSM is not a particularly accurate proxy for NS-SEC [National Statistics Socio-economic Classification]' (p.3). However, they showed that eFSM children were more likely to live in single-parent households, have more siblings, have a parent/carer who is long-term unemployed, live in rented accommodation, to be less likely to have access to a car and have parent(s)/carer(s) who are relatively less qualified than those of non-FSM children.

A final criticism of eFSM relates to its binary nature. This means it is impossible to observe variability within either the eFSM group of children or the non-FSM children. This is of particular concern within the larger 82% non-FSM group of children, who will clearly be a heterogeneous group based on their socio-economic circumstances. This has several implications, not least our ability to compare within-group differences but also because binary comparisons of outcomes can also lead to oversimplifying their interpretation (as will be shown later).

Despite these concerns the use of eFSM continues to be a key proxy for policy, accountability and as a proxy for other socio-economic characteristics continues to grow in importance and use. The primary reason for this is the absence of any other suitable measure, that is, (a) routinely collected, (b) almost universal (independent schools are not required to collect these data and pupils who move school within the school year may be missing from the annual collection of data) and (c) is based directly on pupils' individual family circumstances (i.e., not inferred from other sources). The ability to link individual pupil records to other socio-economic data has been achieved using home postcodes of pupils (see Chowdry *et al.*, 2013 for an example of this). With the development of new ways of linking administrative data (such as through the ESRC Administrative Data Research Network), it may soon be possible to link individual pupils to official income and employment administrative data of their parents based on their name, date of birth and/or home postcode.

Another advantage of using eFSM as a measure of SES is that its definition and the criteria for eligibility have remained relatively similar over time. This means it is possible and meaningful to consider trends in the outcomes of socio-economic disadvantaged children.

However, the advantages of using this measure has, in turn, limited the desire to develop new, possibly improved, measures of SES. Consequently, it is useful to consider the strengths and weaknesses of using eFSM when we can, even if it is just to help users of the measure, analysts or policymakers, recognise its limitations. The analysis is also timely in that there have been important changes to both the welfare benefits that are used to determine eligibility for free school meals in England and Wales in 2012 and the decision in England only to introduce *universal* free school meals to all infant school pupils (4–7 year olds) from 2014.

3. METHODOLOGY

The MCS is a birth cohort study of children born in the UK between 2000 and 2001. Households with children born during this period were sampled according to their geographical location. This meant that the study included an over-representation of children living in socio-economically deprived areas (based on indices of deprivation across the UK) and children from the devolved nations of the UK. The MCS collects information from the children and their parents every few years, known as ‘sweeps’ – initially when the children were 9 months old, then 3 years, 5 years, 7 years and 11 years. There has been a further ‘sweep’ of data collection when the children were aged 15 years old. This is the only UK-based birth cohort study that includes children born at different times of the year.

To consider, in detail, the characteristics of eFSM children it was necessary to link data from the MCS to educational administrative data. In England and Wales, this is referred to as the National Pupil Database (NPD) and combines pupil-level data collected from schools in January every year (the Pupil Level Annual Schools Census – PLASC) and other educational data collected throughout the year, such as their attendance records and levels of achievement at the end of each Key Stage of the National Curriculum.

The Welsh Government and the Centre for Longitudinal Studies (CLS) provided individually linked NPD to Wales-domiciled MCS cohort members for 2007–2008, to coincide with ‘sweep’ 4 of the MCS (i.e., when children were aged 7 years old). Within the NPD, this indicates which children were formally recorded as eFSM and provides teacher assessments of their achievement at the end of the Key Stage 1 (KS1) National Curriculum (in Year 2). It should be noted that this does not include 76 children in Wales who participated in the pilot stage of the Foundation Phase – a new curriculum for 3–7 year olds, piloted in 22 primary schools across Wales (see Taylor *et al.*, 2014 for more information). To summarise, for the purposes of this paper only children living in Wales at age 11 (‘sweep’ 4) are included in the analysis, all of whom were born during the academic year 2000–2001. In the original sampling frame, there were 3864 eligible families; 74% of these agreed to participate in the first sweep when the children were aged 9 months, 2798 in total. After attrition from the MCS over time, data linkage to the NPD and removal of twins/triplets from the data set, only 1590 Wales-domiciled children were available for this analysis. The MCS provides various weights to counteract the original sampling selection, the sample design and attrition from the study.

The findings begin first with a descriptive analysis of the cohort, comparing eligibility for free school meals with other known characteristics from the MCS. To determine the extent to which being eFSM is related to educational outcomes compared to other measures of socio-economic disadvantage, a series of linear regression models were undertaken on a range of cognitive assessments, including maths ability and pattern construction. The paper presents results from two of these: (i) word-reading ability, taken from assessments on MCS children at age 7; and (ii) verbal similarities, taken from assessments on MCS children at age 11. Given the

complex sample design of the MCS, all models are weighted to take into account sample design, non-response and attrition (Jones and Ketende, 2010; Plewis, 2007). Although the MCS is not a random sample, it is designed to provide a representative sample after sample design weights have been applied. Therefore, and in line with all other studies using the MCS, confidence intervals and levels of significance are presented to show that observed relationships in the MCS sample would be present in the wider population.

4. ELIGIBILITY FOR FREE SCHOOL MEALS AND INCOME DEPRIVATION

Figures 2 and 3 illustrate the income distribution of families with eFSM children compared with other children in Wales. Figure 2 presents the predicted weekly net income of families and Figure 3 presents an adjusted-level weekly income that is based on the number of household members – the Organisation for Economic Co-operation and Development (OECD) equivalence scale. OECD equivalised scale for household income is calculated using weightings for different members of the household (1.0 to the first adult, 0.7 to second and subsequent adults aged 14 years and over and 0.5 to each child aged under 14 years (see Hansen and Kneale (2011), for example, of other income measures for measuring poverty). In both cases, the income distribution of eFSM children is considerably lower and less varied than that of other children. However, both figures demonstrate the sizeable number of children living in households with relatively low incomes who are not recorded as eFSM. It is also worth noting that these patterns are similar for both weekly net income and equivalised weekly income, with a similar degree of overlap in the income distribution of both groups of children.

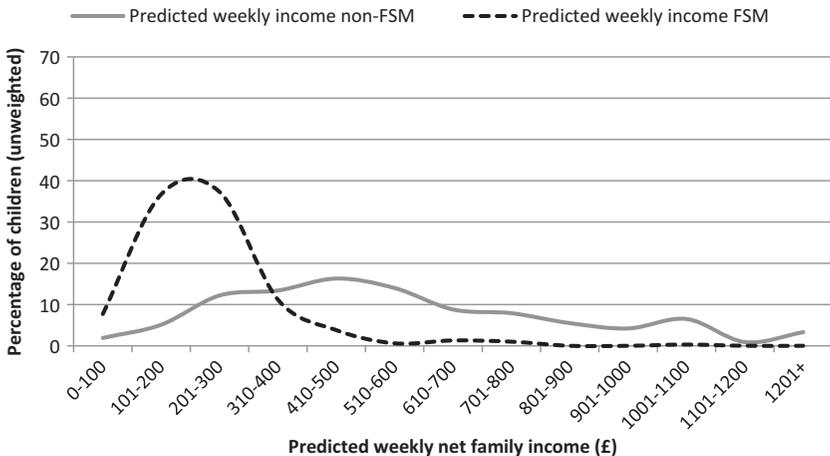


Figure 2. Distribution of predicted weekly net income for Wales-domiciled children in Sweep 4 of the Millennium Cohort Study (age 7 years)

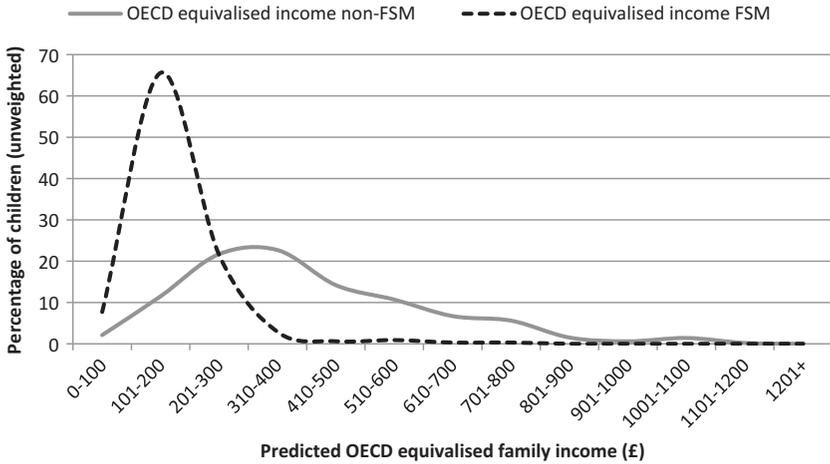


Figure 3. Distribution of equivalised weekly income for Wales-domiciled children in Sweep 4 of the Millennium Cohort Study (age 7 years)

The most common measure of relative poverty used in the UK and the European Union is based on 60% of the median household income. In the context of the UK and the MCS, this was approximately £236 of equivalised income in 2007. Table 1 outlines the number of Wales-domiciled children living in poverty (based on this measure) and whether they were eFSM. This shows that approximately 31% of Wales-domiciled children in the MCS (weighted) were living in poverty in 2007. However, less than half of them (48.7%) were recorded as eFSM.

Although the eFSM indicator does not include every child living in poverty, almost all of them were living in poverty. However, nearly one in seven eFSM children (14.6%) were living in households above the poverty threshold.

TABLE 1: Distribution of Wales-domiciled children by measure of poverty and eligible for free school meals at age 7 years (weighted)

Poverty threshold	Eligible for FSM	<i>n</i>	% of all children	% of children living in poverty	% of eFSM children	% of children non-FSM
Above poverty threshold	Non-FSM	1051	66.4%	n/a	n/a	80.7%
	eFSM	41	2.6%	n/a	14.6%	n/a
Below poverty threshold	Non-FSM	252	15.9%	51.3%	n/a	19.3%
	eFSM	239	15.1%	48.7%	85.4%	n/a

TABLE 2: Persistent poverty and eligibility for free school meals (weighted)

Number of MCS sweeps ^a in poverty	Number eFSM ^b		% by eFSM		% by no. of MCS sweeps in poverty	
	Non-FSM	eFSM	Non-FSM	eFSM	Non-FSM	eFSM
0	646	3	61.3%	1.4%	99.5%	0.5%
1	167	7	15.8%	3.2%	96.0%	4.0%
2	75	25	7.1%	11.5%	75.0%	25.0%
3	83	58	7.9%	26.7%	58.9%	41.1%
4	83	124	7.9%	57.1%	40.1%	59.9%
Total	1054	217	100.0%	100.0%	82.9%	17.1%

^aAt age 9 months, 3 years, 5 years and 7 years old.

^bThese figures are based on only Wales-domiciled cohort members who had income data at all four Sweeps of the MCS.

Using longitudinal data in the MCS, it is also possible to examine the relationship between living in *persistent* poverty and whether children are known to be eFSM. Table 2 outlines the number and percentage of eFSM children by the number of sweeps they were predicted to be living in relative poverty. Over half of eFSM children were living in relative poverty at all four time points in their first 7 years of life. Over three-quarters were living in relative poverty in at least three time points. This contrasts with just 15.8% of children who were not eFSM (at age 7). This would suggest that despite a considerable number of children living in relative poverty at age 7 who were not recorded as eFSM, few of them could be said to have been in persistent poverty. In contrast, eFSM children were more likely to have lived in persistent poverty. However, Table 3 also demonstrates that for every three children who were eFSM and living in poverty at all four Sweeps of the MCS there were two other children living in poverty at the same time points but who were not recorded as eFSM.

This initial analysis suggests that being recorded as eFSM is accurate in that it identifies children living in poverty. However, as with previous studies, this analysis shows it does not fully capture income disadvantage (i.e., poverty) and hence does not include every child living in poverty. Furthermore, being eFSM in a given year does not necessarily reflect previous levels of income disadvantage.

5. ELIGIBILITY FOR FREE SCHOOL MEALS AND OTHER SOCIO-ECONOMIC CHARACTERISTICS

In this section, the relationship between being recorded as eFSM and other socio-economic characteristics is examined. Table 3 summarises the relationship between being eFSM and some of these other characteristics.

TABLE 3: Socio-economic composition of Wales-domiciled non-FSM and eFSM children at age 7 years (weighted)

	Non-FSM	eFSM	Non-FSM children living in poverty
Gender			
Male	53.1%	50.5%	57.5%
Female	46.9%	49.5%	42.5%
Season of birth			
Autumn 2000	23.8%	30.5%	25.0%
Winter 2000/2001	25.6%	29.0%	26.2%
Spring 2001	25.2%	17.9%	21.4%
Summer 2001	25.4%	22.6%	27.4%
Highest NS-SEC of parent(s)/carer(s)			
Managerial and professional	47.4%	3.2%	7.9%
Intermediate	12.7%	1.8%	8.3%
Small employer or self-employed	8.1%	1.4%	13.5%
Lower supervisor and technical	8.4%	2.5%	9.9%
Semi-routine and routine	16.3%	14.6%	38.5%
Not applicable or unemployed	7.1%	76.4%	21.8%
Highest qualification of parent(s)/carer(s)			
None or overseas	3.6%	25.0%	11.2%
NVQ level 1	2.8%	11.9%	5.8%
NVQ level 2	20.2%	33.2%	39.0%
NVQ level 3	18.4%	13.1%	17.8%
NVQ level 4	40.2%	14.9%	22.4%
NVQ level 5	14.8%	1.9%	3.7%
Household structure			
Two parents/carers	85.9%	37.9%	66.5%
One parent/carer	14.1%	62.1%	33.5%
Geography ^a			
Urban	69.5%	80.4%	75.0%
Mixed	15.9%	11.4%	15.5%
Rural	14.6%	8.2%	9.5%
Area deprivation (index of multiple deprivation (IMD))			
20% most disadvantaged	15.2%	42.5%	29.1%
IMD 20–40%	18.5%	26.4%	25.5%
IMD 40–60%	14.6%	10.7%	13.1%
IMD 60–80%	19.7%	12.1%	15.5%
20% Least disadvantaged	32.0%	8.2%	16.7%

^aThe geography of the children in the MCS was only known at Sweep 1 when they were 9 months old.

There are number of observations to make from this. The first is that boys were more likely to be living in poverty but not recorded as eFSM than girls. This could be an important observation given recent trends in male low achievement. eFSM pupils were also slightly under-represented amongst spring- and summer-born children – again, these children were more likely to have lower attainment than their autumn- or winter-born counterparts, particularly during the primary years (Crawford *et al.*, 2013). In these early years, this could suggest parents of younger children entering primary school are less likely to apply for free school meals.

As perhaps expected, the majority (over three-quarters) of eFSM children were from unemployed households. But it is important to note that 7.3% of non-FSM pupils appeared to be from unemployed households, possibly reflecting the significance of some families moving in and out of unemployment but who were not recorded as being eFSM. It is also worth noting that 3.7% of eFSM children were from households with at least one parent in a professional or managerial occupation. But it is the relatively high proportion of non-FSM children living in poverty whose parents were self-employed or in (semi-)routine occupations that would appear to be of most importance. Despite their low incomes and low occupational groups, these children were not recorded as being eFSM. They constitute, therefore, an important group of children from disadvantaged backgrounds that being eFSM is not identifying.

Furthermore, whilst eFSM pupils were six times more likely than non-FSM pupils to have parents with no qualifications, pupils who were not eFSM but who were living in poverty were also more likely to have parents with no or low qualifications than non-FSM pupils. This would seem to be another group or set of characteristics that the eFSM indicator is not fully identifying.

Nearly two-thirds of eFSM pupils were from single-parent households, reflecting the criteria for eligibility. But being from a single-parent households per se does not necessarily mean that children are educationally disadvantaged. This will be an important factor to consider in the next section when the paper looks at the relationship with educational outcomes.

Lastly, it is useful to note the geographical relationships with eFSM. For example, it can be seen from Table 3 that eFSM children were more likely to live in urban areas and are significantly under-represented in rural areas. This may reflect differences in the geographies of socio-economic disadvantage, and this is reflected in the geographical distribution of children living in poverty but not recorded as eFSM. However, it is possible that these measures do not capture some distinct and contrasting features of rural poverty (OCSI, 2012). Similarly, there was an under-representation of eFSM children, particularly those living in poverty, from the least disadvantaged areas of Wales. This could reflect the stigma attached to applying for free school meals especially for low-income families living in predominantly high-income areas.

6. ELIGIBILITY FOR FREE SCHOOL MEALS AND COGNITIVE ABILITY

Knowing the socio-economic characteristics of eFSM children is only part of the picture. It is also important to assess whether eFSM children are at a disadvantage when it comes to their educational achievement. It is widely recognised that eFSM children are, on average, much less likely to achieve expected levels at the end of their primary years. Table 4 shows the percentage of Wales-domiciled children in the MCS who achieved the Core Subject Indicator (CSI) at the end of KS1 in 2006–2007. It is very clear that non-FSM pupils not living in poverty were one and a half times more likely to achieve this than eFSM pupils living in poverty (90.9% compared with just 61.5%). But Table 4 also shows that eFSM children not living in poverty were less likely to achieve the KS1 CSI than non-FSM children living in poverty. If these educational outcomes are an indicator of relative disadvantage then it would seem from this that being eFSM is a better measure of educational disadvantage than living in poverty. But what about other measures of SES? And what about the relative importance of different socio-economic characteristics on educational outcomes?

To fully test these relationships, multiple regression was used to try to discern the relative associations between a wide variety of socio-economic characteristics and educational outcomes. Since being eFSM is closely related to many of these socio-economic characteristics, particularly income, the models also include interaction terms (otherwise known as moderation effects). This provides the opportunity to consider whether the effect of an independent variable, such as being eFSM, on a dependent variable, such as word-reading ability, differs because of a second independent factor, such as the educational levels of parent(s) (based on National Vocational Qualification (NVQ) levels).

The educational outcomes employed in this analysis are presented in Figure 4. They represent a range of cognitive assessments undertaken in the MCS. This shows a consistent pattern across all outcomes; as with the KS1 CSI above, FSM pupils achieved, on average, lower scores in word-reading ability,

TABLE 4: Key Stage 1 achievement of Wales-domiciled children by free school meal and poverty status (weighted)

	Achieved CSI ^a	
	No	Yes
Non-FSM and not in poverty	9.1%	90.9%
eFSM and not in poverty	31.0%	69.0%
Non-FSM and in poverty	20.6%	79.4%
eFSM and in poverty	38.5%	61.5%
Total	16.0%	84.0%

^aCore Subject Indicator (CSI) = Level 2 or above in English or Welsh and Maths at Key Stage 1 (age 6–7 in 2006–2007)

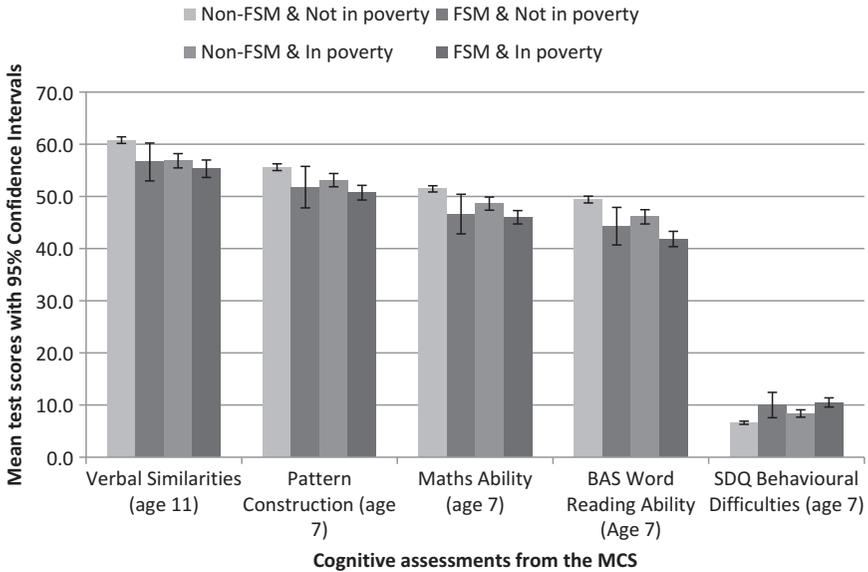


Figure 4. Educational outcomes of Wales-domiciled children by free school meal and poverty status (weighted)

maths ability and pattern construction at age 7, lower scores in verbal similarities at age 11, and had greater behavioural difficulties at age 7. Crucially, eFSM children not living in poverty tended to do worse, on average, than non-FSM children living in poverty, although these differences were not statistically significant and could have occurred by chance.

For brevity, only the regression results for two cognitive outcomes are presented here – for word-reading ability at age 7 and verbal similarities at age 11. Analyses of other age 7 cognitive outcomes (e.g., maths ability) generate different estimates, but the main conclusions of these are consistent with results for word-reading ability at age 7. The justification for using two assessments in literacy at age 7 and 11 is twofold. The first is that it is useful to consider the immediate versus more long-term effects of socio-economic disadvantage on educational outcomes. The second is that the relationships observed between these two educational outcomes and some of the socio-economic characteristics differ markedly. However, it is important to note that all the socio-economic characteristics used in the two models are based on when the children were aged 7. Therefore, the model for verbal similarities at age 11 does not take into account changes to these characteristics in the intervening 4 years. But on the other hand, the associations with verbal similarities at age 11 can be considered to be more robust because of the longitudinal nature of this analysis. Comparing the results of two independent cognitive assessments using the same children is

susceptible to regression to the mean – that is, children with outlying results in the first assessment are very likely to be closer to the mean scores for children in the second assessment. However, since these are separate models and neither is dependent upon the cognitive scores of the other in the models this should not affect the results.

The main finding from this analysis is that after controlling for other socio-economic characteristics, being eFSM is not significantly associated with word-reading ability at age 7. Indeed, on average, eFSM children score slightly higher than non-FSM children in these assessments once their other characteristics are considered. Furthermore, there appears to be no significant relationship between levels of household income, occupational group or neighbourhood deprivation and word-reading ability at age 7 either. Indeed, children in single-parent households achieved, on average, a higher word-reading ability than similar children in two-parent households. Since we know that the majority (two-thirds) of eFSM children are in single-parent households this may help explain why there does not appear to be a relationship between word-reading ability and eligibility for free school meals. The inclusion of interaction terms in the model between eFSM and the other socio-economic characteristics does not find any significant relationships either. The apparent absence of a strong relationship between these common measures of socio-economic disadvantage and cognitive outcomes in Wales has been demonstrated before in other studies using the MCS (Taylor *et al.*, 2014). This contrasts slightly from similar analyses for children in England where there are social class and income gradients in cognitive outcomes using the MCS, but they are greatly reduced after controlling for parental education (Sullivan *et al.*, 2013; Taylor *et al.*, 2013).

Instead, this analysis finds that there are significant differences in the word-reading scores of children by gender, season of birth, the number of siblings they had when they were born and the educational levels of their parent(s)/carer(s). Despite this, these models could only account for approximately 10% of the variation in the word-reading ability scores at age 7. If there are systematic socio-economic differences in educational attainment at age 7 then it seems that family size and educational levels of parents/carers are by far the most useful indicators of this.

Although surprising, similar conclusions were drawn from analyses of other cognitive outcomes at age 7, including maths ability. However, analysis of these factors on children's verbal similarities scores at age 11 reveals markedly different results (Table 5). Here, we find that FSM children had significantly lower scores on average after controlling for other characteristics. Furthermore, children from households with low income also achieved significantly lower scores than children from households with high incomes, and children from the most disadvantaged areas achieved lower scores than children in the least disadvantaged areas.

It is still the case that children from single-parent households achieved higher scores at age 11, and that children from large families and/or who had parents with

TABLE 5: Predicting literacy attainment of Wales-domiciled children at age 7 and 11 by eligibility for free school meals and other socio-economic characteristics (weighted)

	Word-reading ability age 7	Verbal similarities age 11
Unweighted population	1359	1359
Weighted population	1349.7	1348.7
Sampling degrees of freedom	85	85
R ²	0.103	0.115
Adjusted R ²		
Characteristics at age 7 unless specified		
Gender		
Male	<i>Ref.</i>	<i>Ref.</i>
Female	2.37***	-0.56
Season of birth		
Autumn 2000	<i>Ref.</i>	<i>Ref.</i>
Winter 2000/2001	-1.73*	-0.15
Spring 2001	-2.32*	0.47
Summer 2001	-3.75***	1.62
No. of siblings at birth		
None	<i>Ref.</i>	<i>Ref.</i>
One sibling	-0.65	-1.94**
Two siblings	-2.67*	0.05
Three or more siblings	-2.63*	-4.03**
Household Structure		
One parent/carer	1.46*	2.76***
Two parents/carers	<i>Ref.</i>	<i>Ref.</i>
Highest NS-SEC in H/ hold		
Professional or managerial	<i>Ref.</i>	<i>Ref.</i>
Intermediate	2.22	-3.34~
Small employer. or self-employed	3.50	-1.16
Low supervisory or technical	-1.15	-4.62~
Semi-routine or routine	-0.71	-1.81
N/A or unemployed	-1.63	-3.55
Highest NVQ in H/hold		
None or overseas	-7.31***	-4.78***
NVQ level 1-3	-2.45*	-0.88
NVQ Level 4-5	<i>Ref.</i>	<i>Ref.</i>
Geography^a (Birkbeck classification)		
Urban	<i>Ref.</i>	<i>Ref.</i>
Mixed	-1.33	0.14
Rural	-1.56~	0.12
Neighbourhood deprivation		
20% most disadvantaged	-1.09	-2.86*
IMD 20-40%	0.70	-1.00
IMD 40-60%	1.12	-1.05
IMD 60-80%	1.00	-1.94
20% Least disadvantaged	<i>Ref.</i>	<i>Ref.</i>

(Continued)

TABLE 5: (Continued)

		Word-reading ability age 7	Verbal similarities age 11
Free school meals	Recorded as eligible	1.00	-6.27**
	Recorded as not eligible	<i>Ref.</i>	<i>Ref.</i>
Equivalised income	<£237	-1.59	-8.25***
	£237-£560	-0.99	-6.44***
	£561-£885	2.51	-3.05~
	£886+	<i>Ref.</i>	<i>Ref.</i>
FSM interactions (redundant interactions removed)			
Non-FSM and two parents/carers		1.01	0.02
Non-FSM and professional or managerial		3.77	-4.93
Non-FSM and intermediate		-3.27	10.85*
Non-FSM and small employer or self-employed		-2.59	0.17
Non-FSM and low supervisory or technical		1.03	11.99~
Non-FSM and semi-routine or routine		1.68	-0.15
Non-FSM and no NVQs		-0.87	-3.42
Non-FSM and NVQs 1-3		0.54	-3.35
Non-FSM and most disadvantaged wards		-5.04	6.09*
Non-FSM and 20-40%		-6.11	8.32**
Non-FSM and 40-60%		-5.08	5.68*
Non-FSM and 60-80%		-8.21~	6.71
Non-FSM and <£236 equivalised income		6.00	2.29
Non-FSM and £237-£560 equivalised income		4.49	3.95

~ $p < 0.01$; * $p < 0.05$; ** $p < 0.005$; *** $p < 0.001$

^aThe geography of the children in the MCS was only known at Sweep 1 when they were 9 months old.

low or no qualifications achieved systematically lower scores. But levels of income, and hence eFSM status, at age 11 now appear to be the most important socio-economic characteristics to account for variations in educational achievement. It is also worth noting that none of the interaction effects to predict verbal similarities scores at age 11 suggest there are any specific groups of non-FSM children that are particularly disadvantaged educationally because of their other socio-economic circumstances, including household income. Indeed, children not eFSM and living in socio-economically disadvantaged areas achieve significantly higher scores.

These second set of results would suggest that being eFSM is a good indicator of socio-economic disadvantage in terms of educational outcomes. However, they still demonstrate that being eFSM does not account for all the variation in educational outcomes of other children with other socio-economic disadvantages, whether they are living in low-income households, living in the most disadvantaged areas of Wales, having older siblings, having unemployed parents or having parents with no or low educational qualifications.

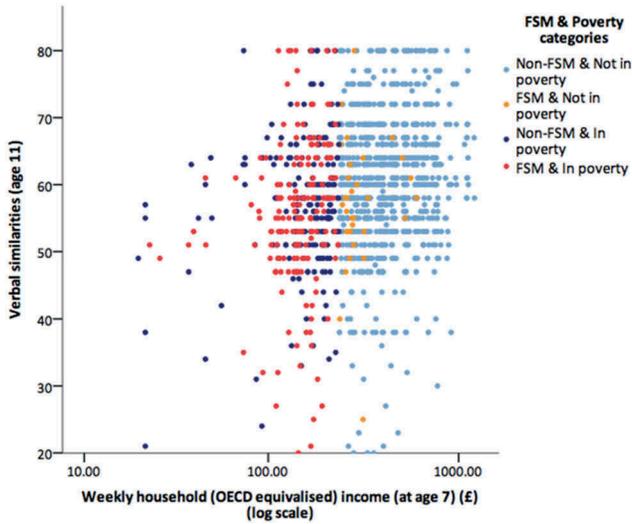


Figure 5. Verbal similarities (age 11) by household income (and eFSM status) of Wales-domiciled children

Finally, it is worth noting that the propensity to use binary categories (i.e., eFSM versus non-FSM pupils) to compare educational achievement of children can tend to simplify the complex relationships between socio-economic disadvantage and educational outcomes (such as those presented in Table 5). Despite a relatively strong association between income and cognitive outcomes at age 11, the distribution of individual children by their cognitive scores and their respective household income clearly illustrates how weak (and complex) this relationship really is (Figure 5). Figure 5 also illustrates the challenge that policymakers face when attempting to mitigate the impact of socio-economic disadvantage on educational outcomes. Policies and interventions focussing solely on pupils' eFSM may have the appearance of concision, but such a binary policy tool may not be able to fully address the complex and nuanced relationship between socio-economic circumstances and educational outcomes.

7. CONCLUSIONS

In terms of assessing the reliability of eFSM as a measure of socio-economic disadvantage, this simple binary measure is a very good indicator. However, in the context of its relationship with educational outcomes the limitations of this measure are more clearly highlighted. There are three ways in which the paper has assessed the eFSM measure. The first is whether being eFSM fully captures all those who have socio-economically disadvantaged backgrounds. The initial descriptive analysis of eFSM children would suggest that they did clearly

represent children living in the poorest households in Wales. However, it was also clear that a small but significant group of children who were not eFSM were living in poverty. Indeed, just under 8% of children not eFSM appeared to have been living in poverty for most, if not all, of the first 7 years of their lives. Similarly, 7% of non-FSM children have unemployed parent(s). Given 17.7% of all Wales-domiciled children in the MCS are known to be as eFSM this 'other' socio-economically disadvantaged group constitutes a significant group of children. This is not that surprising given that the number of children living in poverty is nearly twice that of children eFSM. But it does help explain why practitioners face challenging decisions when deciding how to spend resources to reduce the attainment gap between eFSM and non-FSM pupils but which is also intended to mitigate the effects of socio-economic disadvantage more generally.

The second way of assessing the reliability of the eFSM measure is whether all eFSM pupils are socio-economically disadvantaged. In terms of income and poverty, it certainly seems the case that eFSM children are amongst the poorest in Wales. However, a small number of them had at least one parent in a professional, managerial or intermediate occupation (5.0%) and/or had at least one parent with an NVQ Level 4 or 5 qualifications (16.8%). It is quite likely to be the case that these 'anomalies' result from the very high proportion of eFSM children in single-parent households (62.1%). Although these findings deserve some attention, it is certainly the case that whilst the eFSM measure may not capture everyone from socio-economically disadvantaged backgrounds it is nevertheless a good measure of identifying only children living in socio-economically disadvantaged households.

The final way, the paper has assessed the reliability of eFSM as a measure of socio-economic disadvantage was to examine the relationships between numerous socio-economic characteristics and a variety of educational outcomes. If being eFSM is a good way of identifying some of the most socio-economically disadvantaged children in Wales (as the conclusions above would suggest) then this would really be of importance in an educational context if this group of children were also found to have significantly worse educational outcomes. Otherwise, what kind of systematic inequality are policymakers attempting to address through such policies as the Pupil Premium and the Pupil Deprivation Grant? Based on literacy ability at age 7, there was almost no relationship found between being eFSM or living in poverty and levels of attainment. Instead, other socio-economic factors such as the educational levels of parents appeared to be of more importance in accounting for differential attainment. These are similar results to other recent analyses in England using a different survey data set, the LSYPE. Ilie *et al.* (2017) also found that 'parental occupation levels and parental education are the best predictors of pupils' attainment [at age 15]' (2017, p. 268). Indeed, they too go on to argue that income was a weak predictor of attainment. However, literacy ability at age 11 was strongly associated with all the socio-economic variables available to the analysis, including low income and being eFSM. Given this was irrespective of whether children were eFSM or not (or

irrespective of household income levels), then this would still suggest that being eFSM does not capture all forms of socio-economic disadvantage in the educational context. The contrasting results between educational outcomes at age 7 and then at age 11 might also suggest that inequalities of educational outcomes between eFSM and non-FSM children could be reinforced during their schooling.

Crucially, however, none of the interaction effects between these circumstances and not being eFSM are negatively associated with cognitive outcomes at age 7 or 11. Therefore, it is not clear that there is a distinct or clearly identifiable group of non-FSM children who systematically underachieve. In contrast, children who are eFSM do share a common (i.e., average) and significant disadvantage in terms of their levels of educational achievement.

These findings have important consequences for both analysts and policy-makers. It is certainly the case that eFSM is not a perfect proxy for socio-economic disadvantage, and that there are quite significant numbers of other children who experience socio-economic disadvantage of one form or another. This would help to explain the concern amongst practitioners that policies and interventions that primarily target children who are eFSM neglect other children in similar levels of need. However, the relationship between socio-economic disadvantage and educational attainment is not as straightforward as commonly assumed, or at least as it is understood in policies such as the Pupil Premium in England and the Pupil Deprivation Grant in Wales. And because of this complex set of relationships, it is difficult to clearly identify a group of socio-economically disadvantaged learners to target initiatives that are designed to try and mitigate the disadvantages they experience. For all its imperfections, being eFSM comes very close to identifying such a group, even if it does mean that other children are absent from this group who perhaps also warrant positive discrimination. In addition, the use of eFSM status has been very important in drawing attention to systematic differences in educational achievement due to children's socio-economic circumstances. But it could now also be argued that eFSM status is not sufficient *alone* at helping policymakers design interventions to mitigate such socio-economic inequalities. Analyses that combine eligibility for free school meals with other socio-economic indicators to create combined measures, such as Chowdry *et al.* (2013) and Strand (2014), may now be necessary.

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10. DISCLOSURE STATEMENT

No potential conflict of interest was reported by the author.

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