

Opportunities and challenges of using secondary analysis for analysing social policy questions in Early Childhood Education and Care and children's food and nutrition

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UCL Institute of Education:
PhD by Publication

23 October 2019

Declarations

This thesis is not substantially the same as any previously submitted or currently being submitted by the candidate whether published or in unpublished form, for a degree, diploma, or similar qualification at any university or similar institution. I, Antonia Simon, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Work for submission must include: a) Complete list of author publications (see appendix 3), b) the candidate publications (copies of which are included in the submission in appendix 2), and c) an integrative summary of between 10,000 and 20,000 words providing an analytic commentary on and synthesis of the works included in sections 1-9. These publications must be limited to the five years preceding the acceptance to undertake the PhD programme of study, with no stipulation about where the articles should be published. However, references can be made to previous and forthcoming publications. Due to Covid-19 and issues at UCL beyond the candidate's control, there is a larger than expected gap between the writing of this thesis and its submission for examination.

The entire thesis word count of the thesis is within the 100k limit for a UCL PhD (96,761). The layout of sections is as specified in the binding instructions.

Abstract

Aims: This integrative summary aims to critically assess the opportunities and challenges of using secondary data analysis of large-scale UK data for addressing social policy questions within Early Childhood Education and Care (ECEC) and children's nutrition (two areas of my research and which both focus on aspects of childhood wellbeing and developmental health). A key and original contribution of the integrative summary is the proposal of identifying a core outcome set (COS) of indicators, underpinned using Bronfenbrenner's '*proximal*' and '*distal*' factors (Bronfenbrenner and Morris, 2006), within studies of early childhood education and care (ECEC) and children's food and nutrition. The development of these COS are recommended in order to support ongoing secondary analysis research in these areas e.g., to assess service or outcome quality.

Research Questions: RQ1: What does the literature identify as important concepts, factors and indicators and what does this suggest for a scope of a COS in my two research areas? RQ2: What indicators have been operationalised and analysed within my work? RQ3: What are the 'data gaps' within current large-scale UK data collections regarding the operationalisation of indicators in ECEC and children's food and nutrition? RQ4: What indicators could be included within a COS for ECEC or children's food and nutrition?

Methods: First, a critical review of seven of my candidate publications from the past 5 years and the literature on ECEC and children's food and nutrition. Second, to follow the suggested steps within the Core Outcome Measures in Effectiveness Trials framework (COMET) for developing a COS by identifying suitable indicators using literature in my two subject areas.

Findings: RQ1: In ECEC, literature suggests 'good relationships' are key for achieving 'good quality outcomes' for children and it is important to distinguish and measure both structural and process concepts (distal or process) of service quality, underpinned by what children need for their development. In children's food and nutrition, the key concepts discussed are indicators of dietary quality in relation to key government targets (measured through consumption of single foods or analysis of the 'whole diet') and indicators of dietary intake that meet needs for health and social participation as part of wider living standards. RQ2: Relationships between adults and children in ECEC settings are not well measured within large-scale UK

datasets. These so-called process or proximal concepts are difficult to identify and operationalise. Secondary data analysts instead have to rely on measuring and analysing structural/distal concepts available to them in datasets. Proxy indicators, such as staff qualifications, can be used but it is not clear if these are good for assessing service quality. In children's food and nutrition, indicators developed in relation to nutritional benchmarking are often subjective indicators (because they are based on self-reported behaviour) and are mostly process/proximal indicators, centred on the child. RQ3: Indicators are often 'fragmented' (spread across datasets), which makes secondary analysis of large-scale data difficult for researchers who may have to combine datasets or carry out separate analysis using a range of datasets. In children's food and nutrition, large-scale UK data have detailed nutritional information but may lack important contextual data and/or have issues with reliability in the data collected. RQ4: The beginnings of a COS has been identified for ECEC and children's food and nutrition based on evidence from the earlier RQs (drawing on the literature) to identify indicators that are important to measure. However, each COS needs further refinement through consultation with a relevant group of experts in each subject area.

Conclusions: Secondary analysis of existing data has enormous potential for monitoring outcomes for children and families, through for example, the identification of a core outcome set (COS) within ECEC and children's food and nutrition. To overcome problems of data fragmentation (when indicators are spread across a number of datasets), a COS in my research areas is recommended to enhance efforts for data harmonisation (unifying measures across research studies). The success of implementing a COS in ECEC and children's food and nutrition is reliant on three key things. First, common understandings and definitions of indicators (and here my work needs building to include consultation with expert groups). Second, development of outcome indicators that are sensitive to the context in which they are being developed and applied. Third, a clear understanding of the purpose or aims of the indicators being included through the inclusion of an agreed supporting theoretical framework to unite the indicators and guide their organisation within the COS. This last point is important for providing a sound evidence base for informing social policy and practice.

Impact statement

I am an Associate Professor of Social Policy, with a background in human geography, who has been working for more than 20 years carrying out research within the field of child and family social policy, focusing on early childhood education and care (ECEC) and children's food and nutrition¹. These are two key areas which are concerned with understanding and supporting the wellbeing of children and developmental health (Hertzman, 2010) and they are the central focus of the research unit, Thomas Coram Research Unit, where I have worked for a substantial part of my career. My research predominantly uses secondary analysis methods, either as a standalone method or as part of mixed-methods research (where I provide the statistical expertise within a multi-disciplinary team), to examine large-scale datasets within the UK and Europe to address policy relevant research questions within these areas.

The thesis includes a critical review of selected publications from my work from the five years prior to registering for this degree. This thesis, and my wider body of work, contributes to the evidence base and is beneficial for the academic community for two reasons. The first contribution I make is to illustrate and discuss the opportunities and challenges of using secondary quantitative analysis of large-scale data for addressing social questions within my two research areas. This involves analysing concepts (or factors – the terms are often used interchangeably) which the literature I have reviewed for this thesis consider to be important for addressing social policy questions (see section 2). I also discuss related issues, including challenges with operationalising indicators within my research areas. An indicator is something that points to, measures or otherwise provides a summary overview of a specific concept or factor².

Operationalisation refers to 'the process of figuring out how to measure the concepts that interest us'³. In my thesis, I have used the term to mean how I have worked with large-scale quantitative data to identify and analyse concepts and factors in early childhood education and care (ECEC) or children's food and nutrition to address social questions about service or outcome quality. Outcome indicators

¹ <https://iris.ucl.ac.uk/iris/browse/profile?upi=ASIMO62>

² <https://www.qualityresearchinternational.com/socialresearch/indicator.htm>

³ <http://mateenaltaf.blogspot.com/2017/02/operationalization-of-variables.html>

within this thesis differ according to whether they are being considered within ECEC or children's food and nutrition. I am defining outcome indicators in my thesis as a standard against which the success of social policies can be assessed. Outcome indicators in this context can be to assess services. For example, to assess quality of service ECEC provision as distinguished by two main types: 'structural quality', understood as the quality of the conditions of the ECEC centre, such as the number of staff and their working conditions, and 'process quality', understood as the way in which a child experiences the ECEC setting (Janta, van Belle and Stewart, 2016). Or outcome indicators can be some form of child outcome, for example, within my work on children's food and nutrition, we operationalised concepts of child health through indicators of dietary quality. These indicators are usually underpinned by an understanding of what children need for their development and/or what produces good child outcomes.

In discussing issues of operationalising concepts in my two research areas, I identify an important issue of 'data fragmentation' of indicators (by which I mean indicators are often spread across different datasets or platforms and/or indicators are not comparable across research studies) which makes secondary analysis problematic for researchers.

The second and most important contribution my thesis makes, is to identify a Core Outcome Set (COS) within ECEC and children's food and nutrition, which I underpin using Bronfenbrenner's '*proximal*' and '*distal*' factors (Bronfenbrenner and Morris, 2006). A COS is 'an agreed minimum set of outcomes or outcome measures. It is a recommendation of 'what' should be measured and reported in all trials in a specific area'⁴. The aim of proposing the identification of a COS in each of my research areas is to bring together indicators used to measure concepts which the literature I have reviewed for this thesis considers to be important for evaluating child and family outcomes and / or services for children, and which consider what children need for their development. I argue that the identification of a COS in each of my research areas could be a good way of supporting ongoing secondary data analysis research within these areas and of overcoming data fragmentation issues (by which I mean avoiding issues of indicators being spread across a range of datasets in secondary analysis research). However, I suggest in the conclusions of this

⁴ <http://www.comet-initiative.org/glossary/cos/>

integrative summary that before a COS in ECEC or children's food and nutrition can be implemented, more work needs to be done building on my initial steps in this thesis. For example, to consult with experts in the field in order to determine (and then agree) if the indicators I have suggested (which are based on a critical review of published literature and my own understandings of working with indicators and datasets) are indeed useful to be drawn together, and which indicators, if any, should be added (or removed).

Following this impact statement is a critical review of my papers, which discusses the unique contributions each of my submitted papers make to the field of social policy and secondary analysis research practice. For example, the creation of a novel diet quality index in the area of children's food and nutrition which did not exist prior to my research but which has the potential to enable overall dietary quality to be assessed for different ages of children.

My research continues to make national and international impact. For example, the findings of my research within the ECEC domain have contributed to changes within the Standard Occupational Classification (SOC) system for ECEC occupations (see end of appendix 1 for more details). Exemplar evidence of media impact of my ECEC work can be found in Appendix four. My work on pay and the working conditions of the British childcare workforce has also been used in a major European Union report (Hevey 2017 p.61) and the methodology has been used within analysis for a new Nuffield Project led by Dr Sara Bonetti at the Education Policy Institute for a Nuffield Foundation study on the Early Years which is currently underway (2018)⁵. In recognition of the impact of my work in the field of ECEC, I am currently leading an important project to conduct an analysis of the reach and impact of private sector childcare in England for the Nuffield Foundation⁶.

⁵ I was approached by this team to explain how I had conducted my analysis and to advise on their approach. On page 8 of her report she acknowledges this by saying 'The report builds on two other pieces of research, Simon et al. (2007) and Machin, McNally and Ou (2010), which provided data about the childcare and social care workforce until 2005 and 2008 respectively' which cites my earlier work.

⁶ I am the PI of this new project taking place between February 2019 and December 2021. See project webpage: <https://www.ucl.ac.uk/ioe/news/2019/mar/private-sector-childcare-england>.

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Acknowledgements

I would like to thank my supervisors, Professor Ingrid Schoon, Professor Sandy Oliver and Dr Rebecca O'Connell, for their advice and guidance throughout the writing process. I would also like to thank Charlie Owen and Rebecca Rees who gave their time generously to me as internal reviewers and for their support and encouragement. I am grateful for having such supportive family and friends who allowed me the time to write this and encouraged me to stick with it, especially my husband Paul, my daughters, Sophia and Alana, and friends (especially Elaine, Kristina, Natasha and Jenny). I owe much of this also to my colleagues with whom I conducted the research on which this thesis reports.

Critical review of candidate publications and supporting statements

This is a thesis by publication, formed by selected publications and an integrative summary. My selected papers forming this thesis (see appendix 2) from my research in ECEC, and children's food and nutrition are two key areas which are concerned with understanding and supporting the wellbeing of children and developmental health (Hertzman 2010). The candidate publications were chosen to form part of my thesis for two reasons. First, because they were conducted within the permitted timeframe for this thesis. Second, and most importantly, because together they demonstrate the opportunities and challenges of using secondary analysis for analysing social policy concepts in ECEC and children's food and nutrition to inform policy on ECEC and child nutrition.

The papers are united by a common methodology of using secondary analysis of large-scale data to address social policy questions within ECEC (where secondary analysis is a standalone method, papers 1-4) or children's food and nutrition (where the papers report on the secondary analysis results, papers 5-7, of a wider mixed-method study in which I provided the statistical social policy expertise). For the papers drawing on mixed-method studies (papers 5-7), other social policy questions were asked which could not be addressed by the large-scale datasets using qualitative methods and are reported elsewhere by other members of the research teams.

This thesis discusses how indicators within my publications, along with other indicators identified in the literature review for this thesis, could be used within core outcome sets (COS) in my research areas to improve issues of data fragmentation (by which I mean indicators spread across a range of datasets in secondary analysis research), and to enable better data harmonisation (the process of combining or bringing together and unifying measures from multiple data sources into an integrated unit or site).

The papers are all peer-reviewed outputs. Table 1 in appendix one summarises the key findings of these papers, including the datasets I used for the analysis carried out within those papers (the candidate papers are submitted within appendix 2). As a consequence of how these research projects were carried out, as part of multi-disciplinary team effort (most also mixed-method), the candidate papers are all co-authored with colleagues on these projects (except paper 1 which is sole authored). It is common practice to co-author research publications within social science policy research teams. However, in all candidate publications, I was the lead author and led on the analysis reported within them.

The papers build on a much larger body of work dating back to 2001 as detailed within my complete list of publications in appendix 3. Where relevant, I draw on the papers and also some of my 'back catalogue' publications in the discussion within the sections of my integrative summary. Before this, I critically assess the analysis within my papers/chapters, and in so doing, draw out the key contributions and impact of my submitted papers.

My papers are descriptive in nature. First, they provide the descriptive context for the work required within the mixed-method studies I have undertaken. The role of my statistical work here has been to provide information about a large sample of participants which other parts of the work, using qualitative methods, could draw on in order to assess how a smaller in-depth sample compares with the wider population. This is exemplified in my work within children's food and nutrition. Second, the aim of my work in the papers within this thesis, has been to illustrate and describe changes within ECEC which as I go on to describe, has been important for impacting changes in the classification of ECEC workers within Britain.

As De Vaus (2001) argues, 'although some people dismiss descriptive research as 'mere description', good description is fundamental to the research enterprise, and it has added immensely to our knowledge of the shape and nature of

our society' (p.2). Descriptive accounts can vary in their nature and complexity of course, but 'good ones' are argued to raise important questions about 'why' patterns are observed, and they will contribute to knowledge by for example using exploratory analysis to develop, challenge or advance theory (*ibid*). This is not to say that some of my analysis could usefully be extended through the application of more advanced statistical techniques to model which factors are most important (statistically) for explaining why parents use different modes of childcare and for controlling for important contextual factors such as maternal education and family/household income. As the discussion that follows shows, some datasets do not collect data about contextual factors or they do not collect them in the right way/in a reliable way, which hampers the types of analysis that can be carried out using large-scale datasets.

Overview of the contributions made

Within ECEC, my work using secondary analysis methods has led to changes within the Standard Occupational Classification (SOC) system which is used within the Labour Force Survey (LFS) to identify, count and provide details about different workforces in the UK (I and others have used it to analyse the ECEC workforce). My work has also been cited in several media outlets and academic publications and has therefore furthered knowledge about the ECEC sector. Paper one highlights important methodological challenges of working with large-scale data such as 'data fragmentation' (where indicators needed for analysis are spread across several datasets). My review of paper two suggests qualifications are not necessarily the best indicator to measure the concept of 'ECEC quality' and that it is possible to obtain a range of different estimates for the numbers of staff working in ECEC by using different datasets and classifications of childcare workers. Paper three suggests maternal education and/or income may be more important than maternal employment status for explaining patterns of ECEC use. My critical review of this paper suggests further analysis is needed to really unpack these patterns to disentangle which factor explains most of the variance. Paper four suggests important differences between the ECEC workforces in New Zealand (NZ) and England. This paper also highlights the problems with comparing data between these two countries – e.g., about differences in qualifications.

Within children's food and nutrition, a novel diet quality index was created led by me (Paper 5), which did not exist prior to our research but which has the potential to enable overall dietary quality to be assessed for different ages of children. However, this index needs to be validated. My review of paper five suggests two data factors caused problems in analysis and interpretation. First, the lack of information on maternal hours of work in the NDNS. Second, the four-day unweighted food diaries which although considered as 'gold standard' dietary data, may not be reliable because they could be burdensome for families to complete. My review of paper six reveals differences in food consumption between Family Affluence Groups (FAS) were small, meaning the interpretation of these results must be treated with caution. Paper seven (the last paper) argues for the need to consider social participation when using food budgets as indicators in research concerned with examining children's wider living standards. My critical review of my papers highlights how different approaches to analysing indicators can impact the results obtained.

Topic 1: Early Childhood Education and Care

Paper 1. Simon, A. (2017) A critical review of the advantages and limitations of using national large-scale data to examine childcare patterns in Britain. Journal of Early Years: An International Journal.

<http://dx.doi.org/10.1080/09575146.2017.1291586>.

This is a sole authored paper which draws on a major ESRC funded research study of which I was the principal investigator and which examined the 'Provision and Use of Preschool Childcare in Britain'. I was the principal investigator of this research and directed all the analysis and was lead author on this paper. I wrote this paper to highlight crucial issues involved with carrying out the research and drawing on the project's methodological challenges.

This paper critically assesses the methodological considerations from conducting the analysis reported in papers 2 and 3. In addition to critically evaluating the challenges of using secondary analysis, this paper provides an analysis of the patterns of ECEC provision and usage in Britain with applicability for the UK and other countries seeking to understand how best to utilise their statistical collections for examining childcare patterns. These issues are important for

researchers tasked with analysing trends in the care workforce or in parents' use of childcare. In critically evaluating the empirical analysis from papers 2 and 3 for example, this paper is able to highlight some important issues, such as the fragmentation of indicators across datasets when addressing key ECEC social policy questions. For example, I discuss in this paper how the information to address our research questions was not all available in one dataset. I found that while some datasets had great detail about ECEC provision, they lacked sufficient geographical coverage. A major contribution of paper 1 was using its evidence to petition the UK Office for National Statistics for changes to adjust the occupational codes for classifying the childcare workforce. The newly revised SOC is in line with my recommendations. For example, amendments to the unit group titles in order to join up education and care, to disaggregate the SOC2020 unit group for 'Early education and childcare services managers and proprietors' (1233) and to split managers from owners/proprietors to form two new unit groups – as managers have different qualification levels to what could be considered more 'frontline' staff. See end of appendix 1 for a more detailed explanation of these changes.

Paper 2. Simon, A., Owen, C., and Hollingworth, K. (2016) Is the 'quality' of preschool childcare, measured by the qualifications and pay of the childcare workforce, improving in Britain?. American Journal of Educational Research, Vol.

4, No. 1, 2016, pp 11-17. <http://pubs.sciepub.com/education/4/1/4/index.html>

Although this paper is co-authored with the other researchers on my grant, I was the principal investigator of this research (same project as above), directed the analysis and lead the analysis and interpretations within this paper.

This paper provides in-depth analysis about the ECEC workforce in Britain using data from a range of sources including the Labour Force Survey (LFS, see Table 1 in the appendix). Other research has related qualifications to quality (e.g., see for example Sylva 2010). In this paper we used qualifications of the childcare workforce as assessed in large-scale data as a proxy of the quality of childcare provision. We assessed changes in qualifications over time (between 2005 and 2014) in the childcare workforce. Our paper identified a highly gendered workforce that has seen modest improvements in qualifications but persistent low pay. We also found long service in the workforce (an average mean length of service of six years and increasing), despite the low pay of the sector. Identifying these patterns matter

because staff recruitment, retention and workforce turnover are commonly cited as problems in practitioner publications for childcare services, with many providers arguing that these factors can undermine the quality of ECEC (Cameron, Moss and Owen 1999). However, as I go on to discuss later in this thesis, qualifications are not necessarily the best measure of ECEC quality – they are certainly not the only measure of quality which can and has been used. However, it was the only indicator of childcare quality available to us within the LFS dataset.

This paper analyses trends in the workforce about the numbers and characteristics of the ECEC workforce and how these results compare using different datasets. As we detail in this paper, a variety of estimates of numbers can be obtained by using different datasets and classifications of childcare workers. This paper was important for highlighting a number of important issues related to the classification of childcare workers in the LFS that would not otherwise have been identified, and which led to the revisions of the SOC outlined above. However, the analysis in this paper is limited. First, we cannot say if qualifications directly relate to quality. An alternative interpretation could be that the increase in qualifications we observed reflected wider changes such as the trend for increasing numbers in higher education (Benson 2015).

This paper also makes no comment about how the observed trends may relate to other workforces such as adult social care. However, in earlier analysis I undertook (Simon et al. 2003 and 2008), we carried out cluster analysis to ascertain similarities and differences between the childcare workforce and other related workforces, including adult social care and education workers (not classified as childcare). This was useful for widening out the debate and showing how ‘social care, childcare, nursing and education occupations cluster into three groups; cutting across sectors: a professional group, a low-skilled group and a middle group’ (Simon et al. 2003: 44). This cluster analysis was also important for identifying similar workers who might (in principle) fill gaps in the childcare workforce (gaps here meaning people to do the work).

Third, while the paper did make comparisons over time, we did not carry out any significance testing to assess difference between the years we examined. This is because the main aim of the paper was to consider numbers and characteristics of the ECEC workforce at each time point using a range of datasets. It means we have been unable to comment if the reported relationships in this paper are significant

over time. While this paper could perhaps be usefully built upon by carrying out some of this significance testing, caution needs to be applied when placing too much emphasis on significance testing. For example, the ‘over-use’ or ‘mis-use’ of p-values in statistics has garnered much criticism in recent years (Baker, 2016; Wasserstein, Schirm and Lazar 2019 and these blogs). The main arguments are that the role of ‘statistical significance’ in interpreting results of analysis has been over-emphasised (Jeehyoung and Heejung 2016). Report using p-values can for example produce mixed results. Some have argued it is not rare to find variations in reported p-values between similar (medical) studies (ibid). This means that researchers should use alternative indicators, such as effect size (Lee 2016), or non-statistical evidence (for example through theory or qualitative evidence) to interpret data results rather than relying on statistical evidence alone (Jeehyoung and Heejung 2016). Another key argument is that the probability of finding a false positive result increases with the number of hypotheses tested within one study which can therefore de-value the statistically significant result (Ranstam 2012). Also, that a statistically insignificant outcome does not mean no difference exists between two groups in a population – it simply means the observed sample is too small to detect a population effect (ibid). A similar argument is true of very large samples where it is easier to detect a positive statistically significant result because of the sample size (Sullivan and Feinn 2012).

Paper 3. Simon, A., Owen, C., and Hollingworth, K. (2017) Is targeting formal childcare the best way to meet the needs of families in Britain? American Journal of Educational Research, 5(7), 794-800.

<http://www.sciepub.com/EDUCATION/abstract/7828> I was the principal investigator of this research (same project as above), directed the analysis and was the lead author on this paper.

One aspect of our research on the ‘Provision and Use of Preschool Childcare’, on which this paper reports, was concerned with understanding how families use childcare and what types of childcare they use. We carried out descriptive analysis which examined the types of childcare families were using. In so doing, we hoped to see if targeting resources towards formal childcare meets the needs for families. We asked ourselves these analysis questions: Is formal childcare what families mostly use? Does the proportion of formal childcare use vary for

different types of family? (E.g., by employment status or maternal education or by family income).

This analysis arose out of UK policy which placed value on 'formal' (paid for) childcare services:

'More great childcare is vital to ensuring we can compete in the global race, by helping parents back to work and readying children for school and, eventually, employment' (Department for Education 2013b: 6).

The benefits of formal ECEC provision has also been demonstrated through research showing better child outcomes in this type of care. For example, language development at age three has been linked with increased hours spent in formal individual ECEC (this has been reported in the Study of Early Education and Development (SEED), Melhuish, Gardiner and Morris 2017). However, research by Ofsted shows that children in the UK do not all have access to childcare of a sufficient standard to achieve desired developmental outcomes (Ofsted 2016).

We hypothesised that if government policy has been successful at encouraging the take-up formal ECEC services, then we would find a greater proportion of families using 'formal' childcare services over time, and from this we could *start* to address the question of whether 'targeting formal childcare is best for families' (title of paper in paper 3). 'Best' here was interpreted to mean the best form of childcare for meeting the childcare needs of families.

As the results of this paper show, we found that parents still rely heavily on informal care and that there are differences between parents, and over time in the use of childcare. For example, we found that mothers working full-time use more than one form of childcare to provide cover for what they need, raising important questions about whether formal childcare alone can meet parental childcare needs. However, there are two notable limitations with this paper. First, we report trends over time by comparing proportions of different childcare use at different survey years. However, we do not carry out any analysis to test the statistical significance of these changes to comment on the size of these differences or to better unpack which of the factors we examine affect take-up of childcare services the most. For example, is it maternal education or income or maternal employment status that explains most of the variance? It was never the intention for our analysis in this paper to be exhaustive, but to highlight patterns which could be further researched – ideally by qualitative enquiry in order to ascertain what parents think is best for them and to

enquire why they use the forms of childcare they do. This paper reports on only one part of a broad set of analysis we carried out to examine the 'Provision and Use of Preschool Childcare in Britain'.

Paper 4. Cameron, C., Dalli, C., Simon, A. (2017). 'The development of a united ECEC workforce in New Zealand and England: a long, slow and fitful journey'. In, Miller, L., Cameron, C., Dalli, C., and Barbour, N. Eds. The Sage Handbook of Early Childhood Policy. <http://dx.doi.org/10.4135/9781526402004.n36>. This was a collaborative paper forming a chapter in a book. My role in this paper was to carry out the analysis reported in this paper about the English workforce, conduct some new analysis about union membership in England and synthesise the statistical data from New Zealand in order to make comparisons in pay and characteristics between the workforce in England and in New Zealand.

This paper provides a unique and important analysis of the care workforces in New Zealand (NZ) and England using the latest available large-scale data. It finds that despite improvements in workforce qualifications and professionalisation, pay remains low in this sector, especially in England. This includes a commonly used service in the UK, called 'home-based care', known as 'childminding' in the UK, which is paid childcare provided in a home setting (Ang and Tabu, 2018). The paper is also descriptive and does not carry out any statistical modelling to examine changes between the two countries. This is because for the most part, the data between NZ and England could not be directly compared (as commented in the paper). Although descriptive, the content of this paper is important for highlighting key statistical challenges with comparing qualifications and ethnicity between the two countries.

Topic 2: Children's Food and Nutrition

Paper 5. Simon, A., O'Connell, R., and Stephen, AM. (2012) Designing a nutritional scoring system for assessing diet quality for children aged 10 years and under in the UK. Methodological Innovations Online, 7(2): 27-40.

<http://journals.sagepub.com/doi/abs/10.4256/mio.2012.009>

In collaboration with Alison Stephen and Dr Rebecca O'Connell, I developed a scoring system, a 'diet quality index' (DQI), to work with data in the National Diet and

Nutrition Survey (NDNS). Following the initial design, I tested this scoring system on the NDNS data and revised the design. Once we were happy with the scoring system I carried out the analysis using it – relating it to the relationship between maternal employment and the quality of children's overall diets. I was lead author of this paper. This research was funded by a strategic partnership between the Economic and Social Research Council and the Food Standards Agency, with Charlie Owen and I being responsible for undertaking the statistical analysis of a number of key government datasets, including the NDNS and Health Survey for England (HSE).

This paper reports on the methodological development of a key measure we used in our analysis; it does not provide details of the empirical research (reported elsewhere, see O'Connell and Brannen 2016) using this data measure. The paper describes how we employed an innovative method for examining the quality of children's diet intake in relation to UK nutritional recommendations using NDNS. The NDNS collects dietary data using four-day unweighed food diaries and the variables derived in the dataset include intakes of macro and micronutrients. The 'diet quality index' (DQI) we developed served (in the wider research, *ibid*) as a means of assessing overall dietary quality for children aged 10 years and under, compared to Recommended Nutrient Intakes (RNIs) for children in this age group. The purpose of developing this index was to a) purposively select cases from the NDNS for the qualitative part of our research and b) compare the relationship between children's 'healthy' and 'less healthy' diets and maternal employment (see full explanation in O'Connell and Brannen 2016).

The results of analysis using the DQI measure are reported elsewhere (see O'Connell and Brannen 2016). In appendix 5, I provide the results from our key regression table (an unpublished table which is partially reported in O'Connell and Brannen 2016) that examined maternal employment status in relation to our DQI. This shows that we did not identify a statistically significant relationship between maternal employment and the DQI after controlling for other factors such as family income (Beta =-0.005, $p=0.933$ – see appendix 5). This finding was in contrast to a previous study using data from the Millennium Cohort Study (Hawkins, Cole and Law 2009) that found that children of mothers who worked longer hours had less healthy diets. The differences between the previous study and our study could be because of the different indicators of dietary quality used (it was not possible to use our DQI in

the MCS as the data for our index were not available in the MCS). However, it could also be because the MCS is limited to mothers' reports of what children ate at home. Given that children of working parents consume food across a range of settings including school and childcare we were concerned to examine the relationship between parental employment and children's overall diet intakes across the intersecting environments in which they live and eat. A key limitation of our analysis using the NDNS is that this dataset did not have information on maternal hours of work. It is possible that if we had been able to distinguish between mothers working longer and shorter hours, we might have found similar results to the MCS analysis. Further, the NDNS uses four-day unweighted food diaries which is considered the 'gold standard' in dietary data because of its level of nutritional detail, but because of the level of detail required which could be burdensome for families to complete, it is possible that the NDNS may not be completed accurately.

We used our DQI to distinguish children with 'healthier' diets from those with 'less healthy' diets. This was possible to do because our index was developed in relation to nutritional recommendations (RNIs) for children of different ages. Another key contribution of paper 5 was that we identified a lack of information about maternal education in the NDNS. We knew this to be an important factor to examine in relation to the quality of children's diets (O'Connell and Brannen 2016) so at the end of our research, Dr O'Connell (PI) and I petitioned the Department of Health who is responsible for the NDNS, to include a variable on maternal education in future datasets, which they did.

Paper 6. Simon, A., Owen, C., O'Connell, R., & Books, F. (2018). Changing trends in young people's food behaviour and wellbeing in England in relation to family affluence between 2005 and 2014. Journal of Youth Studies, 21:5: 687-700. <https://doi.org/10.1080/13676261.2017.1406599>. This and paper seven below report on aspects of a wider study examining 'Families and Food in Hard Times', directed by Dr O'Connell, which aimed to understand what young people eat at home and elsewhere during 'hard times' (e.g., economic recession). Our analysis in papers six and seven present evidence for England where 'austerity' measures introduced from 2010 are impacting on families' income and ability to feed themselves (Tucker 2017). My role in this research was to address the quantitative questions of the wider study. I took the lead with the analysis reported in this paper

by designing and carrying out the statistical analysis using the 'Health Behaviour in School Aged Children' survey (HBSC) for England, which is funded by the World Health Organisation and completed by young people. I led the writing of this paper. As with my other work, carried out within mixed-method studies, the aim of the statistical analysis was to provide descriptive analysis which could inform and provide the wider context for the qualitative research taking place.

The aim of this paper was to explore associations between 'family affluence' (a validated proxy for income that is derived from answers to a list of items in the HBSC self-completion questionnaire) and a range of eating behaviours for young people (such as fruit and vegetable consumption). Some of this analysis had been conducted previously (Currie et al. 2012) but our paper uniquely included data for England in 2014 and carried out (cross-sectional) comparisons over three time points: 2005, 2009 and 2014. As reported in this paper, we found that young people in less affluent families initially reported less healthy eating behaviours than those in more affluent families, but that over time there seemed to be evidence of a 'closing gap' between these groups in terms of some food behaviours, such as the frequency of fruit consumption. We carried out some significance testing at each time point to examine differences between family affluence groups and found in most cases the differences were small. This means we need to be cautious in interpreting some of the findings reported in this paper. Further analysis could compare our findings for England with other countries that are included in the HBSC.

Paper 7. O'Connell, R. E., Owen, C., Padley, M., Simon, A., and Brannen, J. (2018). Which types of family are at risk of food poverty in the UK? A relative deprivation approach. Social Policy and Society.

<https://doi.org/10.1017/S1474746418000015>. This paper reports on other quantitative analysis carried for the 'Families and Food in Hard Times' described above. With Charlie Owen, I co-led the statistical analysis of the Living Costs and Food Survey (LCFS) to examine trends in food consumption and eating for young people in relation to socio-economic factors on which this paper reports. I carried out the descriptive analysis that provided the foundation for the results reported in this paper and wrote the findings document which this paper drew on. Again, this paper was largely descriptive and aimed to provide information about trends in consumption over time in relation to the 'Food Budget Standards' for different types

of families. This analysis was important context for informing the qualitative aspects of this research.

Paper seven was important and novel in that it operationalised a relative deprivation approach to identify the types of family at risk of food poverty in the UK and how this has changed over time. The methodological approach compared the 'food budget standard' (FBS) that is calculated annually for different household types as part of the Minimum Income Standard (MIS), with actual household expenditure using the LCFS from 2005-2013. Carried out in collaboration with the MIS team at Loughborough, the paper makes an important contribution to the food poverty debate which has previously been principally focused on nutritional quality at the expense of social inclusion considerations. An important finding for evidence-based social policymaking is that the proportion of families not spending enough to meet needs for health and social participation has increased over time for most household types and is consistently highest for lone parent and large families. The paper was drawn on in a report by The Food Foundation (Affordability of the Eatwell Guide, September 2018) that was covered widely in the UK print and broadcast media, including the *Guardian*⁷.

As co-authors on these reports, we confirm that this information is correct and represents an original contribution by Antonia Simon to these research projects.

Dr Rebecca O'Connell	Date: 10/05/2018
Charlie Owen	Date: 10/05/2018
Dr Alison Lennox	Date: 10/05/2018
Katie Hollingworth	Date: 10/05/2018
Dr Matt Padley	Date: 10/05/2018
Professor Julia Brannen	Date: 10/05/2018
Professor Claire Cameron	Date: 10/05/2018
Professor Carmen Dalli	Date: 10/05/2018
Professor Fiona Brooks	Date: 10/05/2018

⁷ <https://www.theguardian.com/society/2018/sep/05/four-million-uk-children-too-poor-to-have-a-healthy-diet-study-finds>

Glossary

ALSPAC - Avon Longitudinal Study of Parents and Children is a birth cohort study, asking questions about health of 14,500 families in the Bristol area.

ASHE - Annual Survey of Hours and Earnings is a 1% sample of employee jobs taken from HM Revenue and Customs PAYE records and reports on hours and earnings of workers.

BSA - British Social Attitudes Survey provides evidence about attitudes to a range of topics about Britain and the way it is run.

CEYPS - Childcare and Early Years Providers Survey. Released by the Department for Education (DfE), this data series provides information on the main characteristics of childcare and early years provision in England, including provider characteristics, number of places, number of children attending, staff characteristics and qualifications and fees.

COS – Core Outcome Set. It is ‘an agreed minimum set of outcomes or outcome measures. It is a recommendation of 'what' should be measured and reported in all trials in a specific area’⁸

COMET - Core Outcome Measures in Effectiveness Trials. These are ‘an agreed minimum set of outcomes or outcome measures. It is a recommendation of 'what' should be measured and reported in all trials in a specific area’⁹.

Concepts – abstract ideas that are understood to be the fundamental building blocks of thoughts and beliefs. In this thesis ECEC the key concepts I discuss are ideas related to the quality of ECEC services. In children’s food and nutrition, I discuss concepts of dietary health and wellbeing.

Data fragmentation - indicators spread across a range of datasets in secondary analysis research.

Data harmonisation – the process of unifying data measures within datasets.

DELPHI technique/process - originally developed by Dalkey and Helmer (1963) invites rounds of opinion from experts through an anonymous process.

⁸ <http://www.comet-initiative.org/glossary/cos/>

⁹ <http://www.comet-initiative.org/glossary/cos/>

Dietary intake - daily eating patterns of an individual, including specific foods and calories consumed and relative quantities¹⁰.

Distal factors - are the wider socioeconomic, social, cultural and health resources within communities and also the global economic conditions, which interact with and influence the proximal factors to shape developmental wellbeing (Hardie et al. 2013).

DQI – Diet Quality Index. This is a composite measure of diet, made by combining variables (aspects of food) together.

ECEC – Early Childhood Education and Care.

FAS - Family Affluence Groups. A derived composite variable in the HBSC.

FBS – Food Budget Standard. This sets a minimum acceptable amount different types of families should spend on food for health and social participation.

FRS - Family Resources Survey. This is a dataset produced annually which provides information about the incomes and living circumstances of households and families in the UK.

HSE - Health Survey for England monitors trends in health and care for adults aged 18 years and over.

HBSC - Health Behaviour in School-Aged Children survey. This is a survey within 49 countries which aims to gain insight into young people's well-being, health behaviours and their social context¹¹.

Indicators – something that points to, measures or otherwise provides a summary overview of a specific concept or factor¹².

Large-scale data – are large amounts of quantitative data, typically held / stored in big data repositories which social researchers and students have access to for research. Examples are the FRS and LFS.

LFS - Labour Force Survey. This is a study of the employment circumstances of the UK population, providing official measures of employment and unemployment.

MCS - The Millennium Cohort Study, is a survey of about 19,517 children born in 2000/01.

¹⁰ <https://www.encyclopedia.com/caregiving/encyclopedias-almanacs-transcripts-and-maps/dietary-intake-and-nutrition-status>

¹¹ <http://www.hbsc.org/>

¹² <https://www.qualityresearchinternational.com/socialresearch/indicator.htm>

Mixed-methods - research that involves collecting, analysing and integrating quantitative data (collected through for example surveys) and qualitative data (collected for example through interviews).

NDNS – National Diet and Nutrition Survey. This is a rolling cross-sectional survey which assesses the diet, nutrient intake and nutritional status of the population of the UK.

Nutrition – of individuals usually refers to the consumption of nutrients and calories in diet compared to nutrition recommendations by age group. These recommendations are made by SACN (see below).

OECD - Organisation for Economic Co-operation and Development.

Ofsted – is the Office for Standards in Education, Children's Services and Skills. They are responsible for inspecting services providing education and skills and care for children and young people.

Operationalisation - refers to 'the process of figuring out how to measure the concepts that interest us'.¹³

Outcome indicators - I am defining outcome indicators in my thesis as a standard against which the success of social policies can be assessed. Outcome indicators in this context can be to assess services. For example, a measure to assess quality of service ECEC provision or a measure to assess child health through indicators of dietary quality.

Process factors - as features which are closer to the child (Slot 2018) such as the ways a child experiences the ECEC setting (Janta, van Belle and Stewart 2016).

Proximal factors –characterised by shared environments (spaces shared by families), family resources and family processes (Hardie et al. 2013).

Retail Price Index – is a measure of inflation first calculated in 1947 based on a basket of goods and services. UK Treasury uses the RPI for measuring tax rises. The RPI covers a range of costs including Mortgage interest payments, Council tax, House depreciation, Buildings insurance, House purchase costs, e.g., estate agent fees, TV licence, Road fund licence, Trades union subscriptions. It is representative of private households but excludes highest earners and pensioner households dependent mainly on state benefits¹⁴.

¹³ <http://mateenaltaf.blogspot.com/2017/02/operationalization-of-variables.html>

¹⁴ <https://www.ons.gov.uk/ons/guide-method/user-guidance/prices/cpi-and-rpi/differences-between-the-rpi-and-cpi-measures-of-inflation.pdf>

RNIs - Recommended Nutrient Intakes, used in nutritional research and healthy eating guidelines.

SACN - Scientific Advisory Committee on Nutrition (SACN) advises the UK government on diet and health for different age groups.

Secondary analysis - of large-scale survey data (in my thesis quantitative) involves the analysis of pre-collected data (Cheng 2014).

SOC - Standard Occupational Classification System (used for classifying jobs in the LFS).

Structural factors - tend to be concepts that are determined by legislation, policy and funding (Slot 2018). In ECEC for example, these are the quality of the conditions of the ECEC centre, such as the number of staff and their working conditions.

Triangulation - using more than one method to collect data on the same topic often as a means to check validity of research (Mertens and Hesse-Biber 2012).

UK Household Longitudinal Survey (known as 'Understanding Society') – is a large-scale survey of about 40,000 households followed yearly since 2009.

Introduction

This thesis comprises an integrative summary that aims to fulfil UCL requirements for a PhD by publication (UCL 2016). The overall aim is to assess the opportunities and challenges of using secondary methods either as a standalone method or as part of mixed-methods research studies to address social policy questions within ECEC or children's food and nutrition. A key contribution of this integrative summary is the identification of a core outcome set (COS) of indicators from studies of early childhood education and care (ECEC) or children's food and nutrition to assess service or outcome quality. The recommendation of having a COS in each of my research areas is to support future secondary analysis using large-scale data within these areas, by overcoming problems of data fragmentation.

While some of my research has been carried out only using secondary analysis of a number of key UK datasets in order to examine patterns of ECEC usage and provision (detailed within my papers), my work at other times has been rooted within 'mixed-method' research, where I have been a team member within a multi-disciplinary mixed-methods research project with my role to provide the statistical specialism. For example, my work within a multi-national research project examining 'Families and Food in Hard Times' produced two of my submitted papers (6 and 7). Although some of my papers were developed as part of a multidisciplinary team effort, they represent work that I led or to which I made a substantial contribution as the statements testify. They have all been carried out within a 'social policy lense'.

As a standalone method or within mixed method projects, secondary analysis of large-scale data can be used to great effect through analysis of large representative samples which are generalisable to the wider population. There are a variety of ways researchers mix methods (Brannen 2005). In my research, secondary analysis has usually come first in order to provide the overall empirical context from which later stage qualitative analysis can draw – for example to inform qualitative social enquiry or as a means of 'checking' data interpretations from the qualitative part of research projects. However, as I go on to discuss in section two, there is no consensus among academics on how to mix methods and there are many considerations to weigh up, such as which method or paradigm will be dominant, which can make mixed-method research tricky to execute.

Research Questions

Here I set out the research questions for my integrative summary. The summary draws where relevant on the work carried out for my papers (submitted in appendix 2). I also draw on my wider research portfolio which could not be included in this thesis because the PhD by publication regulations stipulate a five-year publication date limit (listed in appendix 3). My wider research is important to 'dip into' within the summary in order to utilise other examples I have for illustrating interesting limitations of operationalising indicators using large-scale quantitative data.

The papers submitted with this thesis had their own research questions. Here I have set out research questions for the integrative summary. These research questions are designed to address the aim of this integrative summary which is to discuss what I have learnt from carrying out the research in my included publications, wider publications and literature, about the opportunities and challenges of using secondary analysis methods for addressing social policy questions within ECEC and children's food and nutrition. I use this discussion to start the process of identifying a Core Outcome Set (COS) for ECEC and children's food and nutrition using the COMET framework in figure 1 (see section 1), underpinned by Bronfenbrenner's ecological systems theory (1979), grouping measures into '*proximal*' and '*distal*' factors (Bronfenbrenner and Morris, 2006) – see discussion in section two. The rationale for identifying a COS in ECEC and children's food and nutrition is support ongoing secondary analysis of large-scale quantitative data in my topic areas, to overcome problems of data fragmentation (indicators spread across a range of datasets) in secondary analysis research and support data harmonisation (unifying data measures) within the field of social policy. The research questions for the integrative summary are:

RQ1: What does the literature identify as important concepts, factors and indicators and what does this suggest for a scope of a COS in my two research areas?

RQ2: What indicators have been operationalised and analysed within my work?

RQ3: What are the ‘data gaps’ within current large-scale UK data collections regarding the operationalisation of indicators in ECEC and children’s food and nutrition?

RQ4: What indicators could be included within a COS for ECEC or children’s food and nutrition?

RQ1 is intended to explore, using literature, the indicators discussed as important within the two main areas of my work – ECEC and children’s food and nutrition, from a social policy and practice perspective. This is not intended to be an exhaustive review of literature. It aims to provide an understanding and critical analysis of the concepts and factors being currently discussed within these two areas as important to support children’s wellbeing. Within literature, outcome indicators for ECEC are often designed to assess quality of service provision for children; within children’s food and nutrition, outcome indicators are often developed to assess quality of foods consumed in relation to nutritional benchmarking standards (see section 2). I end section two by summarising what could form the beginnings of an outline scope for a COS in ECEC and children’s food and nutrition.

For RQ2, the aim is to evaluate the indicators have been operationalised and analysed within my work using large-scale data. As I go on to discuss, indicators which are considered to be important, process or proximal factors such as ‘good quality relationships’ between adults and children in ECEC, can be difficult to operationalise¹⁵. What usually happens is that researchers measure what they can, even if these indicators are not that important. Consequently, I identify and have used more indicators in ECEC that can be classified as structural or distal concepts and factors. Within children’s food and nutrition, the reverse is true – I have used more indicators which can be classified as process or proximal concepts and factors. The choice of indicators was based on what was available for use in large-scale quantitative datasets.

RQ3 discusses the ‘data gaps’ within current large-scale UK data collections regarding the operationalisation of indicators in ECEC and children’s food and nutrition. Common to both of my topic areas is the issue of data fragmentation, where indicators are spread across a range of datasets.

¹⁵ See earlier discussion in the previous section.

RQ4 aims to identify the indicators that could be included within a COS for ECEC and children's food and nutrition. The next steps (following the COMET framework mentioned in figure 1) is to convene a group of experts to review my suggestions (based on my review of the literature, including my own research studies) for what to measure in these COS and to suggest any further indicators for these COS.

Sections of the integrative summary

Section one sets the context for the discussion in the integrative summary by critically discussing the purposes of using secondary analysis of large-scale data drawing on literature about secondary analysis methods, including mixed methods research. What arises out of the discussion is why and how key outcome indicators can be problematic to operationalise using secondary data methods. As a response to these issues, I discuss a pragmatic framework suggested by COMET (Core Outcome Measures in Effectiveness Trials) which I argue could be used to identify a COS within ECEC and children's food and nutrition. COMET is an initiative that 'brings together people interested in the development and application of agreed standardised sets of outcomes, known as 'core outcome sets' (COS)'¹⁶.

In section one, I also discuss that the COMET framework provides a helpful sequence of steps for identifying a COS, underpinned by Bronfenbrenner's ecological systems theory (1979) to unite the suggested indicators conceptually, and to support the applicability of developing a COS in my two research areas. Bronfenbrenner's ecological systems theory (1979) is proposed by me because my work within this thesis is conceptually linked through its interest in childhood wellbeing, developmental health and it comes from a social policy perspective. Bronfenbrenner's ecological systems theory seeks to explore the different relationships influencing a child's development, formed in his or her environment (*ibid*). It enables indicators that I identify and discuss in this thesis to be usefully grouped into 'proximal' (close to the child) or 'distal' (wider socioeconomic, social, cultural and health resources) concepts, factors and indicators.

Section two focuses on research question RQ1, discussing outcome indicators the literature identifies as important indicators within ECEC and children's

¹⁶ <http://www.comet-initiative.org/>

food and nutrition for addressing social policy questions. For example, assessing the quality of children's diets using outcome indicators based on nutritional benchmarking standards, or assessing the quality of the ECEC workforce using structural indicators about the environment ECEC is provided in.

Section three discusses the indicators that have been operationalised and analysed within my work (RQ2). Section four focuses on RQ3 by drawing out the 'data gaps' within current large-scale UK data collections regarding the operationalisation of indicators in ECEC and children's food and nutrition. This is followed by section five which identifies which indicators could be included within a COS for ECEC or children's food and nutrition. These indicators are suggested from my review of literature in section two and my own work. The evidence addressing all of my research questions covers step four in the COMET framework which seeks to identify 'what to measure' in a COS based on existing literature and key studies (see section 1.5).

Section 1. The use of secondary analysis methods of large-scale UK data as a standalone method within studies or as one method within mixed-method research

This section provides an overview of the context of my research - particularly the methodological focus of my work on using secondary analysis methods of large-scale UK data – but also the context for the value of using secondary data for operationalising indicators in my research areas. Earlier, I said that my work centres around the use of secondary analysis methods, but why use secondary analysis of pre-existing data? What are the common uses of large-scale data within mixed-method research projects? What are some of the noted advantages and disadvantages with conducting secondary analysis of pre-existing large-scale UK data? This is what I discuss below, drawing on literature and also my own experiences of conducting secondary analysis of pre-existing UK data over the past 20 years. This section also sets out what 'Core Outcome Sets' (COS) are (currently mostly confined to the field of health), a framework for identification of a COS for ECEC and children's food and nutrition, and my suggested conceptual framework for uniting the indicators and guiding their organisation or grouping within these COS.

1.1 Why use secondary analysis of pre-existing data?

Secondary analysis of large-scale data is frequently used within policy to inform decision making. For example, large-scale data are used for monitoring long-term trends for the population and sub-groups, for example in relation to health outcomes. An example of this is the use of the Health Survey for England (HSE) for monitoring the health of the nation in key areas such as obesity (HSE 2016). Large-scale datasets are also used to monitor the effectiveness of public policies. For example, the Childcare and Early Years Providers Survey (CEYPS) series in England is used for monitoring progress towards meeting the ‘tax-free childcare’ offer for working families in England (Department for Education 2013a). Further afield, the Organisation for Economic Co-operation and Development (OECD) has been encouraging the creation and use of monitoring systems and statistical collections to ensure quality and accountability in ECEC across member countries (OECD 2015). For example, the publication *Starting Strong* (ibid) discusses how countries can develop statistical collections to enhance service and staff quality for the benefit of child development. The availability of objectives, benchmarks and indicators are also being recognised as an essential means of comparing countries on progress made with different policies, such as the ECEC Quality Framework (Working Group on ECEC 2014). The OECD Family Database is another resource used to ensure investment in ECEC continues to be made in the sector (OECD 2014).

Monitoring outcomes to meet social policy objectives is possible because the quantity and accessibility of quantitative data has increased in the last ten years (Sherif 2018). The popularity of conducting secondary data analysis of large-scale survey data has largely arisen out of realising cost and time efficiencies that come with using pre-existing data (Cheng 2014). It has been argued that ‘original survey research rarely uses all of the data collected and this unused data can provide answers or different perspectives to other questions or issues’ (Johnston, 2014) so large-scale data has become a good research resource. Secondary data sources are also attractive because they are ‘cleaned’ of data entry errors by the survey teams before data deposit and provide ‘ready-to-use survey weights and design variables’ to enable findings to be generalised to the population (Cheng 2014).

However, there are some notable drawbacks to using pre-existing empirical data. First, secondary data analysis relies heavily on comparable data being

collected and being made available (for example between member states in the OECD collections) (Working Group on ECEC 2014). Second, while data can be (and often are) made public for secondary analysis by researchers, users are restricted to the information collected (and the format it is collect in) which may be challenging for ongoing research. For example, the data are collected for the original research purpose and may not lend themselves well to alternative questions posed of them by secondary analysts. In my research for example (Paper 1), it was necessary to analyse several UK datasets in order to find the information I needed. This was because while some datasets provided some information on the provision of childcare, others provided information on the use of childcare, but it was not possible to find all of this information within one single dataset. This type of data fragmentation (when data and/or indicators are not in a single source) can be problematic for analysts.

When working in the area of children's food and nutrition, I also found that while some datasets provide detailed information about children's dietary intake (e.g., the National Diet and Nutrition Survey), they did not have as much information about contextual, sociodemographic factors such as maternal education. This lack of data on important contextual factors was a serious drawback to the analysis we were able to conduct (see earlier discussion about the candidate publications). Additionally, most of my analyses were confined to cross-sectional data which only provides a 'snapshot' picture at one point in time which is restrictive if an analyst wants to assess changes over time, especially about the same children and/or families.

1.2 What is secondary analysis of large-scale survey data and what are the main types of UK large-scale data?

Secondary analysis of large-scale survey data involves the analysis of pre-collected data (Cheng 2014). These data have been collected for a particular purpose (to fulfil the original data collection needs) but have been made publically available (in an anonymised format) for other research questions to be asked of them and further analysis to be conducted of them (*ibid*). Large-scale data are commonly, but not always, owned by the UK government and made public via the UK Data Service.

Two main types of large-scale data are available. First cross-sectional or repeated

cross-sectional data. This is data collected by a survey either as a one off or the same survey is administered to a new sample of interviewees at successive time points (with different participants at each time point). Researchers either examine a single survey year, or for analysis over time, a series of survey years. Examples includes the British Social Attitudes Survey (BSA) (conducted in most years since 1983) which provides evidence about attitudes to a range of topics about Britain and the way the country is run (Phillips et al. 2018). While a new sample of respondents is selected for every survey year, many of the same questions are asked at each time-point.

A limitation of these cross-sectional survey data is that they can only be used for analysing population or group changes over time (also known as aggregate change), and they cannot be used to look at changes to individuals (Cheng 2014). This is attributed to a type of bias known as ecological fallacy or 'aggregation bias' which occurs when the same inferences about individuals are made from aggregate data derived about the group to which these individuals belong – i.e., what is true of the group must be true of the individual (Abhishek, Hosanagar, and Fader 2015). For example, ecological fallacy can occur when indices are created using categorical data transformed into binary (e.g., yes, no) options which forces an 'arbitrary grouping' and a variable which can only be 'generated as a proportion at an aggregate level' which is often not representative of sub-groups or individuals (Lancaster 2002).

The second main type of large-scale data available to the public for future research are longitudinal studies. These data usually involve information following individual people over a specified period of time. There are two types of longitudinal data: panel data or cohort data. In panel surveys, the same individuals are interviewed at multiple time points (or waves). An example of this type of data is the UK Household Longitudinal Survey (known as 'Understanding Society'), which has a very large sample of about 40,000 households followed yearly since 2009. All adults aged 16 and more are interviewed; questionnaires are filled by children aged 10-15. The second sub-type of longitudinal data are cohort surveys, which involve following respondents from an identical point in their life onwards, often from birth. These surveys enable analysis for example of child development over time. An example of this type of survey is The Millennium Cohort Study (MCS), which is a survey of about 19,517 children born in 2000/01, provides data about parenting, childcare, cognitive

development, health, parents' employment and education, income and poverty, housing and ethnicity (Platt 2014). The value of longitudinal studies is that they allow researchers to distinguish between age and cohort effects, and they are good for tracking events in people's lives, such as for examining factors causing a person to enter and exit poverty (*ibid*). However, they are known to be subject to certain biases. For example, non-response which may occur due to attrition (people dropping out of the survey e.g., between waves because of moving address) or respondents refusing to answer certain questions (Longhi and Nandi 2014).

Cheng (2014) discusses two general approaches for analysing pre-existing data: the 'research question-driven' approach and the 'data-driven' approach. The first approach starts with researchers having a question in mind and they then look for suitable datasets to address the question; with the data-driven approach, researchers review variables in a particular dataset and then decide what kind of questions can be answered by the available data (*ibid*). However, in practice, Cheng says both approaches are often used together. This was certainly true of the analyses I conducted within this thesis. I started off with a set of predefined research questions, searched for suitable databases, and then critically evaluated the variables in each database (often running 'test' analysis to see what the data looked like) before deciding on my final set of variables and which types of statistical analysis to perform. In most of my analyses, I was restricted to using repeated 'cross-sectional' datasets such as the Labour Force Survey (LFS) or Family Resources Survey (FRS) or the Health Behaviour in School-Aged Children survey (HBSC) as these data series had the most suitable variables (or most detailed questions) for me to explore relative to what was included in many of the cohort or longitudinal datasets in the UK. An essential step of my work looking at trends over time in repeated cross-sectional datasets, was to ensure variables had not been changed (in the wording or measurement). If such changes had occurred, it affected the types of analyses I could undertake and the subsequent interpretations. This process of identification of suitable variables can be time consuming. It is what has sometimes been termed 'evaluating a database' (Johnston 2014).

In my experience, 'evaluating a database' often requires a detailed process to identify similar questions and/or variables in different datasets or across the same dataset but over survey years (e.g., to check variable consistency). It is an important step in carrying out secondary analysis successfully (*ibid*). Cheng (2014) suggests

this type of data evaluation is necessary in order for researchers to have a comprehensive understanding of datasets – to assess their strengths and weaknesses – and the process ‘involves obtaining detailed descriptions of the population under study, sampling scheme and strategy, time frame of data collection, assessment tools, response levels, and quality control measures’ (p.373). Johnston (2014) comments that researchers need to ascertain the purpose of a research study, when the information was collected and by whom (and how), and, perhaps most importantly, how consistent the information is with similar information available from other sources. As I go on to discuss within section 1.3, this last point forms part of a validation-type checking exercise (but while below qualitative and quantitative methods are used to cross-check information, here it is suggested that different sources of quantitative data can be used to verify information). Johnston (ibid) says using more than one dataset is important to ‘bolster confidence in findings’ (p.624). This need for verification was one reason I utilised more than one dataset in my own research (for example, see my discussion in paper 2 in which results from the LFS were compared with the Ofsted (Office for Standards in Education, Children’s Services and Skills) registration statistics to understand numbers of childcare workers in England). However, a question which occurred to me in doing this, was how then do researchers reconcile differences between datasets? Does one dataset take precedence over another? And if so, how is this decided? These are the types of questions which arise from this type of verification checking which though important, are not straightforward to answer.

1.3 What is mixed-method research and what role can secondary analysis play?

Mixed-method research involves collecting and analysing quantitative and qualitative data in a single or in a series of studies, with the basic premise that ‘the combination of quantitative and qualitative approaches provides a better understanding of research problems than either approach alone’ (Creswell and Clark 2007 p.8). This is sometimes referred to as ‘triangulation’ - using more than one method to collect data on the same topic often as a means to check validity of research (Mertens and Hesse-Biber 2012). However, some argue that triangulation is an inappropriate metaphor since the qualitative and quantitative analyses may address different questions or aspects of the questions (Brannen and O’Connell 2015; Hammersley

2005). It is postulated that mixed-methods offsets weaknesses in both quantitative and qualitative methods (Creswell 2011): it is argued for example that quantitative methods are weak at understanding the context of people's lives and qualitative methods are weak because of the subjectivity involved with interpreting the results and the difficulties in generalising qualitative findings to the general population (*ibid*). The attraction to researchers of using mixed methods is in the possibility of drawing together the strengths of each approach. However, some researchers have called into question the extent to which this is true. The criticisms range from citing a lack of clarity in how to use and/or combine the key components of methods belonging to the quantitative or qualitative paradigms (e.g., data collection and analytical techniques) (see Symonds and Gorard 2010) to whether and how to decide on which of the paradigms is dominant (Creswell 2011).

Tariq and Woodman (2010 p.8) summarise the main ways researchers could choose to combine quantitative and qualitative methods in research. The first, 'complementarity', describes the use of one method to illustrate the results in another (Brannen 2005). For example, a survey of childcare use which is then followed up qualitatively to explore why parents use particular forms of childcare. The second way, 'development', describes the use of one method to inform the use of the other method. The example they use is the use of a focus group to identify technologies useful to supporting epilepsy patients, which is then developed into an app for these patients, which is then tested through an intervention study comparing outcomes for those using the app with those who do not use the app. The third way to combine methods is 'initiation', which Tariq and Woodman describe as using 'different methods specifically to look for areas of incongruence in order to generate new insights' (2010 p. 4). The example they use refers to different results between drug adherence within medical consultations and actual medication adherence which could be explored by using two methodologies: a review of case notes and semi-structured interviews with clinicians. The fourth approach, 'expansion', is where researchers set out at the start which aspects of a research question require different methods to address them, such as the use of a large-scale survey to ascertain medical adherence rates, which would then be followed by qualitative enquiry to collect information about experiences of chronic illness and medication in adolescence. The final approach, 'triangulation', is where data obtained by both methods is used to corroborate or 'check' findings. The example they use is

quantitative evidence (e.g., surveys) to measure drug levels and qualitative methods (they cite video diaries, but it could also be observations) to confirm the levels reported by individuals. However, it is not clear from these accounts what the advantages are of using each approach and in which context each approach should be applied.

There are also some known issues with 'mixing methods' which complicate their application. For example, Brannen (2005) argues that mixing methods to corroborate data may not lead to 'validation', and the complementarity rationale for mixing methods may not complete the picture. Further challenges may also arise from the different philosophical traditions to which quantitative and qualitative methods belong (Brannen and O'Connell 2015). For example, quantitative methods usually take a positivist stance, stemming from a belief that reality can be measured and observed objectively (Tariq and Woodman 2010). The positivist tradition is more interested in trends and patterns than individuals and it argues the importance of doing quantitative research through using for example large-scale surveys, in order to get an overview of society as a whole (*ibid*). Its strengths lie in conducting data collection using representative random sampling which then makes it possible to generalise its results from the sample to the wider population. This quality makes it the dominant paradigm in health research (*ibid*). In contrast, qualitative data usually stems from research taking an interpretivist stance, 'usually informed by the belief that there are multiple realities shaped by personal viewpoints, context and meaning' (*ibid* p.3). Qualitative methods aim to delve 'in-depth' in order to obtain rich accounts from individuals about their beliefs, values, and meanings which quantitative data approaches cannot do, but the sample sizes are usually small (*ibid*). Another key contrast between the methods lies in how analysis is carried out within different paradigms. While in quantitative data approaches, a deductive approach usually is taken to test hypotheses in order to explain how or why things are happening, qualitative data approaches tend to use inductive enquiry, through open-ended questions which allows the hypotheses to 'emerge' from the data (Creswell and Clark 2007). Thus, the different methods, because of their epistemological traditions, can be less than straightforward to combine.

For those interested in mixing methods a number of key considerations must also be decided upon before commencing this type of research. Brannen (2005) for example points to: the logic of enquiry and poses the question: 'Is the study primarily

to be inductive aimed at discovery?'. The sequencing of methods – that is the order in which methods can be mixed within single or a series of projects – and the dominance of a method. In terms of sequencing, researchers must decide if the methods will be applied sequentially or simultaneously which usually depends on the reason for using them (*ibid*). For example, is a large-scale survey needed first from which smaller samples of sub-groups can be drawn to investigate (the same or different) research questions using qualitative methods? In terms of methodological dominance, researchers need to decide if one method is supplementary 'in terms of having lesser resources of time being devoted to them in terms of data collection and also in the analysis phase and the writing up' (*ibid* p.14).

Tariq and Woodman (2010) discuss five typologies for combining mixed-methods: 'convergent' (applied concurrently and mixed in interpretations), 'explanatory sequential' (used to address how and why questions following quantitative methods), 'exploratory sequential' (quantitative methods used to address questions raised by earlier qualitative enquiry), 'embedded' (a small qualitative study within a larger quantitative study), and 'mixed-method systematic review' (a systematic review which combines these methods/traditions in the searching of studies, inclusion of data and interpretations of findings). Again, while these are useful descriptions of possible strategies, they do not provide a clear process or rationale for researchers to apply mixed-methods in their research. Within health research there is a recommendation to use research teams experienced in both qualitative and quantitative techniques if the mixing of methods is to be successful (Regnault, Willgoss and Barbic 2018).

What I can add from my personal experience of working on a number of mixed-method projects is that mixed-method projects often take much longer to complete than projects using a single method. In my projects, secondary analysis of large-scale data has been employed at the start of the research and is followed by qualitative method(s). The role of the quantitative analysis here has had two main aims. The first is to provide evidence about a representative population to which the later, qualitative data, can be compared. For example, in the area of children's food and nutrition, the quantitative part has analysed questions in datasets about frequency of fruit and vegetable consumption which have also been asked of the (smaller) qualitative sample and the results compared. The second aim of the secondary analysis of large-scale data (within mixed-methods studies I have worked

on) has been to provide analysis about general trends of the population to inform the context for the whole study and *different* analysis to the qualitative component(s). For example, in the area of children's food and nutrition, answering questions about how actual food expenditure compares with benchmarking levels for what different types of families are expected to be spending on food (see fuller discussion in paper 7) complemented qualitative case studies that examined how families managed when they were spending much less than expected and the effects in terms of compromises in food quantity and quality.

1.4 Problems with operationalising indicators and the move towards data harmonisation of indicators within and across large-scale data

Within quantitative analysis, operationalisation 'refers to the process of figuring out how to measure the concepts that interest us'¹⁷. Some researchers have defined operationalisation based on an 'assumption that an abstract construct under examination can be inferred from its observable effects' (Emmerich et al. 2016 p.307). However, others argue many concepts are not tangible and researchers need to instead find another way to measure concepts, often using indirect indicators (Roskam 1989). Even if indicators can be reliably operationalised (to capture or represent the concept of interest), evidence shows the format of indicators within datasets, even for the same themes, may differ because of factors such as historical legacies, changing definitions or varying standards (Chen et al. 2018). For example, a researcher is interested in attitudes towards junk food. One approach would be to ask a question such as 'To what extent do you agree that junk food is unhealthy?'. This question then becomes the 'operational definition of a person's attitude towards junk food' (Emmerich et al. 2016 p.307) – a measure of behaviour based on attitudes. An indicator of food behaviour could however be operationalised differently. For example, instead of asking about attitudes, a researcher could actually observe the frequency with which a participant consumes (their definition of) junk food within a certain period of time (*ibid*). An indicator created from directly observing phenomena could produce a very different result to one created from people's expressed attitudes or beliefs or reported behaviour. This is because what

¹⁷ <http://mateenaltaf.blogspot.com/2017/02/operationalization-of-variables.html>

people do is not always the same as what they report doing (especially noted in response to subjective or attitudinal survey questions), resulting in measurement error (Nardi 2018). For example, in the reporting of dietary behaviours I have examined, there are possible discrepancies between reported and actual consumption of fruit and vegetables. One reason for this difference is social desirability bias where respondents wish to give a ‘favourable answer’. This is relevant for fruit and vegetable consumption which is widely encouraged in health promotion. So, the challenge therefore becomes how to operationalise a measure which represents the construct well and minimises error which can arise from mismeasurement of the construct (Landers and Bauer 2015).

One suggestion for minimising mis-measurement error is to use different measurement methods such as questionnaires in combination with observational methods in order to check or confirm results which is where mixed-method research can be used to good effect (see earlier discussion). Emmerich et al. (2016) discuss the many challenges of operationalising indicators. For example, they suggest that although data collected through self-report methods such as questionnaires can be standardised to ask the same questions of each respondent, this process produces subjective data, especially if attitudinal questions are used; observational methods usually produce objective data but indicators developed this way can be prone to observer bias (*ibid*).

Influences on decisions about how to operationalise indicators are varied but include cost and feasibility. For example, in health research where studies often use available information collected as part of routine administrative practices – such as prescriptions from pharmacy databases being used to assess medication adherence – to operationalise indicators (Iyer, Spaeth-Rublee, and Pincus 2016).

Operationalising indicators also depends on the aims of measurement. Raleigh and Foot (2010) argue that within health, there are two main purposes for the creation of indicators - for improvement and for judgement – and these are not mutually exclusive. For example, while the former (improvement) involves ‘benchmarking against peers’ and is designed to prompt further investigation, ‘measurement for judgement’ involves assessing actual performance e.g., hospital death rates to measure patient safety (*ibid*). Raleigh and Foot (2010) suggest a three component approach to indicator development: structure, process and outcomes. They argue that while structure refers to attributes (such as staff to patient ratios), process refers

to the care given to the patient (e.g., the treatment plan for patients) and outcomes refers to what happens to the patient (e.g., mortality following surgery). Outcome indicators are usually (but not always) evaluative in nature – comparing the benefits or results that are expected once some change (in quality, experience or cost) has been made (Department of Health 2014). This is the way that I have used outcome indicators in my research to address key social policy questions, for example to evaluate ECEC services using structural indicators¹⁸ such as quality of the workforce, or the how indicators of the quality of children's diets may be affected by wider processes such as changing food policies and economic phenomena.

The variety of ways in which it is feasible to operationalise process and outcome indicators creates another challenge for researchers – of how to repeatedly examine populations, sub-populations and individuals reliably and consistently¹⁹. Repeating the same analysis across a number of studies is important because it can allow researchers to test whether results are consistent across studies or differ in response to changing social conditions. For example, when evaluating policies or changing outcomes (e.g., the health of the population). However, if studies use different methods to collect information on important aspects of respondents' lives such as indicators of household income, the ability to reliably measure and evaluate the same concept over time becomes problematic (*ibid*). One way around this problem is to invest in 'data harmonisation' which 'involves recoding or modifying variables so that they are comparable across research studies' (*ibid*). Raleigh and Foot (2010) discuss the pros and cons of developing centralised national indicators and conclude there is great benefit to this idea because it can provide 'a cost effective option for ensuring standards while also meeting local needs' (p. 22). However, such data collections rely heavily on common understandings of data definitions and standards so that indicators can be consistently applied across organisations and regions (*ibid*).

1.5 *Pragmatic framework for a COS*

¹⁸ Structural factors tend to be concepts that are determined by legislation, policy and funding (Slot 2018).

¹⁹ See blog on CLOSER which brings together eight world-leading longitudinal studies with participants born throughout the 20th and 21st centuries: <https://www.closer.ac.uk/about-the-research-we-fund/data-harmonisation/>

A growing area of interest within the field of health effectiveness studies which speaks to this agenda of data harmonisation (unifying data indicators) and which could address data fragmentation issues (where data and/or indicators are spread across a range of sources), is the development of 'core outcome sets' (COS). COS are said to represent 'the minimum that should be measured and reported in all clinical trials of a specific condition' (COMET webpage 2018²⁰). The expectation of these COS is that they will facilitate easier comparison of the findings from different studies and act as benchmarking tools for monitoring and evaluating outcomes. Originally employed to design randomised trials, they are also used for audit and evaluation purposes. For instance, a COS is currently being developed for assessing school based interventions to prevent overweight and obesity²¹. These methodological developments may also be suitable for other research areas, for example within the social sciences, not only for randomised controlled trials but also for enhancing the consistency of data in large-scale datasets and for unifying indicators across them.

The COMET handbook (2017), which is the culmination of a review of existing COS, provides a pragmatic framework for how researchers can develop a new COS (Figure 1 below). It recommends starting with (Step 1) outlining the scope, (Step 2) checking there is need for a COS (i.e. there isn't one already registered with COMET), then (Step 3) developing a protocol (a technical term which means setting out what should be measured) based on what has been identified from a review of existing literature / studies about what is important to measure, 'gaps in knowledge' and views from experts in the field about what is important, reporting the work which involves stakeholder input using the 'Delphi technique'²² (step 4).

In the next sections of the integrative summary below, I use this established COMET framework to start to tease out how separate COS for ECEC and children's food and nutrition could be identified, using evidence from secondary data analysis.

²⁰ <http://www.comet-initiative.org/>

²¹ <http://www.comet-initiative.org/studies/details/971?result=true>

²² originally developed by Dalkey and Helmer (1963) which invites rounds of opinion from experts through an anonymous process.

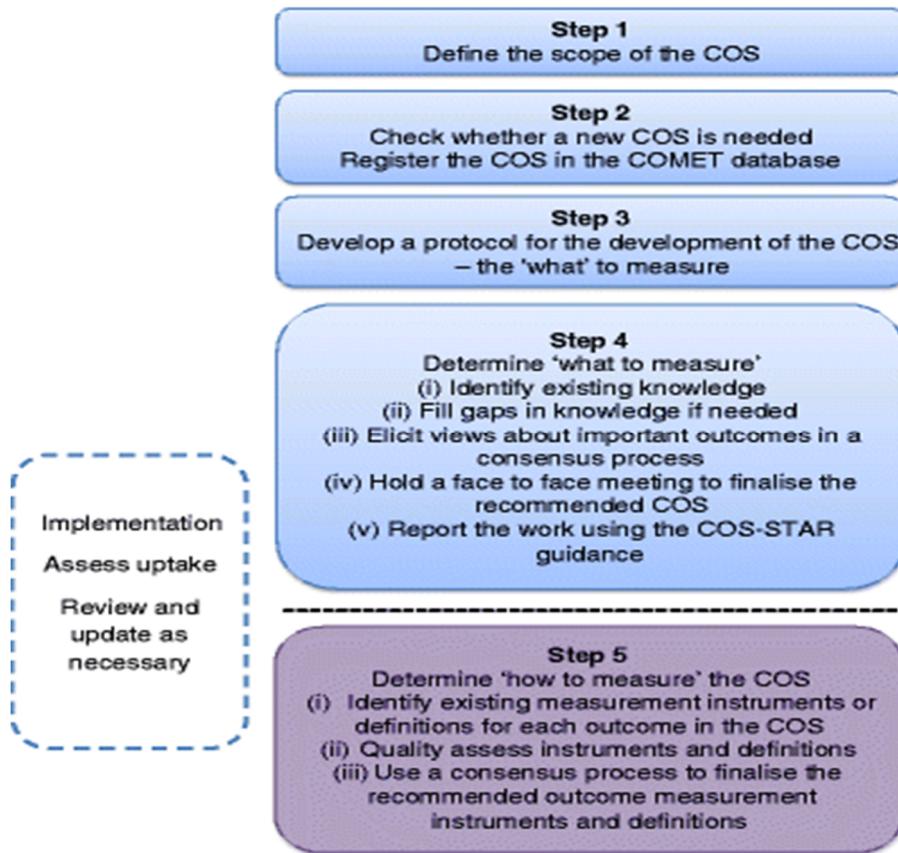


Figure 1: The core outcome set (COS) development process, COMET (2017).

The COMET framework above is pragmatic. What is missing, and which could enhance the applicability of developing a COS in my two research areas, is a guiding theoretical framework.

1.6 *Identifying a suitable conceptual framework for a COS in ECEC and children's food and nutrition*

My work within this thesis is conceptually linked through commonalities in the subject matter and methods. It is concerned with two important domains for understanding how to support good childhood outcomes: ECEC and children's food and development. In this thesis I argue that children's wellbeing and development is influenced by a myriad of social and environmental factors operating across and within ECEC and children's food and nutrition, and that the development of a COS in these areas, requires data measures that must also capture these environmental and contextual influences on child outcomes. Therefore, a suitable underpinning theoretical framework needs to not only recognise the different environmental

influences on outcomes for children's lives, but also provides a holistic perspective on childhood development, to include ECEC and children's food and nutrition.

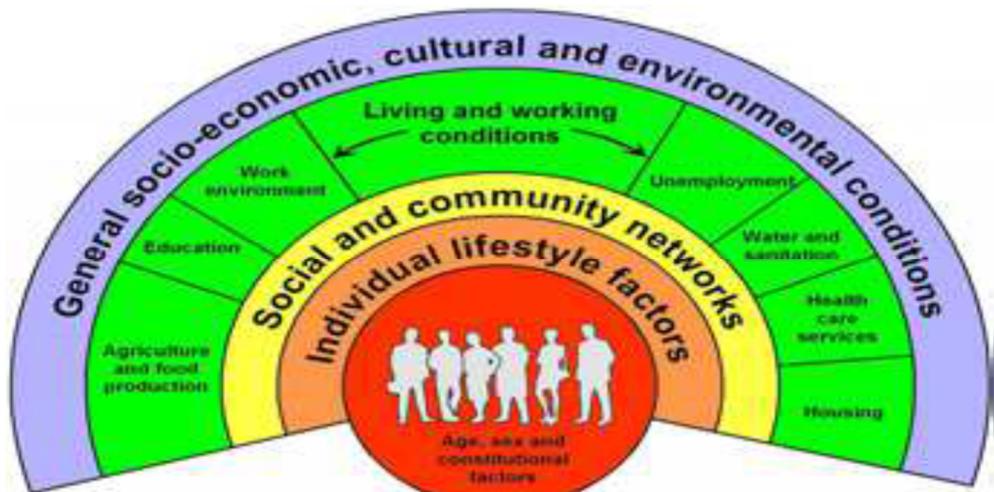
Bronfenbrenner's ecological systems theory (1979), is closely focused on children and their development. It sets out to explore from a psychological and biological perspective, the different relationships influencing a child's development, formed in his or her environment. Bronfenbrenner's theory defines five complex 'layers' of environment, each having an effect on a child's development: the microsystem, the mesosystem, the exosystem, the macrosystem, and the chronosystem (ibid). These levels include immediate settings of family and school, to broader cultural values, laws, and customs that govern the environment that children live in. The focus on childhood wellbeing and the emphasis on viewing children holistically, make Bronfenbrenner's ecological systems theory particularly well suited to use alongside the development of a COS in ECEC and children's food and nutrition. In particular, data indicators and outcomes could be usefully united and grouped in terms of Bronfenbrenner's '*proximal*' and *distal* factors (Bronfenbrenner and Morris 2006). Proximal factors are characterised by shared environments (spaces shared by families), family resources and family processes (Hardie and Landale 2013). The distal factors are the wider socioeconomic, social, cultural and health resources within communities and also the global economic conditions, which interact with and influence the proximal factors to shape developmental wellbeing. Applied to my two areas, the consideration of distal and proximal factors, will allow me to consider factors and environments, that children need to support development and lives.

Within section four, I discuss how the ECEC literature distinguishes between structural and process factors. Distal factors (as identified by Bronfenbrenner) could be another term we could apply for structural factors, as these are concepts that are determined by legislation, policy and funding according to Slot (2018). Bronfenbrenner's proximal factors could be another term for process factors, as these are concepts such as staff or classroom features which are closer to the child according to Slot (ibid). Organising indicators in a COS in relation to distal and proximal factors provides a useful and theoretically informed basis for the identification of a COS (in conjunction with the COMET framework) for ECEC. Although the literature on children's food and nutrition does not distinguish between proximal and distal factors, I argue it is possible, and may be equally informative, to

also apply this conceptual framing to the identification of a COS for children's food and nutrition, especially since Bronfenbrenner's theory has been widely used within the field of human development and child health (Houston 2015).

However, there are some notable criticisms and updating of Bronfenbrenner's Ecological Systems Theory (1979) which need to be acknowledged. The first concerns the need for a good visual representation of an ecological model to make it more accessible for policy development (Graham, 2004). Visual models have been developed to translate the concept of social determinants for a policy audience (ibid). One of the most widely known is Dahlgren and Whitehead's model (Dahlgren and Whitehead 1991) who mapped the relationship between the individual, their environment and health to visually express the processes involved in understanding the social determinants of health (see Figure 2). The map shows individuals at the centre, surrounded by the various layers of influences on health – such as individual lifestyle factors, community influences, living and working conditions, and more general social conditions.

Figure 2: The main social determinants of health: policy rainbow



Source: Reproduced from Dahlgren G, Whitehead M. (1991).

Defined by the World Health Organisation as '*the conditions in which people are born, grow, live, work and age*' (Marmot Review, 2010: 37; WHO, 2017), the 'Social Determinants of Health' framework is important for focussing on the wider socio-economic conditions influencing health, including the distribution of wealth, power and resources at global, national and local levels. These are factors that are

commonly used to explain inequalities in health between groups and between regions of the world. For example, evidence shows that relative deprivation²³ affects children throughout their lives, from their educational attainment through to their employment prospects, which in turn influences child physical and mental wellbeing (PHE, 2017). For children, research has shown that the '*strongest determinants of adolescent health worldwide are contextual factors such as national wealth, income inequality, and access to education*' (Viner et al., 2012: 1641). Further, childhood trajectories within health and wellbeing are *modified* by wider country level economic and social structural factors leading to national health inequalities (*ibid*). However, the social determinants of health framework that does not specifically relate to children and focuses on health only and is not specifically related to education.

The second point concerns the importance of time. A theory which was developed more recently, is 'Developmental Health' (Hertzman, 2010; Keating and Hertzman, 1999), which originated in Canada and is underpinned by Canadian data on child wellbeing. This is very similar to Bronfenbrenner's ecological systems theory, by suggesting that there are many different risk and protective factors (such as income, education, health, culture, parenting, neighbourhood, and social status). However, it posits this from a lifecourse perspective. The main difference between this theory and Bronfenbrenner's ecological systems theory is its developmental focus and emphasis on the early years of childhood. Both Development Health and Bronfenbrenner's ecological systems theory argue that the environments influencing early childhood wellbeing are not hierarchical but interrelated, with an emphasis on process. For example, income can influence education, access to health and childcare services, where people live, transportation, and social status. Hertzman argued that the family environment 'is the primary source of socio-economic and relational experiences for children' (Hertzman, 2010: 32). This is because relationships with family members /caregivers are the main routes by which children make contact and connections with their broader environment. Time is important to consider at the micro level, for example to assess impact on children moving schools, and at the macro level, to consider the impact of migration and colonialism

²³ The lack of resources to sustain the diet, lifestyle, activities and amenities that an individual or group are accustomed to: Townsend (1979) *Poverty in the United Kingdom: A Survey of household resources and standards of living*. Penguin Books).

on child development. The issue of time permeates some of my own discussion in this thesis when I discuss the limitation of measures fixed at one point in time.

The third point is that some factors have arisen since Bronfenbrenner's Ecological Systems Theory (1979) that mean his theory could benefit from some updating. For example, globalisation²⁴ has arisen since Bronfenbrenner's Ecological Systems Theory, and this has led to some authors arguing for an additional level to be added to Bronfenbrenner's levels (Christensen, 2016) to recognise that society has narrowed and is influenced by global organisations and processes (ibid). To argue for the inclusion of globalisation, Christensen (2016) raises these pertinent questions: "How do we understand education and the profession in a welfare context?" and "Can transformation in a welfare context be understood from both an individual perspective and a social one?" (p.27). Such questions can perhaps be addressed by the inclusion of public policy or governance theories, such as the Dynamic Systems Theory (or approach), which provides a reasoning for *how* changes occur within and between system levels in a systems or model (Lunkenheimer, 2018). For example, the idea of 'ecological citizenship' which posits that individuals take personal responsibility for enacting positive change (such as the local environment, their health) within a global society, and that beliefs, lifestyle, and behaviour can be politically motivated at the macros and ex-macro level (Grabs, 2018).

To make Bronfenbrenner's theory more applicable 'to the effects of public policies on development', Yoshikawa and Hsueh (2001) argue that the concept of 'dynamic change' needs to be included (p. 1890). This refers to the idea that policy environments bring about change in multiple systems and involve comparisons of child outcomes across two or more policy environments (ibid). For example, they say that antipoverty policies create change to families and child development through 'incentive structures' and home environments are noted to explain as much as half of the effect of income poverty (ibid). These latter points are particularly pertinent to my thesis, since they provide a supporting theoretical rationale for combining and including both ECEC and children's food and nutrition.

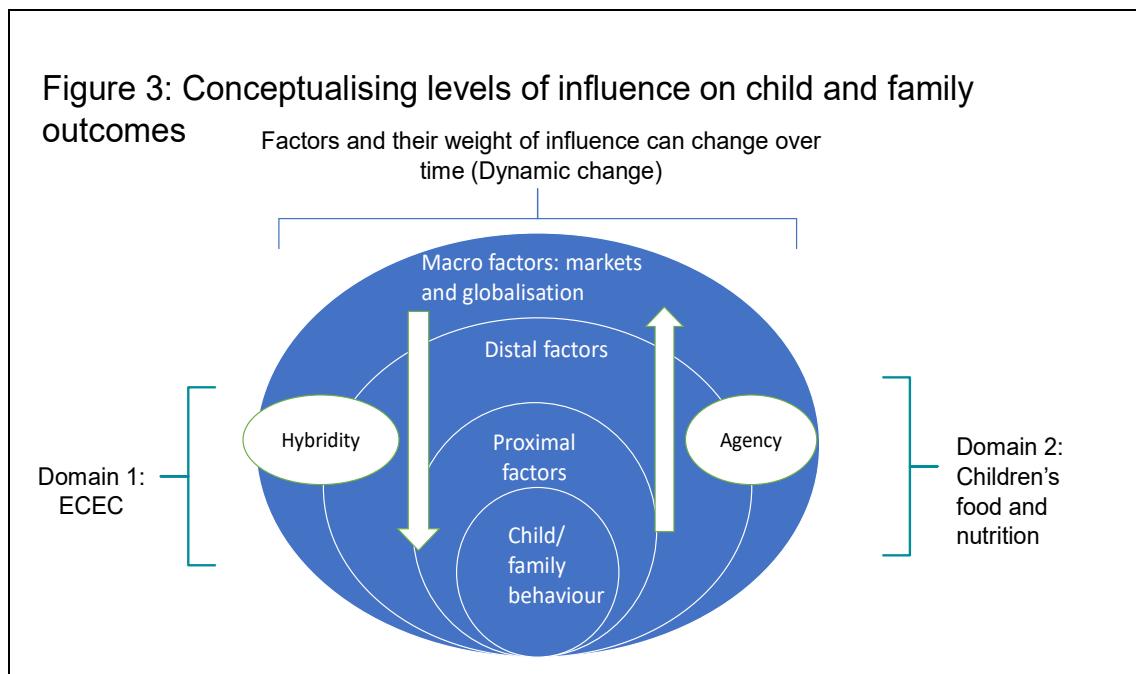
²⁴ The process by which businesses or other organisations are said to develop international influence or operate on an international level.

The last point concerns two further theoretical concepts that could usefully be added to / or could supplement Bronfenbrenner's Ecological Theory: agency and hybridity, which Robinson (2016) argues is 'a way of resolving tension between structural and agential accounts where there is dynamic interaction between markets, hierarchies, and networks' (p.2). The concept of agency provides a governance rationale for *how* development takes place as a result of forces exerted by both individuals and institutions, and that individuals have the power to conform to institutional forces or to resist change and exert influence (ibid). The concept of hybridity has been defined as 'processes in which discrete social practices or structures, that existed in separate ways, combine to generate new structures'²⁵. It is argued to be of particular relevance to ECEC because it 'typically refers to the complex organizational forms that arise as voluntary, charitable, and community organizations confront differentiated task, legitimacy, or resource environments' (McMullin and Smith, 2018, p.912). Robinson (2016) argues that the mixed economy of care in ECEC in England "exerts dynamic influences on each other and distinctions between profit and not for profit providers can become blurred" (p.7) so in this way, hybridity can be a good way of conceptualising the impact of the different structures and types of organisational model on ECEC outcomes. Wiesel and Modell (2016) further argue that 'The identification of distinct governance logics is one way of making analytical sense of this diversity' (p. 177). Although thus far, I've considered this in the context of ECEC, concepts of hybridity and agency are also of relevance to the domain of children's food and nutrition, since governance structures are responsible for what is recommended in terms of nutritional benchmarks and standards.

The below model (Figure 3) is an attempt to bring the above relevant concepts from my thesis together into one model, which could be used in the development of a COS for measuring child and family outcomes. As Bronfenbrenner's Ecological Theory suggests, the child and family are at the heart of the process, with proximal factors nearest to them and distal factors further away. I've included a new level of macros factors (such as markets and globalisation), suggested by Christensen (2016), and included concepts of agency and hybridity, to show their influence on the two domains. The upwards arrow signifies the flow of

²⁵ <https://www.sciencedirect.com/topics/social-sciences/hybridity>

change from individual to macro level – the idea of agency which suggests individuals have the power to influence changes to them/about them. The downwards arrow indicates the power of macro systems to exert change on the processes of the lower levels, including the individual.



Source: authors own work.

1.7 Summary

Secondary analysis has enormous potential for monitoring outcomes for children and families. In my research, I have used secondary analysis methods to address social policy questions about the provision and use of childcare and to examine changing dietary quality for children in Britain. However, as my discussion of mixed-methods above shows, some researchers argue there are key limitations with using secondary analysis of large-scale data, such as not being as good as qualitative methods at explaining *why* observed trends are found. Some researchers suggest mixed-method research perhaps offers the best of both worlds by combining the strengths of quantitative and qualitative methods, so long as research questions are tailored and addressed by their own epistemological and methodological assumptions (Brannen and Moss 2012). There are a variety of ways in which

methods from each approach can be mixed. In my research, I have used secondary analysis as an initial research stage in order to provide the overall context from which later stage qualitative analysis can draw – for example to inform qualitative enquiry or as a means of ‘checking’ data interpretations from the qualitative part of research projects.

There are two key issues arising out of this discussion which are of relevance to this thesis. First, concepts can be problematic to operationalise using secondary data analysis of large-scale data. Some concepts are more successfully operationalised within mixed method studies which consider depth, such as reasons young people consume the foods they do, as well as breadth, such as the range of foods young people consume. Second, some questions cannot be addressed using secondary analysis methods alone. For example, in my research I was able to examine the ‘healthiness’ of children’s diets (see paper 5) using particular food items as a proxy for measuring the concept of dietary quality but secondary data analysis could not fully address why children were consuming healthier and less healthy foods (which was addressed from the qualitative part of the research on which this paper draws – published by other team members as separate publications not submitted as part of this PhD).

I argue here that problems of data fragmentation could be overcome by a COS for ECEC and children’s food and nutrition following the recommended COMET framework steps, which is conceptually underpinned using Bronfenbrenner’s ecological systems theory (1979), grouping measures into proximal and distal factors (Bronfenbrenner and Morris 2006). I suggest this overarching theory could be usefully supported by public policy theoretical concepts of ecological citizenship, dynamic change, agency and hybridity, to provide a supporting explanation for how Bronfenbrenner’s levels structural and process factors can influence and shape children’s wellbeing in different domains.

Section 2. RQ1: What does the literature identify as important concepts, factors and indicators and what does this suggest for a scope of a COS in my two research areas?

This section is not intended to be a comprehensive review but rather a critical analysis of the important concepts and factors and indicators within each topic area that are highlighted within the literature as important. Each topic area is discussed separately and then I present a summary at the end which attempts to tease out some of the similarities and differences between indicators in these fields.

2.1 Early Childhood Education and Care

2.1.1 A brief overview of ECEC research in the UK context

The rise in employment of mothers with young children over the last 20 years has largely driven the demand for childcare in the UK (Thompson and Ben-Galim 2014). Supporting maternal employment is seen to be important for society and the economy:

'Our reforms seek to benefit both society and the economy by delivering high quality education in the early years at the same time as helping parents back to work' (Department for Education 2013a p.13).

However, affordability and access to 'good quality childcare' remain key barriers to uptake for some families. It has been argued that the lack of access to flexible childcare may force parents to choose low-quality part-time jobs, trade down roles or leave work altogether, which would place more parents at risk of poverty (Butler and Rutter 2016; Simon and Owen 2016).

Currently, the ECEC system within England involves four main types of provision: state, private-for-profit, not-for-profit and informal providers. At present there is no free childcare provision for children between when maternity pay ends and age two. However, early education is free at the point of delivery for 3- and 4-year olds and some (economically disadvantaged) 2-year olds for children who have a parent earning the equivalent of 16 hours at the national living wage or minimum wage per week (for example, £120 per week if you are 25 or older) and no more than

£100,000 in taxable income (either parent)²⁶. The requirement is not tied to the number of hours worked per week but to how much is earned per parent. For other children parents pay often very high childcare fees (especially in London) – analysis by the TUC reported in 2017 showed that childcare costs had risen three times faster than wages²⁷ and a childcare survey (2018) by the Family and Childcare Trust reported childcare prices for children under three have risen above inflation and wages in 2018 (Hardie and Cottell 2018). Government subsidies have been introduced to help with these rising costs (Department for Education 2015). For example, the UK government is offering an estimated £1 billion funding by 2020 to support childcare and education for three and four year olds and some two year olds which is free to parents (House of Commons Committee of Public Accounts 2016). However, such subsidies have been heavily criticised. A survey by the Family and Childcare Trust (Rutter 2016) for example reported low take-up of the policy of the 15-hours free childcare. One report estimated that one in five children did not access their free place from the beginning (Campbell, Gambaro and Stewart 2018). The ‘free childcare offer’ has also been argued to not cover the true cost of providing places (House of Commons Debates 2017; Jarrett 2016), meaning parents may be at risk of not finding a place for their children, or having to find top up costs for ‘free’ placements. The effect of childcare costs on female labour market participation has been shown to vary significantly between studies (HM Treasury 2018: 6).

2.1.2 Indicators used to monitor and evaluate ECEC in the UK and elsewhere

2.1.2.1 Concepts of ECEC service quality

Mathers and Ereyk-Stevens (2017) discuss the ‘sound foundations’ of providing ECEC in the early years, arguing that the most significant influence on children’s development in the early years is the nature of relationships formed with adults who care for them. However, it is noted that the formation of relationships is different between home settings, where this usually involves the child and their parent (or friend/family), and more formal childcare settings, where many children in the UK spend most of their day and which must somehow cater for the individual needs of

²⁶ Full eligibility criteria are reported here: <https://www.gov.uk/30-hours-free-childcare?step-by-step-nav=f517cd57-3c18-4bb9-aa8b-1b907e279bf9>

²⁷ <https://www.tuc.org.uk/news/childcare-fees-have-risen-three-times-faster-wages-2008-tuc-analysis-reveals>

young children within a group setting with often high staff to child ratios (ibid 2017). Despite these differences, formal childcare continues to be the preferred delivery method within policy because formal childcare has been shown to lead to better outcomes for children (see European Commission/EACEA /Eurydice 2014; Melhuish et al. 2015). For example, it has been reported that '*Children's centres are best able to respond to children's needs holistically*' (McNeil, and Cory 2017 p.54). However, evidence is mixed as to the types of observed effects. For example, while the SEED (Melhuish, Gardiner and Morris 2017) study shows relationships between formal group care and problem behaviour, an earlier study by Hansen and Hawkes (2009) using data from the Millennium Cohort Study did not find this (but they did find that formal group care is positively associated with school readiness test scores).

'Quality' is a key phrase underlying discussions such as the above, but what achieves good child and family outcomes? There is no consensus as to what quality is, what it means and how it can be measured. Although there are multiple definitions of quality, the literature often discusses quality as distinguished by two main types. The first is 'structural quality', and is understood as the quality of the conditions of the ECEC centre²⁸, such as the number of staff and their working conditions. The second is 'process quality', and is understood as the way in which a child experiences the ECEC setting (Janta, van Belle and Stewart 2016). This typology maps on well to Bronfenbrenner's *proximal* and *distal* factors (Bronfenbrenner and Morris, 2006).

Research using secondary data analyses overall identifies a complex picture of findings between process quality and child outcomes. High process quality ECEC has been shown in some studies to have important beneficial effects on children's cognitive, language, and social-emotional development (e.g., Burchinal et al. 2010; Melhuish et al 2015). In particular, curriculum quality has been found to be related to gains in children's literacy and math skills (Sylva et al. 2014). Some studies outside of the UK have reported similar results. For example, the longitudinal BiKS study in Germany has found curriculum quality related to gains in maths (Anders et al. 2012). However, the longitudinal Portuguese Contexts and Transition study did not find associations between curriculum and children's math skills (Abreu-Lima et al. 2013; Pinto, Pessanha and Aguiar 2013) - but they did find effects of process quality on

²⁸ Usually determined by legislation, policy and funding (Slot 2018).

language and literacy outcomes (ibid). Furthermore, some studies have shown that the level of quality is important. For example, one study found quality of service provision is related to child outcomes, with higher rated services resulting in better child outcomes (Sylva, Melhuish, Sammons, Siraj-Blatchford, and Taggart 2011).

2.1.2.2 Structural and process factors

Some studies have examined associations between structural and process factors. For example, using evidence in their study, Janta, van Belle and Stewart (2016) argue that high process quality generally follows from high structural quality, citing an example of staff-child ratios (a measure of structural factor) facilitating positive child experiences and better interactions with their learning environment (indicators of process quality). Child-staff ratios are a key quality indicator in early childhood education and care (ECEC) programmes, linked to improvements to child outcomes by 'increasing opportunities for individual interactions and educational instruction from staff' (Perlman et al. 2017). However, Janta, van Belle and Stewart (2016) postulate that process quality does not necessarily follow from good structural quality because of differences between settings and between countries in how ECEC is provided.

An influential comparative study of childcare quality by Slot, Lerkkanen and Leseman (2015) carried out secondary analysis of longitudinal data in five countries to examine the interactions between structural and process factors. They examined process quality using three 'commonly used observation indicators' which they used to evaluate the emotional and educational process and curriculum quality: the Early Childhood Environment Rating Scale revised (ECERS-R) and its extension (ECERS-E) and the Classroom Assessment Scoring System (CLASS). The purpose of this analysis was to investigate associations between structural and process factors. The results for England showed that 'quality was highest in provisions with an educational orientation compared to more care oriented provision, with a large effect size. In addition, higher qualified teachers provided higher process and curriculum quality showing small effects' (ibid p.5).

Slot, Lerkkanen and Leseman (ibid) additionally identified an important interaction effect whereby 'low educated teachers working in educationally oriented provision provided higher process and curriculum quality compared to their counterparts working in care oriented provisions, with medium to large effects' (p.5).

This finding suggests that structural factors, such as whether the setting was educationally or care orientated, could somehow offset the impact (on child outcomes) of staff having low educational levels. From other analysis Slot, Lerkkanen and Leseman conducted (reported in the same publication), this finding seems to be the result of low educated staff having received important work experience and / or professional development opportunities which supported their work with children. This finding was also found within another study from England by Otero and Melhuish (2015) which also reported positive effects of professional development, and data from Portugal which identified 'teachers working in the public sector were better able to deal with a more unfavourable children-to-staff ratio compared to teachers working in the private sector' (Slot, Lerkkanen and Leseman 2015 p.50).

This work was followed up by Slot in 2018 when she carried out a very useful literature review which identified the key indicators of process quality used in ECEC research. In table two, I have summarised the key indicators reviewed by Slot (2018).

Table 2: Key process indicators identified by Slot, 2018 (summarised from box 2.1, page 14)

Name of measure / indicator	What is it measuring?	Example studies
Environmental Rating Scales (ERS) or ECERS	Quality aspects: space and furnishing, personal care routines, language reasoning, activities, interaction, programme structure, and parents and staff, i.e., Process and structural factors. Different versions of this tool have been developed for infant and toddler classrooms.	E.g., Sylva, Siraj-Blatchford and Taggart (2003) developed the ECERS-E to capture aspects of the curriculum with a focus on literacy, math, science and diversity.
Caregiver Interaction Scales	Indicators teacher sensitivity, harshness, detachment and permissiveness in interactions with children.	E.g., Arnett (1989)
Classroom Assessment Scoring System (CLASS)	Evaluates emotional, behavioural and instructional aspects of the teacher's interactions with children and the way the teacher fosters	Different age versions available, e.g., Hamre et al. (2014) for infant classrooms, La Paro, Hamre and Pianta (2012) for toddler classrooms,

	interactions with materials and peers, i.e., Process and structural factors.	and Pianta, La Paro and Hamre (2008) for preschool classrooms.
Observational Record of the Caregiving Environment (ORCE)	Indicators caregiver-child interactions. Few items addressing language and cognition.	E.g., NICHD Early Child Care Research Network (1996).
Early Literacy and Language Classroom Observation	Focuses on classroom interactions. Also has domain-specific focus on emerging literacy activities.	E.g., Smith, Dickinson and Sangeorge (2002).

Slot (2018) also considered the main structural factors discussed within ECEC literature on pages 18-23 of her report, which I've summarised in Table 3 – this time including a brief overview of the findings from some of the key studies.

Table 3: Key structural indicators identified by Slot, 2018 (summarised from pages 18-24)

Concept being measured	Indicators	Brief findings from studies using this indicator
Type of centres/care provision	Public settings versus private settings	Public settings provide higher process quality in China, Portugal, and the United States as measured with the ECERS (Coley et al. 2016; Hu et al. 2016; Slot, Lerkkanen and Leseman 2015). However, no effects in Spain between private and public settings (Sandstrom 2012) and one Chinese study rejected this after controlling for centre characteristics such as location of the centre, governmental funding, staff salary and child tuition (see Hu et al. 2016).
	Geographical location	Less ECEC availability and lower ECEC quality in rural areas (see Hu et al. 2016).
	Type of setting e.g., delivered in a classroom / part of a school	Higher process quality for preschools in schools (see Pianta et al. 2005; Slot, Lerkkanen and Leseman 2015).
Organisational climate and leadership	e.g., management quality	Has been found to be a strong predictor of process quality (e.g., Biersteker et al. 2016).
Working conditions	Staff working hours, workload and wages	Large effects found between staff receiving more salary and higher process quality in China (Hu et al., 2016), but not found in the US (Pianta et al. 2005).

Classroom features	Child-staff ratios and group size are the most commonly studied aspects	Findings are mixed. E.g., Vermeer et al. (2016) reported no significant differences in mean group size and child-staff ratios between Europe and North America. However, some other studies have reported a relationship between smaller ratios / group size and process quality (e.g.,, Hu et al., 2016a). Cryer et al. (1999) found differences between countries.
	Mean age in the classroom or ethnic classroom composition	E.g., Kuger et al. (2015) in Germany: higher process quality in classrooms with, on average, older children. Lower process quality in classrooms with higher proportions of ethnic minority children.
Staff characteristics	Pre-service training levels/ Staff qualifications	Early et al. (2006) identified strong relationship between staff having a degree above bachelor level and higher process quality. Tout, Zaslow and Berry (2005) argue that pre-service training levels were more strongly related to process quality if the training included early childhood and education content, such as child development. Slot (2018) identified 12 studies across Europe and the US, the majority of studies indicated positive effects (9 out of 12).
	Continued professional development (CPD)	Egert (2015) found inconsistent results from conducting a systematic literature review to evaluate the effectiveness of professional development (PD). Differences were explained by varying provision of on-site support, such as mentoring. Coaching was found to be an important moderator.
	Ratings of Well-being/job satisfaction	A study by Jennings (2015) found associations between 'burn out', self-efficacy and observed classroom quality in the United States.
	Work experience	Mixed evidence. Some studies show significant associations with process quality (e.g.,, (LoCassale Crouch et al. 2007) while others do not (e.g., Hu et al. 2016).

The information provided in table three highlights that Slot (2018) has identified a mix of evidence in support of different structural measures. This is corroborated by other evidence, such as an analysis of quality process measures by Mathers et al. (2012) which identified some limitations with the use of ECERS. Slot (2018) also points to the limited extent to which some of the more distal factors (such as working conditions) can be seen to impact process quality outcomes. She further argues that the picture is clearer when 'proximal characteristics' such as staff or classroom features are used as indicators in analyses predicting quality and child

outcomes. She also considers the importance of confounding factors in the mixed results of these studies. For example, taking the case of her example in China, Hu et al. (2016) argue that working conditions are better in urban centres (as compared with rural areas) in China because they receive greater government funding which allows them to attract higher qualified staff who then receive higher salaries and work in centres with higher child-staff ratios. Child-staff ratios are not currently available in the published tables within the large-scale datasets I have examined. However, they can be calculated from information in the Childcare and Early Years Providers Survey – as done recently by Bonetti (2018) which she compared between ‘group based settings’ and ‘school-based settings’ and found that ‘providers usually comply with the required child to staff ratios’ (p. 16). Ratios have also been measured within a number of individual studies that are included in a major systematic review of ‘Child-Staff Ratios in Early Childhood Education and Care Settings and Child Outcomes’ by Perlman et al. (2017). Ratios are also covered within Slot’s (2018) systematic review which builds on an early review of ratios by Munton et al. (2002). In all of these studies, the ratio indicator is the number of children being cared for per adult.

Slot, Lerkkanen and Leseman (2015) concluded from their research that it is advantageous to have cross-country comparative datasets in order to strengthen conclusions regarding effective factors across settings and contexts but, as their study showed, this is a challenging endeavour. This is because they were unable to produce a dataset with data from the five countries they examine because of incompatibility of data indicators across the countries. Instead, they had to conduct country-level analysis with indicators and analyses specific to each country. To overcome this issue, they point to the need to have ‘the same comprehensive set of structural and contextual variables, and preferably measure these constructs in the most straightforward way (i.e., as continuous variables instead of categorical variables)’ (ibid: 52). So, in other words, they consider that a unified set of indicators would be beneficial for measuring the concepts of process and structural ECEC quality. Additionally, as they identified a number of important interactions between countries (system specific, centre, classroom and teacher characteristics), they would urge future studies to explore possible associations between structural and process factors which better take account of what they term ‘country-specific aspects of the ECEC system’ (the ways in which ECEC is provided at the country level).

Other outcome indicators produced about provision quality are those reported by Ofsted from their inspection reports. The indicator is an assessment of 'overall quality' of an ECEC setting and are provided in the form of a rating of overall effectiveness, as Outstanding, Good, Requires Improvement, or Inadequate²⁹, with a 'good' rating now being a minimum requirement³⁰. Ofsted ratings have been found to capture child development levels. For example, the importance of the quality of the setting for children's wellbeing and development has recently been reiterated by the Study of Early Education and Development (SEED) project (Melhuish and Gardiner 2017). A noted key strength of Ofsted data over survey data, is that they cover almost the entire population of three and four year olds, which enables researchers to include different indicators of quality to examine how these measures vary in their relationship to children's background (Gambaro, Stewart, and Waldfogel, 2015). For example, Ofsted data include a score which measures the Income Deprivation Affecting Children Index (IDACI), which can be used to identify settings in disadvantaged areas and compare them with less disadvantaged areas. The relationship between socio-economic background and the IDACI score is complicated, however. For example, according to Mathers, Mathers, Singler, and Karemaker (2012), nursery schools have been found to be high quality and more common in poorer areas, but childcare tends to have lower scores in poorer areas. This means that quality confounds, or complicates, the link between background and outcome.

Mathers, Singler and Karemaker (2012) noted other shortcomings of the Ofsted rating as a measure of quality. In their study, which examined the extent to which concepts of quality embodied in Ofsted indicators align with stakeholder perceptions of quality, they found that they were poor at capturing the depth of information needed to reflect all elements of quality stakeholders valued, particularly 'staff-child interactions'. However, the effectiveness of leadership, management and self-evaluation were covered well in Ofsted ratings (*ibid*). Mathers, Singler and Karemaker (2012) suggest some of these limitations are due to the 'one time point' nature of these indicators and stakeholders reported that Ofsted did not spend sufficient time at settings to produce a comprehensive measure. Despite these

²⁹ <https://engage-education.com/blog/video-article/>

³⁰ <https://www.gov.uk/government/news/good-now-minimum-standard-ofsted-expects-from-schools>

limitations, Ofsted ratings remain the only quality measure available for all registered childcare in England to assess whether the quality of nurseries in the more deprived areas is on average equivalent to that in less deprived areas, or whether more deprived areas have poorer quality nurseries (Simon et al. forthcoming).

A recent study by Stewart, Campbell and Gambaro (2019) set out to address how low-income children in England are distributed across early education centres in the year immediately before formal schooling, and the relationship between the proportions of low-income peers in a low-income child's early education centre and these children's subsequent educational attainment (p. 5). They assessed this using a variety of outcome indicators. Some of these indicators were at the child level (e.g., the proportion of children who are low-income and Key Stage One scores). Some indicators were school level variables, for example, the most recent Ofsted inspection rating looked at whether qualified teachers and/or early years professionals work with 3–4 year olds, number of weeks per year open, total number of children in this age group attending school, type of ECEC setting (e.g., private day care, school nursery, voluntary sector setting) and staff qualifications. Two key main outcome indicators were Foundation Stage Profile (FSP) scores, 'which are teacher-assessed according to a series of standardised criteria at the end of the first (reception) year of primary school (age five years)' and Foundation Stage Profile scores (p. 10). The paper is helpful for highlighting the need to be sensitive to the level of measurement, and they operationalised outcome indicators at both the child and school level for use in their fixed effects ordinary least squares (OLS) model. They found a null relationship between peer constitution by income level and subsequent attainment which is a departure from patterns identified in previous literature. Some reasons given for their differing results from other literature seem to relate to the use of secondary analysis methods and operationalising data indicators. For example, first they discuss that while FSM has been shown to 'provide a reasonably valid indication of family circumstance, it does not capture all very low-income families' (*ibid*, 21). Another issue reported earlier in the paper is that their FSP measure includes six sub-scales which are highly correlated with one another, This meant they opted to use a summed total score of these scales as one of their main outcomes in their analyses rather than using the separate sub-scales as outcome indicators. They also report that their analytical year of interest was

removed from the first observation of FSM take-up, making temporal conclusions problematic; the binary nature of the FSM variable is reported to possibly mask ‘nuanced variations at the individual level, and at the level of the centre constitution, which might relate to children’s attainment’ (ibid, p.21). Moreover, they say that the FSP attainment measure ‘is an inexact representation of children’s manifest capacities’. This paper offers tangible examples of the complexities of working with large-scale data and operationalising indicators to accurately represent or measure the underlying social phenomena.

2.1.3 What does my review of literature suggest should be included in a scope for a COS in ECEC?

Earlier in this section I discussed how Slot (2018) suggested that a unified set of indicators for ECEC would be beneficial for supporting analysis that was interested in assessing the relationships between structural and process (distal and proximal) concepts of ECEC quality. The literature seems to suggest that both structural and process factors should be measured – although some of these (see earlier discussion of the literature) have stronger associations with ‘quality’ than others and measures of quality can have a complicated relationship with background measures such as the IDACI. The literature also suggested cross-country comparative datasets are ideally important to develop. With this in mind, a useful outline scope for a COS in ECEC would seem to include indicators of ECEC which cover both process and structural aspects of the concept of ECEC quality, indicators which can be measured in different countries and indicators which include an agreed set of contextual variables. However, as Slot (ibid) argued, cross-country comparisons are often a ‘challenging endeavour’, I would recommend starting with a COS in the UK only as a first step.

According to the COMET framework for developing a COS (figure 1) discussed earlier in section 3, an accompanying step is to identify if a COS is needed (is one registered). I searched COMET to see if there were any existing reviews or COS in scope (step 2 of figure 1). I concluded from this search that there is no COS that is relevant to ECEC that mentions quality or any structural or process factors. This suggests a COS in this area is open to development. The benefits of which would be to contribute to build on the important key study by Slot (2018) to

identify and bring together indicators important for assessing structural and process aspects of ECEC quality.

Now, let's turn to children's food and nutrition where my work has been concerned with understanding the factors which influence children's dietary intake. Consequently, the indicators I discuss in this section are confined to those targeted at monitoring children's diets. First I discuss why dietary intake is an important concept in the literature and then what the key indicators discussed are.

2.2 *Children's Food and Nutrition*

2.2.1 A brief overview of the UK context

In November 2008, Professor Sir Michael Marmot was asked by the Secretary of State for Health in England to chair an independent review about the most effective evidence-based strategies for reducing known health inequalities in England from 2010 (Marmot Review, 2010). This report recognised that disadvantage starts before birth and accumulates throughout life, so addressing health inequalities early is important for good long-term health outcomes (ibid). Access to good quality food was discussed in this report as a key area in which reduce health inequalities for children and their families (ibid). A follow-up report in February 2020 (Marmot et al., 2020) noted that the link between poverty, food and health was crucial to understand, and that since the last report 10 years before, as much as 'between eight and 10 percent of households in the UK were food insecure' (p.26).

Diet is widely recognised to be important for good child health outcomes and has an important role to play a role in reducing health inequalities (World Health Organisation 2017). For example, it is known that poor diet in childhood can lead to longer-term health problems, including heart disease, obesity, Type 2 diabetes, osteoporosis and some forms of cancer (Lagerros, Hsieh, and Hsieh 2004). In addition, aspects of diet such as skipping breakfast (Hoyland, Dye and Lawton 2009), are associated with poor cognition and lower academic achievement as children's ability to concentrate is damaged by insufficient food or food of poor nutritional value (Dowler 2014). Consequently, types of foods and nutrients consumed by children are understood to be part of childhood wellbeing (Public Health England 2013) and government policies to improve children's dietary intake

include targets to help children achieve the recommended '5 a day' portions of fruit and vegetables³¹, and reduce sugar intake (for example through social marketing and a soft drinks levy since 2016³²), and to provide children with a 'Healthy Start'³³ through funding vouchers for fresh fruit and vegetables and milk for low income mothers of young children.

The nutritional quality of food in (most) schools is also subject to regulation. In England for example, standards for school food were introduced between September 2006 and September 2009 (Children's Food Trust 2016). In 2015 these were replaced by the School Food Standards. While these food standards applied to the food provided in local authority maintained schools, they did not apply to some academies or to free schools (ibid). However, there is a lack of monitoring with regard to implementation.

In recent years quantity as well as quality of food consumed by children and families has become prominent in public debates, as the number of food banks has risen³⁴. As yet, there are no government targets or official indicators of individual or household 'food security'³⁵ (Dowler and O'Connor 2012). However, the Office for National Statistics ONS recently announced plans to begin to measure this³⁶.

Research has examined the dietary patterns of children and families, including associations with household and individual characteristics such as income, social class and maternal employment. For example, the cost of food has been examined relative to disposable income (affordability) (Roberts, Cavill and Hancock 2013). Evidence shows a change in households' spending behaviour in relation to changing food prices, with some groups 'trading down' (buying cheaper versions of usual commodities) to cope with rising prices, with the exception of those in the lowest income group who are already 'on the most basic of diets' (Dowler 2014 p.167). Other studies have also suggested that the rise in maternal and dual parent employment can impact negatively on children's diets (Hawkins, Cole and Law 2009) and their participation in family meals which can be a protective factor for children's

³¹ The School Fruit and Vegetable Scheme: <https://www.nhs.uk/live-well/eat-well/school-fruit-and-vegetable-scheme/>

³² See: <https://www.gov.uk/government/publications/soft-drinks-industry-levy/soft-drinks-industry-levy>

³³ <https://www.healthystart.nhs.uk/>

³⁴ Beyond the Food Bank Report: <https://www.sustainweb.org/foodpoverty/profile/>

³⁵ Defined as having reliable access to a sufficient quantity of affordable, nutritious food.

³⁶ See: <https://www.theguardian.com/society/2019/feb/27/government-to-launch-uk-food-insecurity-index>

health (see for example Neumark-Sztainer et al. 2003). However, the evidence is mixed and most research has been undertaken in the US with a small number of studies in the UK. Other studies have examined the roles mothers and fathers play in food preparation – what is sometimes referred to as the division of foodwork – using time use and other survey data to identify the persistence of gender stereotyping, with women undertaking most ‘foodwork’ (e.g., Bittman and Wajcman 2000).

2.2.2 Indicators used to monitor and evaluate children’s food and nutrition in the UK and elsewhere

2.2.2.1 Concepts of dietary quality as measured by single foods versus whole diet approaches.

The literature on children’s food and nutrition often discusses concepts of dietary quality. The resulting indicators (variables in the given dataset) include amounts and frequency of consumption of different food items and nutrients over a specified time period. For example, the Health Behaviour in School-aged Children study (HBSC) includes frequency consumption data for a range of food items (see paper 6 which used the HBSC to examine the frequency with which young people consumed a variety of foods including breakfast, fruit, vegetables and soft drinks over the past week). These foods are often used as indicators of so called ‘healthy eating’.

Questions about the frequency of consumption of foods and drinks that recommendations suggest are limited in, or excluded from, children’s diets, such as sugary drinks, are also measured to indicate poorer dietary quality. These indicators are often used to investigate dietary patterns in a study population in order to make a judgement about adherence to dietary guidelines such as the UK 5-a-day fruit and vegetable policy mentioned earlier or specific dietary patterns such as following a ‘Mediterranean diet’ (Tong et al. 2016). The NDNS, which also contains measures of individual food consumption, is also used to provide evidence on the diet and nutrition of the UK population to enable Public Health England to identify and address nutritional issues in the population and monitor progress towards public health nutrition objectives³⁷.

³⁷ See: <https://www.gov.uk/government/collections/national-diet-and-nutrition-survey>

Measurement of dietary quality is complex, but broadly falls into two types of assessment methods (see the 'DAPA Measurement Toolkit³⁸'). The first set of methods used to assess dietary quality are collectively called 'subjective methods'. These use self-reported answers from participants to estimate aspects of diet through asking broad questions such as: What was eaten? How much was eaten? How often is this item eaten? The operationalisation of self-reported dietary outcome indicators typically involves two steps. First, the assessment of food consumption using dietary assessment tools (such as food frequency questionnaires or diet diaries) and second, the conversion of reported intakes into nutrient data. This is the approach taken in the UK's National Diet and Nutrition Survey (NDNS), which is the main source of evidence about nutritional intake and progress towards public health nutrition objectives in the UK. The NDNS collects data using a 4-day unweighed food and drink diary which is then converted into nutrients consumed (Roberts et al. 2018).

The second group of methods for assessing dietary quality, 'objective methods', do not rely on written or verbal responses from participants. Instead, they record dimensions of diet through methods of direct observation, which are sometimes preferred because they minimise issues relating to respondent bias, such as recall errors and social desirability (see earlier discussion in section 1). Examples of this are biomarkers (collected through for example blood tests) or video-recording someone eating during a meal time (e.g., Muesbeck et al. 2018). European Prospective Investigation of Cancer (EPIC-Norfolk) is a cohort study of c.30k men and women aged between 40 and 79 living in Norfolk providing data on habitual dietary intake with subjective instruments and nutritional biomarkers (Harding et al. 2008). These biomarkers form 'outcome indicators' in analysis. This approach enables explicit relationships to be observed between dietary and lifestyle factors and risk of disease development to inform health policies. However, objective outcome indicators like biomarkers are often burdensome for participants and expensive to operationalise, confining them to small scale studies to validate subjective methods within larger studies (Shim, Oh, and Kim 2014).

Rather than focussing on individual foods, some studies are more interested in the 'whole diet' approach to measuring the concept of dietary quality. This is

³⁸ <https://www.dapa-toolkit.mrc.ac.uk/>

because it is argued that it is: 'the combination of foods that groups of individuals eat which comprise the overall diet, rather than the presence or absence of specific food items, that is ultimately of importance to nutritional health status' (Pryer et al. 2001 p.19). One method of operationalising the whole diet approach is by using so called 'data driven' tools which produce types of diet using 'patterns' suggested by the statistical relationship between variables in a dataset (see Fahey et al. 2007). In support of the data driven approach, North and Emmett (2000) say that 'exploring the relationship between several socio-demographic factors and various components of diet, such as the frequency of food consumption of individual foods, can be difficult to summarise, and since many isolated foods form even the most basic of diets, this could be seen as an uneconomical method of analysis' (p.73).

The literature also discusses the problem of inter-correlations in food data. This refers to the idea that some foods are eaten together while others are eaten separately. For example, vegetables are commonly eaten with a main meal whereas fruits are often consumed alone (Mak et al. 2012). Studies using data driven tools often choose analytical techniques such as Cluster Analysis (CA) or Principal Components Analysis (PCA) to allocate individuals to distinct groups based on their similar dietary characteristics (e.g., James 2009; Pryer et al. 2001) or in order to group dietary information into food groups (e.g., Brunner et al. 2008; Crozier et al. 2006; Wärffelt et al. 2000). Such 'data driven' tools have been used to examine the diets of adults (e.g., Barker et al. 1990; Whichelow and Prevost 1996) and children (e.g., North and Emmett 2000; Northstone, Emmett and Rogers 2008; Craig et al. 2010). For example, Pot et al. (2014) used PCA and reduced rank regression (RRR) to examine dietary patterns linked to breast cancer risk and found mixed results (PCA did not identify any meaningful link to diet but RRR did). However, data driven tools are not without criticism. For example, it has been argued that the exploratory nature of such methods means that the technique lacks repeatability between studies (Hu 2002; Jacques and Tucker 2001; Martinez, Marshall and Sechrest 1998) and produce poor results when using dietary patterns to predict disease (Hoffmann et al. 2004).

Studies analysing the 'whole diet' approach sometimes use indicators developed through combining variables available in a dataset. So called 'composite score' indicators are sometimes called 'Diet Quality Indexes' (DQIs) in the literature. As with the analysis of single food items, DQIs may be operationalised as indicators

in relation to current nutritional benchmarking using official guidelines, for example from the UK's Scientific Advisory Committee on Nutrition (SACN) (as we did in paper 5). DQI's have been argued to be better for examining the quality of whole diets than the above data-driven tools because they are based on existing knowledge of optimal dietary patterns (McNaughton et al. 2008: 86). DQIs have been used to assess how for example dietary guidelines are met by population sub-groups (Armstrong et al. 2009:4; Dubois, Girard and Bergeron 2000; Huijbregts et al. 1997). Two commonly used indicators are the Healthy Eating Index and the Revised Diet Quality Index (Haines Siega-Riz, and Popkin 1999; Kennedy, Ohls, Carlson, and Fleming 1995). Both of these DQIs are based in the U.S. and measure adherence to food and nutrient-based guidelines. At the time of our research, there were no UK measures which similarly took account of dietary intakes compared to recommendations for different age groups of children.

Exemplar studies operationalising single or whole dietary quality concepts include the Avon Longitudinal Study of Parents and Children (ALSPAC), which collects some food frequency data from children and adults (recorded as follows: (i) 0; (ii) 0.5; (iii) 2; (iv) 5.5; and (v) 10 times per week). Analyses of the data from this study have used data driven approaches (specifically factor analysis (FA)) to combine the food frequency data into these key diet indicators using: 'Junk', 'Health Conscious', 'Traditional' and 'Snacks' factors at age three and at age seven: 'Processed', 'Health Conscious', 'Traditional' and 'Junk' (see North and Emmett 2000). Within the Health Survey for England (HSE), there is an 'Eating Habits' section which includes questions on fruit and vegetable consumption (dried and fresh varieties) such as 'How many tablespoons of vegetables did you eat yesterday?'. According to the HSE for 2016, only 16 per cent of children aged 5 to 15 ate five standard portions of fruit and vegetables per day³⁹.

The most comprehensive data for dietary indicators is the National Diet and Nutrition Survey (NDNS) which collects information from children (via adults for young children) using a four day weighed drink and food diary. North and Emmett (2000) compared their results on fruit and vegetable consumption with similar data in the NDNS and identified that while there were only small differences boys and girls

³⁹ <http://healthsurvey.hscic.gov.uk/data-visualisation/data-visualisation/explore-the-trends/fruit-vegetables.aspx?type=child>

in terms of fruit and vegetable consumption, they found a higher proportion of girls consuming fresh fruit than boys. We also note this difference between boys and girls using the Health Behaviour in School-Aged Children survey (HBSC) – see paper six. North and Emmett (2000) also note some important differences between social class groupings within both datasets, with those from manual backgrounds most likely to eat less healthy diets (more processed foods and less fruit and vegetables).

2.2.2.2 Food for health and social participation within living standards research.
Aside from indicators of dietary quality, the reviewed literature discusses a different approach to assessing the adequacy of children's diets which understands that food practices as embedded in everyday life and social relations. For example, O'Connell and Brannen (2016) argue it is important to consider where children of employed parents consume foods throughout the working day, as 'nutritious foods' in childcare settings can 'supplement or complement the diet they eat at home' (p.29). However, few studies (e.g., Mooney and Blackburn 2003) have researched the contribution of food in day care to children's diets, despite reported associations between maternal employment and what children's eat (O'Connell and Brannen 2016).

Social scientific approaches to understanding why people eat as they do also emphasise the value and meaning of food beyond nutrition. For example, food is argued to be a source of pleasure, a way of expressing care (O'Connell and Brannen 2016) and linked to children's identity (Fischler 1988). These social science perspectives of food offer a broader meaning of food quality – incorporating social as well as physical needs - than examination of nutritional values alone (see Stewart and Roberts 2019 quoting Dowler and Leather 2000).

Budget standards are used internationally to calculate the cost of living according to societal norms, including a healthy, socially acceptable diet (Carlson, Lino and Fungwe 2007). The Minimum Income Standard (MIS) uses a consensual approach to calculate budget standards. It is based on detailed research with groups of members of the public specifying what items are needed for a minimum socially acceptable standard of living and consequently what needs to be included in a minimum household budget which is augmented by expert knowledge in relation to energy use, such as electricity consumption, and food and diet (*ibid*). This results in a recommended weekly budget for different family types. The 'minimum' is defined as 'more than just, food, clothes and shelter. It is about having what you need in

order to have the opportunities and choices necessary to participate in society' (Padley and Hirsch 2016 p.5). In the research I undertook (see paper 7), we disaggregated the MIS to focus on the food part of the budget, i.e., a minimum socially acceptable diet that meets social as well as nutritional needs and compared this with households' expenditure to assess which types of families were spending less than the minimum. This reflected a multidimensional understanding of food needs and food poverty and is more comprehensive than some other approaches to calculating the cost of a diet that are based on expert recommendations for nutrient adequacy rather than consensual methods that include social acceptability and participation (e.g., Nelson, Dick and Holmes 2002 p.575).

2.2.3 What does this suggest should be included in a scope for a COS in children's food and nutrition?

As discussed earlier in this section, the literature on children's food and nutrition considers discusses concepts of dietary quality, which are operationalised either as indicators of the consumption of particular foods (such as fruit and/or vegetables) or 'whole diet' indicators (food types such as 'junk foods' or 'processed foods' or composite scores like the DQI we developed using NDNS data). These measures of dietary quality, either use single foods or 'whole diet' approaches or assess diets in relation to current nutritional benchmarking standards, using data driven approaches. Another concept that we have operationalised considers the importance of food for health and social participation within living standards research. I therefore recommend that a scope for a COS in children's food and nutrition should include these concepts and indicators. However, this suggested scope is based on empirical evidence only and could benefit from the consideration of an overarching theoretical framework to inform the organisation of indicators.

According to the COMET framework for developing a COS (figure 1) discussed earlier in section 3, an accompanying step is identifying if a COS is needed (is one registered). I searched COMET to see if there were any existing reviews or COS in scope (step 2 of figure 1). I concluded from this search that and there are no COS relevant to children's food and nutrition apart from a school based interventions to prevent overweight and obesity⁴⁰. Therefore, it is likely that a COS could be established in this area – the benefits of which would be to contribute to

⁴⁰ <http://www.comet-initiative.org/studies/details/971?result=true>

current developments within the field – for example an ongoing study developing indicators to prevent overweight and obesity in schools that already exists (*ibid*).

2.3 *Summary*

There are a range of ways in which outcome indicators within ECEC and children's food and nutrition have been operationalised and analysed in the literature.

Additionally, different studies use different indicators, and do not cover all relevant areas, such as context or background variables. This raises important issues relevant for secondary analysis of large-scale data. For example, it is difficult to pool data from different datasets (data are 'fragmented' across different data sources) and analysis can be restricted by what the original purposes of the research were and consequently the available indicators in each dataset.

Within children's food and nutrition, while some datasets focusing on diet and nutrition provide highly detailed information about outcome indicators, they may lack important information about contextual factors which are needed to interpret and make sense of the outcome indicators. An example I discussed earlier in the critical review of my candidate papers is that the NDNS provides very detailed information about dietary intake, using the 4-day unweighed drink and food diary. However, at the time of our analysis, it lacked important information about maternal education and maternal hours of work, which would have helped us in two ways. First, to interpret diet patterns in relation to maternal employment. Second to assess the effect of employment in relation to findings from other datasets (the MCS has hours of work).

Within ECEC, indicators are often related to concepts of 'quality' (even though there is a lack of consensus over what quality means) and discussed in terms of two main types of quality factors: process and structural factors (both considered to be important to measure). This is underpinned by evidence about what children need in the early years for their development and outcomes: good relationships between carers and children, supported by what is known as an 'iron triangle' of quality: adult to child ratios, group size, and staff qualifications and training (Dalli et al. 2011).

Within children's food and nutrition, the literature discusses two types of indicators. The first are indicators to assess the concept of dietary quality which are often measured as consumption of particular foods types (such as fruits and vegetables) or indicators of 'whole diet'. These indicators are often developed in

relation to recommended food and nutrient intakes about what children need for their development. Another way of thinking about the adequacy of what children eat is to consider whether social expectations about food and diet are met. These indicators relate to the types of diet or nutrients children are said to need to consume in order to be healthy and to fully participate in society.

My reflections earlier in sections 2.1.3 and 2.2.3 on what the literature suggests could be included within a scope for a COS for each of my two research areas, are limited to suggestions emerging from empirical evidence of the literature. As I discuss in section 1.6 of this integrative summary, a scope in ECEC and children's food and nutrition, could benefit from including an overarching theoretical framing for the scope in order to integrate and unite the indicators for each COS. I have suggested within section one that Bronfenbrenner's ecological systems theory (1979) could be an appropriate conceptual framework to consider alongside the pragmatic COMET framework, as it seeks to explore the different relationships influencing a child's development. Bronfenbrenner's '*proximal*' and *distal* factors could map on well for example to the 'process' and 'structural' indicators discussed as important within the ECEC literature in this section (Bronfenbrenner and Morris 2006) and could also be useful for guiding the grouping of indicators within children's food and nutrition.

Section 3. RQ2: What indicators have been operationalised and analysed within my work?

Table one in the appendix one provides a critical summary of the key findings and research gaps identified, paper by paper. Here I consider the challenges I have faced with operationalising the indicators I have used (as discussed earlier, this means defining how concepts should be measured, in this case using what is available in quantitative large-scale data). For example, not having all the necessary data within one dataset and/or not being able to 'pool' data from across different large-scale studies (issues of data fragmentation). I first focus on ECEC and then on children's food and nutrition. I end this section with a summary which aims to identify differences and parallels between the two topic areas.

3.1 ECEC

Section 2.1 highlights from the literature that it is important to distinguish and measure both process and structural concepts of ECEC quality. Here I focus on which ECEC aspects of process and structural concepts (proximal and distal) of ECEC quality my work has focused on and how I have operationalised indicators of these concepts within my own research (see table 4). My research has only focused on analysing structural/distal concepts and factors which is a limitation in terms of identifying a scope which complies with the suggested scope for an ECEC COS in section 2.1.3 to have both proximal and distal factors included. However, I will return to this in section four which identifies a COS for ECEC using not only indicators I have used in my own research but also indicators suggested in the literature from section two.

3.1.1 What indicators have I operationalised and analysed using secondary analysis of large-scale data?

My work in ECEC was funded from a secondary analysis project called 'Provision and Use of Preschool Childcare in Britain'. To examine childcare provision, I was interested in trends describing workforce patterns over time. I specifically sought indicators to assess staff characteristics and working conditions. For usage, I was interested in the types of childcare families were using to meet for preschool aged children. Table four shows the indicators I used to measure these concepts, which I discuss in more detail next.

To examine staff characteristics, we first needed to identify the types of job roles that could be counted in this sector. Using this classification, we then assessed how numbers in these job codes have changed over time. This analysis provided understanding of who is providing care to preschool children and if numbers are low and/or falling, raising important questions about who might do this work in the future. Numbers working in the sector was operationalised using the 4-digit Standard Occupational Classification System (SOC) 2010 codes within the LFS to identify three occupations: 'Nursery nurses & assistants', 'Childminders & related occupations' and 'Playworkers', which I combined to comprise the 'childcare workforce'. Papers 1 and 2 report on changes in numbers reported to be working in

the three individual codes as well as the codes combined as 'the childcare workforce'. Because sample numbers are small in each individual job code, we combined three years of data from quarter one of the LFS. So, for example, in my analysis for paper two, a combined dataset for 2005-7, 2008-10 and 2012-14 was created⁴¹. Because the Annual Survey of Hours and Earnings (ASHE) also uses SOC codes, we were able to compare our findings in the LFS with those in the ASHE. Details about the description of the methodology employed are reported elsewhere (Simon et al. 2003). As discussed in paper one, some of the SOC 2010 codes were problematic for three reasons. First they did not enable workers in 'education' and 'care' to be counted together. Second, the classifications have changed over time raising questions about the reliability of making interpretation about changes over time. Third, managers could not be separately identified from other staff who might be providing the direct care to children. This matters because pay and qualifications are likely to be different for managers than for other workers and it helps therefore to distinguish them in analysis.

Using SOC2010 codes, we examined other things about staff characteristics and working conditions which the literature considers to be related to quality such as qualifications, pay and length of service (see earlier discussion in sections 5.1.1). To measure staff characteristics, according to the literature, we ideally want to measure relationships between staff and children. However, such indicators were not available in the large-scale data I examined. Instead, we used levels of staff qualifications as reported in the LFS, which is the dominant source for information about the paid workforce (see paper 1), as a proxy measure of structural quality. In this dataset, we used 'highest level of qualification' reported and also converted it to 'NVQ levels' (National Vocational Qualifications). NVQ levels are known as work based qualifications. Five levels are reported in the LFS: level 5 (equivalent to a bachelor degree or higher), level 4 (a qualification higher than GCSE but not degree level – such as a Diploma in higher education), level 3 (GCE A-level or equivalent), level 2 (GCSE and below) and level 1 ('other qualifications' which includes a wide array of qualifications not elsewhere classified such as 'GNVQ/GSVQ foundation level'). Although the LFS provides information about the level, it unfortunately cannot tell us anything else about the qualification. So, it is not possible for example to

⁴¹ For each dataset, I divided the survey weight by 3.

establish if a person is qualified in something relevant to their occupation/career, such as the Early Years Foundation Stage qualification in the ECEC sector. This is a major drawback for understanding how qualifications may be related to quality provision. Other staff characteristics we examined were age, gender and ethnicity (see earlier work: Simon et al. 2008; 2003).

We also used these three other indicators of working conditions in the LFS: pay, proportion working in the private or public sector and length of service. The indicators on pay we used were based on 'mean annual gross pay' which is employee gross pay before deductions. We also calculated hourly pay by dividing the gross pay by the total usual number of hours worked per week (total usual hours in the LFS includes paid and unpaid overtime). We also examined length of service using a variable in the LFS called 'months continuously employed' which refers to the length of time a respondent has been continuously employed (in months) with their current employer. I have also examined 'work status' which was operationalised using a variable called 'work status' which gives information about the proportions of respondents in a permanent full-time job. Earlier work (Simon et al. 2003, 2007) was also interested in the proportion of childcare workers within different sectors, which we operationalised using a variable called 'sector' (the numbers working in the public and private sectors), which we then further analysed to see what types of non-private organisation people said they were working in.

The LFS is data reported by employees. However, there are other data sources which report information about the characteristics and pay of those working in the ECEC sector which are reported by the employers. An example of this type of data is the Department for Education's Childcare and Early Years Providers Survey (CEYPS), which was established in order to provide a valuable source of evidence for monitoring progress towards meeting commitments made by the Government for childcare (Department for Education 2013c). Another key source is Ofsted, the main regulatory body for (most of) the ECEC sector (it excludes occupations such as nannies and babysitters etc. who are not legally required to register to look after children but can be included within its voluntary register). We were able to compare our analysis in the LFS with both of these 'employer' data sources. Table three in Paper one shows a comparable picture in terms of the numbers reported to be working in the childcare sector between the CEYPS and the LFS (confining the analysis to England only). However, when we examined the LFS in relation to Ofsted

figures, we found discrepant numbers in the LFS compared with Ofsted regarding the numbers of childminders. For example, in 2014 in England, Ofsted report 53,000 registered childminders and the LFS report 100,916. This compares in 2008 with 61,929 reported in Ofsted and 102,964 in the LFS. The decline between 2008 and 2014 in childminders is greatest in the Ofsted statistics. However, the data do not provide an explanation for this. We were not able to explain the difference between these two data sources. It could be that (as we speculated) more childminders are working unregistered (illegally) or it could simply be an artefact of the different ways the data are collected and compiled.

Table 4: Critical overview of the structural/distal measures I have used in my research on ECEC

Type of measure	Indicator	What is it measuring (concept)?	Problems with these indicators	Problems with analysis	Dataset	Source
Structural/ Distal	<u>Staff characteristics:</u> Staff qualifications	Proxy for 'quality' of service provision. We hypothesised that an increase in qualifications over time is equal to increased quality provision.	Is it really measuring quality? Cannot tell if qualification being measured is directly relevant to ECEC workers – LFS only gives NVQ levels not what these are in.	Not longitudinal data. No tests undertaken to measure size of differences observed over time series	LFS	My research: papers 1, 2 and 4
Structural/ Distal	<u>Type of provision:</u> Take-up rates of different forms of childcare	How many families use formal childcare services? We hypothesised that if government policy is successful, the rates will increase over time.	Doesn't relate directly to one particular policy. Not really a measure of quality. Cannot identify why rates are different annually.	Not longitudinal data. No tests undertaken to measure size of differences observed over time series	CEYPS FRS	My research: papers 3
Structural/ Distal	<u>Staff characteristics:</u> Standard occupational classification system (SOC)	Identifies who can be counted as childcare workers using SOC codes. The implication of changes to the numbers working in the sector is that if fewer people are available to provide	This is based on self-reported data. Is this a reliable source for counting numbers in this workforce? Can this really be linked to a reduction in quality?	Not longitudinal data. Also, no tests undertaken to measure size of differences observed over time series. Have however compared to other data sources such as	LFS	My research: papers 1, 2 and 4 (also see Simon et al. 2003; 2007).

		care to children, this will lead to higher child to adult ratios and quality of provision will be reduced.	Ofsted. Numbers are same as Ofsted if just look at England so can assume reliability.			
Structural/ Distal	<u>Working conditions:</u> Pay, length of service, proportion in public/private sectors, proportion working full-time/part-time	Working conditions of the childcare workforce, in order to again find a measure of 'quality'. Higher pay and better working conditions are known to incentivise people to stay in a sector.	This is based on self-reported data. Is this a reliable source for counting numbers in this workforce? Can this really be linked to a reduction in quality?	Not longitudinal data and also no tests undertaken to measure size of differences observed over time series. Have however compared to other data sources such as ASHE. Pay is largely same so can assume reliability. Data also supported by other research, e.g., Low Pay Commission Report.	LFS	My research: papers 1, 2 and 4. (also see Simon et al. 2003; 2007).
Structural/ Distal	<u>Type of provision</u> Informal care: 'How about people not living with you: do you/(or does	Amount and type of informal childcare	Question does not measure true extent of informal childcare. The data available are a subset of all children receiving care, those children with a long-	Results not shown in this paper. Could not analyse as question had faults – see previous column.	FRS	My research: papers 1

	<p>anyone in this household) provide any help or support for anyone not living with you who has a long-term physical or mental ill-health problem or disability, or problems relating to old age?’</p>		term physical or mental ill-health problem or disability.			
Structural/ Distal	<p><u>Type of centres/provision</u></p> <p>Informal care: 'Do you ever look after your grandchild or grandchildren', and 'About how many hours a week do you spend looking after your grandchild or grandchildren'</p>	Amount and type of informal childcare	Question stopped being asked in 2009	Did not analyse this because it was too dated for my research.	BSA	My research: papers 1

3.2 Children's Food and Nutrition

This section discusses how I have operationalised indicators in research I have undertaken within children's food and nutrition (Table 5). My research has mostly focused on analysing proximal concepts and factors which could be a limitation in terms of identifying a suitable COS for children's food and nutrition. However, I will return to this in section four which identifies a COS for children's food and nutrition using not only indicators I have used in my own research but also indicators suggested in the literature from section two.

3.2.2 What indicators have I operationalised and analysed using secondary analysis of large-scale data?

3.2.2.1 Indicators of the reported intake of individual foods.

We used the HBSC England to examine reported food consumption in relation to recommended intake (see paper 6). The following food indicators were used: Eats Breakfast 5-6 times a week or more, Eats Vegetables 5-6 times a week or more, Eats Fruit 5-6 times a week or more, and drinking soft drinks 5-6 times a week or more. This analysis updated previous analysis carried out by Currie et al. (2012) and the methodology employed by Niclasen et al. (2003) who studied food consumption patterns for Greenlandic children. Earlier, we conducted analysis of the HSE (O'Connell and Brannen 2016) which also used a measure of fruit and vegetable consumption. Both that analysis and previous analysis by Currie et al. (2012) of the HBSC dataset confirmed results we had obtained – e.g., of differences between girls and boys in the consumption of fruits, vegetables and breakfast. Although we can see with these large-scale data differences between gender (and in our new analysis, between 'family affluence' groups), we can only speculate about why these trends are occurring. Other research is needed (such as the qualitative research undertaken by other members of the Families and Food in Hard Times research team and reported elsewhere⁴²) to unpack these patterns.

Additionally, as I discuss in paper six, we had important concerns related to the measure of Family Affluence which we compared with food indicators provided in the HBSC datasets. FAS was developed by the HBSC team as a measure of material deprivation and as a means of differentiating between poor and affluent

⁴² <https://foodinhardtimes.org/>

families in national and cross-national samples. The scale ranges from zero to eight and can be grouped into three categories: low (0-3), medium (4-6) and high (7-8). The proportion of young people in the low FAS group was lowest in 2014 (7.4% in 2005, 11.4% in 2009 and 6.3% in 2014) which appears to suggest socio-economic circumstances have improved for young people over time (see paper 6). However, the HBSC team note a number of limitations with the FAS measure in their protocol. For example, the original items making up the FAS score were based on absolute affluence (defined as the quantity of material assets in the family). This means that FAS scores might not equally correspond to relative differences in affluence across different socioeconomic conditions (i.e., between countries or between survey years). The HBSC team therefore suggest it is problematic to equate the average or distribution of FAS data or the associations between FAS and health over time or between countries (Currie et al. 2008). These problems could explain some of the variations we reported in paper 6. A better measure might ask for the parental occupation and income but these are unlikely to be reported accurately by young people (Rounce 2004 p. 3).

3.2.2.2 Indicators of the whole diet.

In earlier work (than the candidate papers), we derived factor scores to compare children's dietary quality for mothers working and not working (see O'Connell and Brannen 2016). We used the indicators provided in the ALSPAC (see section 3.4) and we then replicated this same analysis (we derived similar factor scores using diet data) in the HSE in order to compare the findings from the two data sources (*ibid*). As discussed earlier, data driven tools are sometime criticised for producing overly simplistic indicators. The labels assigned to factors (of items which statistically correspond together) are subjective and may not necessarily represent the underlying concepts very well. For example, are they really measuring the quality of diet or are they a statistical artefact of the way food items group together?

As noted earlier in section three, an alternative to data driven tools are DQI's which measure the extent to which sub-groups of the population are meeting nutritional guidelines. As detailed in paper five, we created a new and innovative measure of dietary quality for children which used more than one indicator of food/nutrition in order to consider the 'whole diet' was highlighted to be of importance in the literature (see earlier discussion). We used the NDNS Year 1, 2008/09 to

develop this measure (see paper 5 for further information on how this was constructed) as it has very detailed information about dietary intakes which can be used to understand overall dietary quality for children. A strength of the DQI we developed using the NDNS is that the index compares actual intakes to recommendations for children under 10 years. Our method involves awarding 'points' in relation to different ranges of intake of each nutritional component (see paper 5 for full description of how the method was developed), which means it considers the complexity of nutrient recommendations for children at different ages that may be met through consuming a wide range of foods. However, the data on which this measure is based is collected through a 4 day weighed drink and food diary which relies on families not only completing it accurately but also retaining copies of food packaging and sometimes also weighing the foods eaten. This is likely to be burdensome for families to do and while I have no evidence the data is completed incorrectly; it raises an important question about the expected accuracy of such a data collection. Furthermore, the sample sizes in the NDNS are small, making comparison by child age problematic (O'Connell and Brannen 2016).

3.2.2.3 Indicator of diet adequacy which includes the need for health and social participation

In paper seven, we were interested in whether children's and families' diets are likely to meet needs for health and social participation and used the MIS to measure this (see previous section for definition). The key question we considered in paper seven was 'which types of families/households appear not to be meeting the lower spending threshold for a socially acceptable healthy diet that allows for social participation and how has this changed over time?'. We operationalised this using data within the Living Costs and Food Survey (LCFS) to calculate the actual food expenditure of selected household types which we then compared to the FBS from MIS research. We derived a variable which combined data from the LCFS asking respondents about the amount spent on food and non-alcoholic drinks inside the home each week with other variables in the LCFS quantifying expenditure on food outside of the home. Foods eaten outside of the home were defined as: catered food non-alcoholic drink eaten / drunk on premises, hot take away meal eaten at home, cold take away meal eaten at home, school meals-total amount paid last week, confectionery eaten off premises, ice cream eaten off premises, soft drinks eaten off premises, hot food eaten off premises, cold food eaten off premises, food non-

alcoholic drinks eaten drunk on premises, confectionery, ice cream, soft drinks, hot food, Cold food, Contract catering (food) and Meals bought and eaten at workplace. We defined a family as adults with their children (not necessarily their biological children), adults being people of working age (18-64) – as done in the MIS. Data in the LCFS on lone parents with more than three children and couple parents with more than four children were excluded from our analysis because these groups are not currently included in the MIS. We used data spanning 2005 through to 2013 and weighted each survey year using the 'annual weight' variable in the LCFS. We inflated food expenditure to 2013 prices using the Retail Price Index – which has also been used to update MIS budgets. While our analysis in paper seven was novel in relating food expenditure data in the LCFS to the MIS, our analysis uses raw expenditure on food. A limitation we discuss in paper seven is that our analysis does not tell us whether households are spending below the amount because of a lack of resources or for other reasons. Additionally, we know nothing from this analysis about resource distribution within families and how different household members are affected.

Table 5: Critical overview of the (mostly proximal) indicators I have operationalised in my research on children's food and nutrition

Type of measure	Indicator	What is it measuring (concept)?	Problems with these indicators	Analysis conducted	Problems with analysis	Dataset	Source
Proximal	Diet Quality Index - a composite score we derived from: Fat, Saturated Fat, Non-Milk Extrinsic Sugars, Iron, Dietary Fibre, Vitamin C, Folate, Calcium and Energy	The quality of diets for children aged 10 years or under in relation to nutritional guidelines.	Based on self-reported data collected through a 4 day unweighted food and drink diary which is burdensome for respondents to complete	Reported elsewhere. See earlier research: O'Connell and Brannen, 2016 ⁴³ . Regression analysis: maternal employment by these food indicators, controlling for key socioeconomic factors incl. income, maternal education, maternal age, maternal social class and family weekly income.	Our first measure did not distinguish age groups enough so was refined. DQI limited to few key nutrients so cannot claim to be a complete measure of dietary quality. However, these key nutrients are important ones for children's development. Small sample sizes makes comparison by child age unreliable.	NDNS	My research: paper 5
Proximal	Derived variable in dataset	The quality of diets for children	Based on self-reported data collected through a	Reported elsewhere. See	Failed to find relationship with	NDNS	Earlier research:

⁴³ ibid.

	measuring frequency of fruit and vegetable consumption	aged 10 years (5 a day target)	4 day unweighted food and drink diary which is burdensome for respondents to complete	earlier research: O'Connell and Brannen, 2016. Regression analysis: maternal employment by these food indicators, controlling for key socioeconomic factors incl. child gender, maternal ethnicity, has siblings, maternal age, maternal education, maternal social class and family weekly income.	maternal employment. Could be due to the use of a single measure rather than a composite score like the DQI. Or could be due to lack of hours information in maternal employment question. Small sample sizes makes comparison by child age unreliable.		see O'Connell and Brannen, 2016
Proximal	We used the derived factors analysis (FA) scores (see North and Emmette, 2000) by direct application to the authors: 'Junk', 'Health Conscious', 'Traditional', 'Snacks'.	Dietary quality (see: Northstone et al. 2005).	Based on self-report postal food frequency questionnaires for children at 38 and 54 months. Data of children living in Bristol area so not representative of wider population. Cohort data so able to track changes over time.	Reported elsewhere. See Earlier research: see O'Connell and Brannen, 2016. Regression analysis: maternal employment by these food indicators, controlling for key socioeconomic factors: child	We used this data related to employment to compare with our analysis of the NDNS data above. FA is sometimes criticised for producing 'over simplistic' data driven factors.	ALSPAC	Earlier research: see O'Connell and Brannen, 2016

				gender, maternal ethnicity, has siblings, maternal age, maternal qualifications, maternal social class, and family weekly income.	Are these really representing dietary quality?		
Proximal	Using the 'Eating Habits' section of the HBSC questionnaire, we used FA to derive these indicators: 'Sweets and Snacks' (sweets, snacks and fizzy drinks), 'Cakes and cereals' (consumption of these items independent of consumption of sweets and snacks) for 2-10 years, 'Fresh fruits & vegetables' 'Processed	Children's dietary quality	Based on self-report data.	Reported elsewhere. See Earlier research: see O'Connell and Brannen, 2016. Regression analysis: maternal employment by these food indicators, controlling for key socioeconomic factors: child gender, maternal ethnicity, has siblings, maternal age, maternal qualifications, maternal social class, and family weekly income.	We used this data related to employment to compare with our analysis of the NDNS data above. FA is sometimes criticised for producing 'over simplistic' data driven factors. Are these really representing dietary quality?	HBSC	My research: paper 6

	fruits and vegetables' and Fresh fruit and processed vegetables' for 5-10 years.						
Proximal	Eats Breakfast 5-6 times a week or more, Eats Vegetables 5-6 times a week or more, Eats Fruit 5-6 times a week or more, and drinking soft drinks 5-6 times a week or more	Frequency of consumption of key foods included in dataset and identified in literature to be 'good' for children to consume (fruits, vegetables – 5 a day or more target) and breakfast (daily consumption) versus 'bad' or less good for children to consume (soft drinks – high in sugar).	Based on self-reported data. No way of verifying these results within this dataset. While the Health Survey for England (HSE) also collects data on fruit and vegetable consumption, the derived variable is combined ⁴⁴ so there is no way to compared with this data separately for fruit or vegetable consumption. Additionally, the HSE question asks about 'portions' rather than number of times children consume fruits and vegetables so the questions are not compatible. Data in HSE are also self-report. Do	Cross-tabulations of each food measure with FAS. Phi statistic was used to test for statistical differences between the groups at each year.	Known errors with the Family Affluence Scale (FAS) in HBSC (see discussion in text). Not longitudinal data. No tests undertaken to measure size of differences observed over time series (although tests were done of each year analysed).	HBSC	My research: paper 6

⁴⁴ There is a derived variable 'PORFV05': (D) Portions of fruit and vegetables consumed, 6 groups – capped 5+ (0) None (1) Less than 1 (2) 1 portion or more but less than 2 (3) 2 portions or more but less than 3 (4) 3 portions or more but less than 4 (5) 4 portions or more but less than 5 (6) 5 portions or more.

http://doc.ukdataservice.ac.uk/doc/7919/mrdoc/pdf/7919_hse2014_dataset_documents.pdf <http://healthsurvey.hscic.gov.uk/media/63769/HSE2016-Child-health.pdf>

			not have a measure of Family Affluence to compare this to in HSE.				
Distal	Diet adequacy which includes the need for health and social participation	1. Which types of family types are spending below the 'Food Budget Standard' and therefore at risk of food poverty 2. If this risk changed over time.	Comparison of mean/median food expenditure in relation to amounts specified by the FBS. No significance testing was performed.	Analysis related actual expenditure on food to the 'Food Budget Standard' which sets a minimum acceptable amount different types of families should spend on food for health and social participation.	Analysis does not tell us whether households are spending below the amount because of a lack of resources or for other reasons. Says nothing about resource distribution within families and how different household members are affected.	Living costs and food Survey (LCFS)	My research: paper 7

3.3 Summary

A difference between some of the indicators in ECEC and those in children's food and nutrition is that some ECEC indicators tend to be 'soft' because they are collected based on observational measurement (see discussion in section 2).

Additionally, while my work has operationalised and analysed indicators that could be termed 'distal factors' (see table 4), my work in children's food and nutrition is mostly based on proximal factors (see table 5).

The review of my work in this section shows that there are a wide variety of indicators that can be used with large-scale data, which is a real plus point because it demonstrates the value of using large-scale datasets for monitoring child and family outcomes. However, as discussed earlier in this section, there are some important issues with operationalising indicators and 'data gaps' in *both* of these topic areas that call into question the reliability of these indicators for measuring underlying concepts, especially for addressing social policy questions, and these are discussed in section four which follows this.

In ECEC, section two discusses how a number of indicators have been operationalised in the literature with mixed success. For example, Slot's review (2018) suggests distal factors are difficult to link to process quality outcomes. In my work, I have focused mostly on structural factors only (largely because of secondary data limitations) and have used indicators of these to evaluate ECEC service quality. Although staff relationships with children are identified as important in the literature for assessing structural quality, it was not possible to measure staff relationships with children in the large-scale data I examined. Instead, we used levels of staff qualifications as reported in the Labour Force Survey (LFS), which is the dominant source for information about the paid workforce (see paper 1), as a proxy measure of structural/distal quality. However, as I discuss above, staff qualifications may not actually be a good or reliable way to measure structural quality. For example, the information about qualifications is too basic as only NVQ levels are known and there are no details in large-scale datasets about qualifications that are relevant to the ECEC sector, which limits the potential benefit of qualifications as an indicator. This limitation could be improved by datasets such as the LFS routinely collecting more useful indicators of qualification which provide better (and more) information about the relevance of the qualification to the employment sector being evaluated.

In children's food and nutrition, the literature shows a variety of approaches have been employed to measure the quality of children's diets. Dietary quality has commonly been measured one of two ways. Either as the frequency of consumption of individual foods or nutrients such as fruits or vegetables (to assess adherence to UK guidelines for a 5-a-day fruit and vegetable consumption target) or through taking a more holistic view, to examine the 'whole diets' of children (e.g.,, Northstone, Emmett P, and Rogers 2008). Two methodologies have been employed here. The first are use data-driven tools such as FA to identify underlying groups using responses to individual food items in food frequency data. Examples can be found using data in the ALSPAC and HSE (see earlier discussion). The second methodology for measuring concepts of dietary quality are DQI's. Until recently most of the work in this area originated in the US. However, we developed a DQI for the UK for children aged 10 years and under using data in the NDNS. While we do not claim this is a perfect measure (and as discussed earlier, relies on respondents to accurately complete an onerous 4 day drink and food diary), it could enable dietary quality to be examined for young children based on guidelines for macro and micronutrients, which was not possible before we developed this measure. Having said this, the DQI measure has not yet been validated and would need to do so before we could claim this is a reliable measure. Another concept of dietary adequacy discussed in the literature (see earlier discussion) includes the need for health and social participation as part of broader living standards. This conceptualisation discusses a relative and multidimensional phenomenon, beyond subsistence, which includes the need to understand the social aspects of eating as well as the nutritional value of foods. In response to this, our paper seven compares actual food expenditure in the LCSF dataset with the MIS 'food budget standard'.

Section 4. RQ3: What are the 'data gaps' within current large-scale UK data collections regarding the operationalisation of indicators in ECEC and children's food and nutrition?

Here I identify and discuss the implications for future studies of using the outcome indicators that I have operationalised. I do not consider here data gaps from the

literature – but these would be useful to return to and consider building on from my thesis for the identification of a COS in ECEC and children’s food and nutrition.

4.1 What should be measured but currently isn’t?

4.1.1 ECEC

My work (see papers 1-7) has identified some important key data gaps. First, although large-scale data can tell us what types of ECEC are used, these data do not currently provide enough information about what parents want. Most of this information about what parents want from childcare comes from one off bespoke surveys such as that conducted by Ellison et al. (2009) or small-scale research studies such as that conducted by Mooney and Blackburn (2003) or reviews of a range of evidence, such as that conducted by Campbell-Barr and Garnham (2010).

Although some questions are asked in the CEYPS about why parents use the childcare they do (e.g., questions about cost and working patterns of parents), there are no questions within regular large-scale datasets which ask respondents about childcare *preferences*. This is perhaps because this kind of question is best investigated using qualitative methodology that can explore in-depth with parents/carers what motivates their childcare choices and the reasons why different childcare forms are preferred. Second, and discussed in greater detail within paper 1, is that hardly any large-scale survey data exist to provide information about informal caring.

A further key gap from reviewing my own research (and which is echoed within the literature) is the lack of detailed analysis on the reach of the private childcare market. Twenty years ago, the private for profit sector was negligible so its growth to its current position of offering 84 percent UK market penetration has been remarkable (Penn 2014). This compares markedly with France and Germany for example, where the market penetration by private enterprises is only four and three percent respectively (LaingBuisson 2018). However, few if any studies have explored how the private sector operates and whether it is transparent and accountable for the money it receives from government subsidies (Frontier Economics 2016). This seems an important omission which raises questions about quality, regulation, governance and sustainability in the sector. Sustainability of

provision in the short-term and long-term is a significant issue for example in the childcare sector (Blainey and Paull 2017). In terms of governance, this matters because of the rights of the ECEC workforce, particularly in respect of takeovers and closures (Lloyd 2018). To address this gap in knowledge about private sector childcare, I am currently leading a research project, funded by the Nuffield Foundation, which aims to provide evidence of the reach and impact of private sector childcare in England (Simon et al. forthcoming). Some of this work will analyse large-scale data to examine the distribution of provision by provider type. We will do this through linking statistics about the numbers of under-5s in childcare provision (from Ofsted data) with information about the local population in each local authority area (using Office for National Statistics Local Area Data). This linking will allow us to compare the rates of provision relative to local populations. We will also link the data for individual nurseries, using the postcode, to data on Indices of Deprivation (Department for Communities and Local Government 2015). One of the questions we shall examine is whether nurseries are available equally for all levels of deprivation, or if they are more likely to be found in less deprived areas. Our hypothesis is that limited company nurseries will seek to establish their businesses in less deprived areas (where they can charge higher fees to parents) whereas smaller entrepreneurs and non-limited company nurseries are more likely to be established in more deprived locations, following similar patterns of location as seen in residential care for looked after children (Department for Education 2013b). This analysis is very likely to inform the collection of indicators to specifically assess the private childcare sector.

4.1.2 Children's food and nutrition

Although the LCFS dataset enabled us to compare actual food spending with the FBS, we discuss in paper seven that examining minimum food standards does not explain why households are spending below what is considered necessary. We do not know if spending below the FBS is due to a lack of household resources or for other reasons (e.g., preference). Additionally, the data cannot tell us anything about resource distribution within families nor how different members of families may be affected by resource changes. However, this type of question is probably better answered through in-depth questioning using qualitative methods.

Social science enquiry is concerned with understanding why children consume the foods they do across different contexts (e.g., at home versus in school or another setting). This often means relating outcome indicators of diet intake to factors such as maternal employment or income (see papers 6 and 7). However, while some datasets provide very good 'outcome' indicators (such as intake of macro and micronutrients as well as foods in children's diets), they often lack sufficient 'independent' indicators (such as maternal employment or other important context factors, such as eating arrangements), which constrains the types of questions that can be answered. This raises complications for secondary data analysts and often results in having to 'pool' or bring together data from more than one large-scale dataset (issues of data fragmentation).

4.2 What is measured but should be operationalised differently?

4.2.1 ECEC

Although we could use large-scale data to identify key characteristics of the workforce, as discussed earlier, the classification system used to count the workforce (the LFS uses the SOC system to group job titles, and therefore respondents, into different codes) presents some problems. For example, in paper one, I discuss how 'education' jobs are counted separately from 'childcare' ones. Although policy rhetoric seeks to join up 'education' work with 'care' work, the data recording this information, such as the LFS, does not count jobs in these sectors together. For example, at the time of our analysis, primary teachers were not counted within the same code as nursery nurses even though some nursery nurses are based within school settings⁴⁵. Paper four reports on difficulties with comparing the workforces in England and NZ. We show that comparisons on professionalisation dimensions are hampered by a lack of access to data specifically about early childhood education teachers in England. We also discuss how statistical comparisons between NZ and England are problematic because there is no adequate means of counting just those teachers working in early education settings

⁴⁵ This finding was also identified by Gambaro (2012) who argued this difference in coding was probably caused by the fact 'Nursery education provision occurs, in large part, in nursery classes attached to primary schools and that teachers often move between the preschool years (nursery and reception classes) and primary school years' (Gambaro, 2012: 100).

in England and because 'childcare' workers in England have different professional education backgrounds to the NZ workforce. Some of these issues were resolved following an open consultation the Office for National Statistics had with its users, and to which we participated and highlighted our concerns. Appendix one discusses what changes have been made following our petition for change. It should be, I think, incumbent on owners of such datasets as the LFS to constantly review their data to make them 'fit for purpose' and on researchers to participate in such reviews in order to enact positive change in large-scale data.

There are also a couple of technical issues with using large-scale data which currently constrain analysis which I discuss in paper one. For example, the sources differ in their geographical coverage. While some sources provide UK-wide information (such as the LFS), others only provide information for England (e.g., the CEYPS). This is because the sources within England only are collected on behalf of the Department for Education whose remit only covers England. These arbitrary geographical divides make the sources tricky to compare with each other. Additionally, data on childcare usage is often in different datasets to information about childcare provision. As paper one highlights, we needed to use a range of different data to examine both childcare provision and usage. Perhaps this is unavoidable, and another artefact of the purpose these data are originally collected, but having variables spread across different datasets can make analysis difficult. As discussed earlier within the work of Slot's review (2018) some researchers have tried and failed to analyse data from several countries within the same dataset, with the consequence of limiting the extent of analysis and interpretations of the data.

4.2.2 Children's food and nutrition

I discuss in paper six how we used a measure of 'family affluence' (FAS) which was developed by the HBSC team as a measure of material deprivation and means of differentiating between poor and affluent families in national and cross-national samples. The HBSC team note a number of limitations with the FAS measure in their protocol. For example, the original items making up the FAS score were based on absolute affluence (defined as the quantity of material assets in the family). This means that FAS scores might not equally correspond to relative differences in affluence across different socioeconomic conditions (i.e., between countries or

between survey years). The HBSC team therefore suggest it is problematic to equate the average or distribution of FAS data or the associations between FAS and health over time or between countries (Currie et al. 2008). These problems could explain some of the variations we reported in paper six. A better measure might ask for the parental occupation and income but these are unlikely to be reported accurately by young people (Rounce 2004 p.3).

Another issue I discuss in paper six is the change of wording to a key dietary variable we analysed on sugar drink consumption. The consequence of these wording changes is that it is difficult to be confident when making interpretations over time if the changes are real or not. This is not an uncommon issue with large-scale datasets. For example, in earlier work (within the field of ECEC), I noted that changes had occurred between the SOC in 1990 and 2010 (see Simon et al. 2003 and 2008) which potentially had an impact in the numbers of workers within each 'childcare code' (job title) at each data point. These changes make it problematic for researchers to examine change over time and to be confident the observed changes are real and have not occurred by chance. Datasets should be careful to ensure consistency of indicators across time, and to reflect changing social policy priorities and understandings (for example in the measurement of poverty, Stroud 2018).

4.3 Summary

One of the things that strikes me in carrying out the critical review of indicators I have used in my research is the lack of 'data harmonisation' across the datasets – and sometimes also within the datasets I have used. By this I mean that the same underlying concepts seem to be measured differently across the datasets, which reflects the varying methodological and epistemological approaches that can be taken using these data or, practically, the cost of collecting data. For example, examining children's diets by using single foods is likely to be much more cost-effective if less thorough than a 'whole diet' approach. As discussed earlier in section two, single food and whole-diet indicators have been used in research for operationalising indicators of the same concept – of dietary quality.

In the field of child health, Rippin et al. (2017) recommends standardising methodology and indicators to enable comparison of nutrient intake across European countries for measuring child health outcomes. As discussed earlier, the

COMET (Core Outcome Measures in Effectiveness Trials) Initiative⁴⁶ develops and makes available agreed standardised sets of outcomes, known as 'core outcome sets' (COS). The benefits of having such a data store of outcomes is reported as 'making it easier for the results of trials to be compared, contrasted and combined as appropriate; while researchers continue to explore other outcomes as well' (COMET webpage⁴⁷). But how could this be done? What is the framework for operationalising this? And how far is it currently possible to establish as COS for ECEC and children's food and nutrition? This is what I go on to discuss in the next section.

Section 5. RQ4: What indicators could be included within a COS for ECEC or children's food and nutrition?

This section aims to address research question four of this integrative summary. The pragmatic COMET framework discussed in section 1.5, suggests as a key step of identifying measures which could form a COS. In this section, I set out the beginnings of what a COS in my two research areas could look like, drawing on indicators discussed within section one as important in the literature and which indicators I have used in my research (section 2). I also comment where relevant on the 'data gaps', drawing on the discussions in the previous section.

I have shown in what follows that it is possible to identify a COS for ECEC and children's food and nutrition using the steps suggested within the COMET framework. I have suggested that this framework, which draws on empirical data evidence, is underpinned by Bronfenbrenner's ecological systems theory (1979), and the measures are organised into 'proximal' and 'distal' factors (Bronfenbrenner and Morris 2006). I suggest this is an appropriate conceptual framework to use alongside the COMET framework, since it seeks to explore the different relationships influencing a child's development (*ibid*).

At the end of section two I suggested distal factors (as identified by Bronfenbrenner) could be another term we could apply for structural factors, as these are concepts that are determined by legislation, policy and funding according to Slot (2018). Bronfenbrenner's proximal factors could be another term for process

⁴⁶ launched at a meeting in Liverpool in January 2010, funded by the MRC Northwest Hub for Trials Methodology (NWHTMR)

⁴⁷ <http://www.comet-initiative.org/>

concepts and factors in ECEC, as these are concepts such as staff or classroom features which are closer to the child according to Slot (ibid). Organising indicators in a COS in relation to distal and proximal factors arguably provides a useful and theoretically informed basis for the development of a COS (in conjunction with the COMET framework) for ECEC. Although the literature on children's food and nutrition does not distinguish between proximal and distal factors, I argued earlier that it is possible, and may be equally informative, to also apply this framing to the development of a COS for children's food and nutrition, especially since Bronfenbrenner's theory has been widely used within the field of human development and child health (Houston, 2015). With this in mind, I set out proposed indicators for a COS in ECEC (see table 6a) and a COS in children's food and nutrition (see table 6b) which are organised into 'proximal' (process factors in ECEC) and 'distal factors' (structural factors in ECEC).

5.1. ECEC

5.1.1 Identifying what should be measured and data gaps

Table 6a uses the indicators discussed in sections two and three, drawing on my review of the literature in section two and my own operationalisation of measures in section three, to propose which indicators (if any) could be brought together into an ECEC COS using the datasets I have examined in my research. In so doing. It also draws on the discussion of data gaps in the previous section (4). The suggested ECEC COS builds on the review work of Slot et al. (2015) and Slot (2018).

Most of my outcome indicators in this table speak to the *distal* factors at play in children's lives and few seem to measure the *proximal* processes such as the relationships between children and the adults caring for them. In table 6a, the ECERS and Classroom Interaction Scales have elements of both structural and the proximal factors. Additionally, one could argue that child to adult ratios should also be classified as a proximal factor. However, as highlighted in the table, this measure cannot be applied to providers who are not required by law to register with Ofsted – such as nannies and Au Pairs. So, there are problems with using this measure for all types of ECEC worker. Ratios also do not apply to children being cared for informally and so these indicators only seem to be good at measuring one form of childcare provision.

Table 6a: A 'core outcome set' (COS) for ECEC in UK?

Type of indicator	Indicator	National dataset currently in	Underlying concept being measured	How is it currently measured? Or how could it be measured?	Comments	Recommendation
Distal/ Structural	Staff qualifications	LFS, CEYPS	Staff characteristics as an aspect of ECEC quality	<u>LFS asks about:</u> NVQ levels and highest level of qualification <u>CEYPS asks about:</u> Highest Early Years or teaching-related qualifications held by staff (NVQ levels) but also 'Level 6 qualifications' and 'Early Years Educator qualifications' (from 2015)	Data on qualifications is not specific to ECEC workforce in the LFS. Datasets use different definitions.	For future use LFS would need refining to be a 'relevant' qualification in LFS to be similar to the CEYPS. Different indicators would need harmonising.
Distal/ Structural	Continued Professional Development	LFS	Staff characteristics as an aspect of ECEC quality	<u>LFS asks about:</u> training done in the last 13 weeks or 4 weeks, 'on/off job training', time spent training and learning activities in the last 3 months.	Data on training is not specific to ECEC workforce	Could refine to include questions specific to ECEC workforce (e.g., more about the types of training received and if relevant to this workforce) and/or add to CEYPS

Distal/ Structural	Ratings of well-being /job satisfaction	LFS	Staff characteristics as an aspect of ECEC quality	LFS has a variable: JBSATISF: Job satisfaction.	Questions are not specific to ECEC workforce	Could refine to include questions specific to ECEC workforce and/or add to CEYPS
Distal/ Structural	Work experience	LFS	Staff characteristics as an aspect of ECEC quality	LFS has a variable asking about length of service	Does this really capture 'work experience' as meant by the 'quality' discourse?	For future use it would need refining to be more 'relevant' / other indicators may need to be developed to better measure this concept
Both process (proximal) and structural (distal)	(ERS) or ECERS	Not been measured so far using a UK national dataset.	Type of centres/care provision as an aspect of ECEC quality	Scale consists of 43 items organized into 7 subscales: Space and Furnishings, Personal Care Routines, Language-Reasoning Activities, Interactions, Program Structure, Parents and Staff.	Collect in a national dataset? Not sure if this can be replicated in other datasets	These items are not currently collected in UK large-scale datasets. Could consider collecting them in future in order to create this scale.
Both process (proximal) and structural (distal)	Caregiver Interaction Scales	Not been measured so far using a UK national dataset.	Type of centres/care provision as an aspect of ECEC quality	Developed by Arnett (1989 ⁴⁸), it is a scale with 4 subscales: Sensitivity, Harshness, Detachment and Permissiveness.	Collect in a national dataset? Not sure if this can be replicated in other datasets	This is not currently collected in UK large-scale datasets. Could consider collecting in future.

⁴⁸ https://fpg.unc.edu/sites/fpg.unc.edu/files/resources/assessments-and-instruments/SmartStart_Tool6_CIS.pdf

Distal/ Structural	Type of setting	E.g., LFS, CEYPS, FRS, CEYSP, Ofsted	Type of centres/care provision as an aspect of ECEC quality	<p><u>LFS asks about:</u> types of worker using SOC codes.</p> <p><u>FRS asks about:</u> types of provision within education settings such as nursery schools/classes, day nurseries, playgroups, playschools, childminders, nanny/au-pairs, babysitters, grandparents, parents, other relatives.</p> <p><u>CEYPS classifies provision as:</u> group-based providers, school-based nurseries, school-based receptions, school-based before school provision, school-based after school provision, childminders.</p> <p><u>CEYSP asks about:</u> any childcare, formal childcare and informal childcare.</p>	Datasets use different definitions.	Different indicators would need harmonising for future use.
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<p><u>Ofsted asks about:</u> those providers registered with them on the early years register such as childminders, home child carers, childcare on non-domestic premises, childcare on domestic premises.</p>					
Distal/ Structural	Geographical location	E.g., LFS, CEYPS, FRS, CEYSP, Ofsted	Type of centres/care provision as an aspect of ECEC quality/level of deprivation	<p><u>LFS uses:</u> Government Office Regions and nations. Regional level includes geographical areas such as Wales, Yorkshire and London etc.</p> <p><u>CEYPS uses:</u> regions</p> <p><u>CEYSP uses:</u> regions</p> <p><u>Ofsted uses:</u> postcode for all registered provision and the IDACI</p>	<p>Can use this measure to examine spread of provision</p> <p>Suggest continued measurement and use</p>
Distal/ Structural	Public settings versus private settings	LFS, CEYPS, CEYSP Ofsted	Type of centres/care provision as an aspect of ECEC quality	<p><u>LFS asks a question about:</u> the proportion of workers in public/private sectors</p> <p><u>Other data:</u> does not ask this but a similar variable could in theory be developed by grouping types of</p>	<p>Datasets use different definitions. Currently not measured in some of the datasets but could be derived.</p> <p>Different indicators would need harmonising for future use.</p>

formal provision as 'public' and informal provision as 'private'						
(Mostly) Distal/ Structural	Ofsted quality ratings	Ofsted data	Type of centres/care provision as an aspect of ECEC quality	Rating of overall effectiveness, as Outstanding, Good, Requires Improvement, or Inadequate	Similar to ECERS but not measured the same way. Ratings can be used to examine provision quality relative to where children live and their development.	Different indicators would need harmonising for future use or some thought as to how to combine
Distal/ Structural	Management quality	CEYPS collects some data.	Organisational climate and leadership as an aspect of ECEC quality	<p><u>CEYPS asks about:</u> NVQ qualification levels of senior manager in group based settings.</p> <p><u>Ofsted ratings</u> also include a measure of management quality within the overall rating above.</p>	Limited question about this in CEYPS.	Could consider collecting more detailed questions in CEYPS in future to measure 'leadership' quality informed by studies such as EPPSE
Distal/ Structural	Staff working hours, workload and pay	E.g., LFS, CEYPS (and some details in ASHE)	Working conditions as an aspect of ECEC quality	<p><u>LFS asks about:</u> Gross annual pay which can be converted to hourly pay</p> <p><u>CEYPS asks about:</u> Pay for group-based staff aged 25 and over relative to the National Living Wage (NLW).</p>	Datasets use different definitions.	Different indicators would need harmonising for future use.

Distal/ Structural	Child-staff ratios	CEYPS	Classroom features as an aspect of ECEC quality	Number of children being cared for per adult, as measured between 'group based settings' and 'school-based settings'	Ratios only applies to 'formal provision only'. These are Ofsted registered providers.	Continue to measure. Bonetti (2018) looked additionally at compliance with the target for ratios which seemed a useful one to continue measuring
Distal/ Structural	Group size	CEYPS, and Ofsted	Classroom features as an aspect of ECEC quality	Both sources currently measure the numbers of providers in different types of settings – in Ofsted this is childcare on non-domestic premises which includes 'Nurseries, pre-schools, holiday clubs and other private provision on business premises', and in CEYPS it is numbers in 'group based settings'.	Group size applies to 'formal provision only'. These are Ofsted registered providers.	Consider measuring in future.

5.2 Children's food and nutrition

5.2.1 Identifying what should be measured and data gaps

Table 6b suggests indicators for a COS using secondary analysis of datasets I have used in my research on children's food and nutrition. These indicators are suggested using the discussions earlier which draw on the literature in this area (section 2), and reflections about my own research in this area (section 3). In so doing, it highlights the wide variety of indicators being used and also how indicators are often specific to one dataset or another. Even when similar concepts can be measured in different datasets, these have not necessarily been operationalised the same way. For example, concepts of dietary quality measured as single foods versus 'whole diet'. As noted earlier, two outcome indicators are novel – the DQI (a composite score of nutrients for children aged 10 years and under) and the measure of actual expenditure on food by different types of family as compared with the 'food budget standard'.

There are two key differences about these indicators as compared with those in ECEC. First, most of the indicators for children's food and nutrition as set out in Table 6b have been developed in relation to some nutritional benchmarking standards such as official government recommendations or SACN guidelines for nutrients (iron, calcium, etc.) or foods (fruits, vegetables) for children of different age groups. In theory this makes them scientifically robust, but as discussed in sections earlier, these indicators are only as good as the data they are based on, and the best data in terms of nutritional detail (the NDNS) requires onerous data collection from respondents whilst self-reported data about diet intake suffers from social desirability bias. As with the ECEC topic area, some indicators are currently being collected differently across the datasets I have examined and would need harmonising if brought together into a single source of indicators. An example of this would be the various indicators that can currently be derived of so called 'healthy eating' - see points in table 6b below. Second, most of the indicators for the COS in children's food and nutrition seem to me to be 'proximal' factors – indicators for concepts measuring food and nutrition in the child's local or family environments. As such the COS currently does not feature enough indicators to capture the structural 'distal' factors.

Table 6b: A 'core outcome set' for children's food and nutrition in UK?

Type of indicator	Indicator	National dataset currently in	Underlying concept being measured	How is it currently measured? Or how could it be measured?	Comments	Recommendation
Proximal	Fruit frequency	HBSC, NDNS	Dietary quality (single food item approach)	<u>In HBSC</u> : food frequency data. We compared 5 or more times/portions per day/week with lower amounts. See paper 6. <u>In NDNS</u> : we used amount of fruits and vegetables consumed.	Can identify single items in these datasets	Continue to collect and measure; would need to annually check and refine in relation to changing nutritional guidelines
Proximal	Vegetable frequency	HBSC, NDNS	Dietary quality (single food item approach)	<u>In HBSC</u> : food frequency data. We compared 5 or more times/portions per day/week with lower amounts. See paper 6. <u>In NDNS</u> : we used amount of fruits and vegetables consumed.	Can identify single items in these datasets	Continue to collect and measure; would need to annually check and refine in relation to changing nutritional guidelines
Proximal	DQI	NDNS variables can be used to create this measure	Dietary quality (whole diet approach)	See paper 5 for methodology of how we calculated this. It is a composite score which calculates intake of 6 nutrients in relation to nutritional guidelines for children of different ages from 0-10.	Diaries could be burdensome for families to complete the data needed so raises questions about reliability	Continue to collect variables to create the DQI, and save derived measure in the COS. Ideally test reliability of DQI but expensive to collect this data so unlikely to have comparison

Proximal	“Health Conscious”	HSE, ALSPAC	Dietary quality (whole diet approach)	<p><u>In HSE</u>: we used FA to derive food types. See section 5.2.</p> <p><u>In ALSPAC we used</u>: already derived factor groupings. See section 6.</p>	<p>Data on ALSPAC are getting old now, restricted to Bristol area. HSE results approximated but were not identical to ALSPAC indicators</p>	Include both but use differently according to level of geography analysis needs to be conducted on.
Proximal	“Snacks”/ “Junk Food”	ALSPAC, HSE	Dietary quality (whole diet approach)	<p><u>In HSE</u>: we used FA to derive food types. See section 5.2.</p> <p><u>In ALSPAC we used</u>: already derived factor groupings. See section 5.2.</p>	<p>Datasets use different definitions. Doesn't correspond to other food frequency data such as that in HBSC.</p>	Different indicators would need harmonising for future use.
Distal	Actual food expenditure in relation to the FBS	LCFS	Relative Food Poverty	Actual spending on food inside and outside home measured in relation to the food budget standard	Not available in other datasets	Continue to collect and use this measure but suggest refining to measure actual food expenditure as proportion of all household spending.

5.3 Summary

In accordance with the steps in the COMET handbook, I have developed the beginnings of a COS in ECEC and children's food and nutrition using information within sections two and three which draw on the literature and key studies and indicator I have used in my own research. In the case of ECEC, the indicators considered include those highlighted within a systematic review by Slot et al. in 2017. The identification of indicators suggested here also refers to indicators I have used in my own research and the extent to which I think the datasets I have used in my research can measure the indicators discussed in sections two and three. I do not claim that the information in these sections is exhaustive but it is a first attempt to identify a COS using indicators which can be derived from large-scale datasets in the UK (restricted to the ones I have used and/or reviewed). I have taken the process up to mid-way step four of the recommended COMET framework steps. The next step would be to consult with a convened group of experts to debate the suitability of the proposed indicators for the COS's in order to reach a consensus about what to measure, to include any 'missing' important indicators, and to write a final report about these in order to implement the COS. These steps should, I argue, also be guided by a conceptual framework such as Bronfenbrenner's ecological systems theory (1979), using proximal and distal factors to group and unite the indicators within each COS.

As discussed earlier, indicators can be divided into 'soft' or 'hard' indicators. On the surface, the indicators reviewed in table 6b for the proposed children's food and nutrition COS are 'hard' indicators, having been developed in relation to nutritional guidelines/recommendations. However, as discussed earlier in section two, the data collection methods used to collect the information for these indicators often comes from self-reported surveys rather than direct observation. Similarly, the proposed ECEC COS includes many of the outcome indicators available in large-scale data for secondary analysis are also based on subjective or self-report surveys (see section 2).

What the two proposed COS demonstrate together is the vast array of outcome indicators that can be operationalised using large-sale datasets. This suggests enormous potential for using large-scale data to evaluate child and family

outcomes in my two subject areas. I suggest here that a COS could be created using these available indicators and set out in tables 6a and 6b. But how might a construction of a COS in each topic area work in practice? It could be achieved through collection of these indicators within a yearly COS which could be populated from data from the original datasets holding these indicators (or data to create these indicators) but I welcome more discussion about how these COS could be operationalised and would encourage development of my ideas using a DELPHI process as suggested in the COMET framework.

The indicators in tables 6a and 6b have some potential to be used as a benchmark from which to monitor key changes about children and families within ECEC and children's food and nutrition (with regard to these particular outcome indicators). However, there are possible deficiencies, such as the apparent overbalance of proximal/process factors in the suggested COS for children's food and nutrition, and the slight overbalance of distal/structural factors in ECEC, that would need further discussion and agreement with a convened group of subject experts (using a DELPHI process) within each social policy area (ECEC and children's food and nutrition).

There are also notable gaps (see section 4) in these indicators which could benefit from being operationalised differently. Once a beginning COS has been set up, data owners could consider collecting new data to plug the gaps I exposed earlier in section four (if experts agree these gaps are important to include). In the shorter term, data owners could consider changing or tweaking some of the outcome indicators in tables 6a and 6b to better measure the concepts which literature has shown to be important for understanding children's outcomes in these areas - in particular, indicators to support the monitoring of what 'good quality relationships' between carers and children looks like within ECEC.

I have managed to 'sense check' with colleagues working in the social policy areas of ECEC and children's food and nutrition the indicators and approach suggested for developing a COS in these areas within this section of my thesis. Suggested next steps, following the COMET framework for developing a COS, is to convene a stakeholder group to extend what I have been able to achieve in this thesis and agree the extent to which the indicators I have suggested are important from my critical analysis of the literature are indeed useful to measure. Once refined to include agreement over indicators that are useful to collate and use, each COS

has the potential to improve the usefulness of secondary analysis of large-scale datasets to address social policy research questions in the areas of ECEC and children's food and nutrition.

I now return to my research questions posed in section 4 to summarise the critical reflections in the previous sections.

Section 6. Discussion

The integrative summary critically assesses the opportunities and challenges of using secondary data analysis of large-scale UK data for addressing social policy questions within Early Childhood Education and Care (ECEC) and children's nutrition (two areas of my research and which both focus on aspects of childhood wellbeing and developmental health). A key contribution of the integrative summary is the proposal of identifying a core outcome set (COS) of indicators within studies of early childhood education and care (ECEC) or children's food and nutrition, in order to support ongoing secondary analysis research in these areas e.g., to assess service or outcome quality. Four research questions were posed in section 4. I will summarise the results of my critical analysis of these research questions below before moving onto my conclusions.

6.1 RQ1: What does the literature identify as important concepts, factors and indicators and what does this suggest for a scope of a COS in my two research areas?

'Quality' is a key phrase underpinning the desire for families to have 'access affordability and availability' of childcare. However, there is no consensus as to what quality is, what it means and how it can be measured. Two main things arise out of the critical analysis of the key literature in section three: a) relationships between adults and children are crucial to achieving good child outcomes and b) quality is a complex concept which can be measured in multiple ways – not least through distinguishing structural and process aspect of quality. 'Structural quality' is often cited in literature as the quality of the conditions of the ECEC centre, such as the

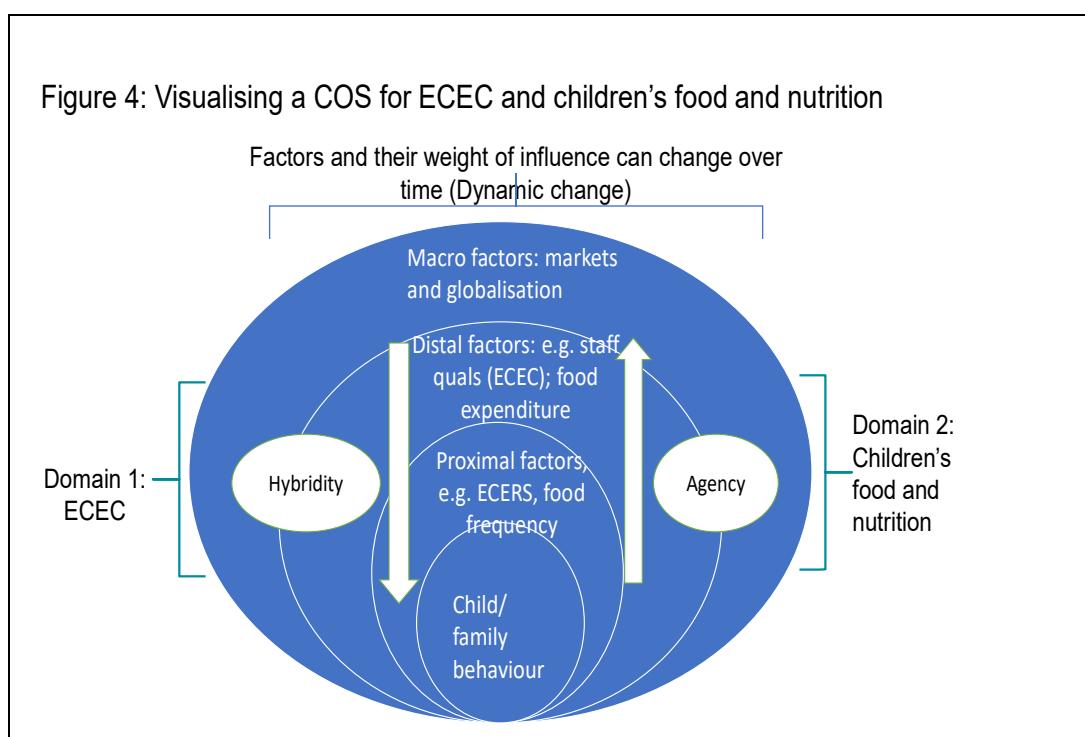
number of staff and their working conditions, and 'process quality' is cited as the way in which a child experiences the ECEC setting (Janta, van Belle and Stewart 2016). I have suggested earlier that structural and process factors could map onto Bronfenbrenner's '*proximal*' and *distal* factors (Bronfenbrenner and Morris, 2006). While some studies have examined interesting correlations between structural and process indicators, I note the caution raised by other researchers against doing this because of important differences between settings and between countries in how ECEC is provided (Slot, 2018).

A number of key concepts can be identified as important to measure in relation to ECEC quality: staff characteristics, classroom features, working conditions, organisational climate and leadership, type of centres/provision. These are commonly divided into 'process' (proximal) and 'structural' (distal) aspects of ECEC quality. Examples of process indicators are: (part of) the Environmental Rating Scales (ERS) or ECERS scales or Caregiver Interaction Scales (other elements of these scales can be classified as structural or distal). Process indicators can be difficult to operationalise as they are based on observational data which can be criticised for not being objective and have been argued to vary between settings (Slot 2018). From the literature I have reviewed in section two, many of the indicators seem to be measuring types of structural or distal concepts and it is notable that, from my understanding of the literature, there are (relatively) fewer indicators measuring process/ proximal concepts/factors. This could be because process/proximal concepts are more difficult to operationalise into indicators within large-scale quantitative datasets and may be better measured using qualitative enquiry. However, some factors, such as the ECERS and the Caregiver Interaction Scales, are examples of both 'process' (proximal) and 'structural' (distal) factors.

In response to the important role diet plays in child health (WHO 2017), a key concept discussed is of dietary quality, and its association with other factors. For example, to monitor adherence to the government's five-a-day fruit and vegetable recommendation. Dietary quality has been operationalised either through indicators of single food consumption or indicators of the 'whole diet', which take a more holistic viewpoint. Different methods are suitable for different research purposes and budgets. Alongside indicators of dietary quality, consideration is also given to whether food budgets allow for social participation. These 'alternative indicators' consider not only the nutritional value of food but the social aspects of eating food.

Indicators arising from these conceptualisations are concerned with food poverty as part of broader living standards for children and families. I have suggested that most of these indicators could be categorised as Bronfenbrenner's '*proximal*' factors and very few factors are discussed in the literature which could be categorised as Bronfenbrenner's *distal* factors (Bronfenbrenner and Morris, 2006).

In terms of theoretical underpinnings, as discussed in section 1.6, Bronfenbrenner's ecological systems theory (1979) is of particular relevance to support the development of a COS, by grouping measures into proximal and distal factors (Bronfenbrenner and Morris 2006), supported by public policy theoretical concepts of ecological citizenship, dynamic change, agency and hybridity. The wider literature I've reviewed suggest these latter concepts will provide a supporting explanation for how Bronfenbrenner's levels structural and process factors can influence and shape children's wellbeing in different domains. Below in figure 4, I've presented a visual representation of the beginnings of a COS in ECEC and children's food and nutrition. This a repeat of the model shown in figure 3, but this time including some of the key factors at each level presented in table 6a and 6b.



Source: authors own work.

6.2 RQ2: What indicators have been operationalised and analysed within my work?

An example of a structural or distal indicator I have used in my analysis is staff characteristics. As table four in section five shows, there are multiple ways of operationalising staff characteristics. This table offers a critical overview of the indicators I have operationalised in my research on ECEC, including issues I suggest exist with these indicators and problems with some of my analysis using these indicators. For example, I have examined staff characteristics using staff qualifications for the ECEC workforce. However, as discussed earlier and in my candidate publications on ECEC, staff qualifications are not a direct measure of ECEC quality and any change in qualifications could be attributed to other factors, such as changes to widening participation in higher education. Despite this, staff qualifications are commonly used to measure and monitor changes to the ECEC workforce (e.g., Sylva, 2010; Nutbrown 2012).

I have suggested in section two that the ECEC COS scope, drawing on key points discussed from the literature in section two, should measure both structural/distal and process/proximal aspects of ECEC quality (since 'quality' is a key phrase underlying discussions about what achieves good child and family outcomes). Although Slot (2018) recommends using indicators to support cross-country comparisons, it would seem sensible given the different national contexts and policies for ECEC, that a COS is first developed for the UK only.

Within children's food and nutrition, the literature operationalises and analyses concepts of dietary quality either as single foods (such as fruit and vegetable consumption) or indicators of the 'whole diet'. I have suggested that the scope for a COS for children's food and nutrition, drawing on the literature in section two, should include concepts of dietary quality, operationalised both through indicators of single foods and indicators of 'whole diet'. As access to a diet that meets needs for social participation as well as health is also discussed as important within the literature, particularly on 'food poverty', I have recommended using indicators of a broader conceptualisation of food which considers the social aspects of food.

In practice, the indicators discussed for children's food and nutrition are not always straightforward to operationalise and some are better represented and identified within large-scale data than others. For example, my critical review of these indicators in section two shows that a number of datasets can be used to

operationalise indicators of fruit and/or vegetables (as single indicators). However, other indicators, which seek to take a more holistic view of dietary quality (such as my DQI) rely on datasets with lots of details about the quantities children consume various nutrients which are deemed to be important (such as iron), which are only found in the NDNS. This makes the NDNS an asset for research questions which require detailed nutritional data and wish to use a whole-diet indicator. However, as discussed earlier, the NDNS data collection can be burdensome for respondents and so one needs to query the potential quality of responses and also be weaker on some of the independent indicators.

6.3 RQ3: What are the 'data gaps' within current large-scale UK data collections regarding the operationalisation of indicators in ECEC and children's food and nutrition?

In section four, I took stock of the evidence from summarising over the indicators that I have operationalised. I did not consider in this section the gaps discussed in other literature (though some of these are covered within the discussion within section two). There are no doubt more data gaps which should be considered and which I would encourage researchers look into to develop further my ideas in this thesis.

I considering the third research question, I asked myself two key questions of my papers: a) which indicators should be measured but currently aren't (or cannot be measured) and b) which indicators are being measured but should perhaps be operationalised differently? Within ECEC I identify two key gaps: not enough large-scale data asking parents about their childcare preferences, and no detailed analysis about the reach and impact of the private childcare sector. Within children's food and nutrition, I note that we do not yet know if spending below the FBS is due to a lack of household resources or for other reasons (e.g., preference) nor how different members of families may be affected by resource changes.

An important limitation arising out of discussions in section four is the fragmentation of outcome indicators across particular datasets. This fragmentation matters because analysis of secondary data then becomes difficult for researchers who may have to combine datasets or carry out separate analysis using a range of datasets. My suggested response to the answers to these questions is to curate an

annual 'Core Outcome Set' (COS) of indicators using the indicators I have suggested in tables 6a and 6b.

6.4 RQ4: What indicators could be included within a COS for ECEC or children's food and nutrition?

Step four of the COMET handbook (see figure 1) suggests identifying what indicators could be included in a COS based on what is considered to be important in the literature. I have suggested such a COS for ECEC (see Table 6a) and for children's food and nutrition (see Table 6b) from a review of the literature (discussed in section 2), a reflection on indicators I have operationalised in my own research (section 3) and also an identification of the key data gaps (discussed in section 4). For example, the COS for ECEC draws on the evidence from Slot et al. (2015) and Slot (2018) and my own research work in the area.

I have argued earlier (e.g., see section 1.6) that a COS for my two research areas can be identified using the COMET steps (see section 1), using a pragmatic framework which draws on empirical data, and is underpinned using Bronfenbrenner's (1979) ecological theory. This theory is chosen for two reasons. First, it seeks to explore the different relationships influencing a child's development, formed in his or her environment. This speaks to the concerns with these subjects to support childhood wellbeing and developmental health. Second, the theory suggests factors are either '*proximal*' and *distal* (Bronfenbrenner and Morris, 2006). Proximal could also be called 'process' and distal could also be called 'structural' factors. These two types of factors are more explicitly discussed with ECEC but can also be used to usefully group indicators in children's food and nutrition.

As I discuss in section 1.6 concepts of globalisation, ecological citizenship, dynamic change, agency and hybridity are also useful to consider alongside, and to update, Bronfenbrenner's work in relation to thinking about processes and influences over time on child and family outcomes. Change in family processes is noted to be rarely measured, and in particular, the process of mapping and understanding change between 'cross-cutting' policy environments that influence family life (Yoshikawa and Hsueh, 2001). For example, welfare policies can enact change in childcare environments through provision of childcare subsidies, and policies designed to encourage parental employment will affect children, at least in part, through changes in their care environment (*ibid*). However, research thus far tends

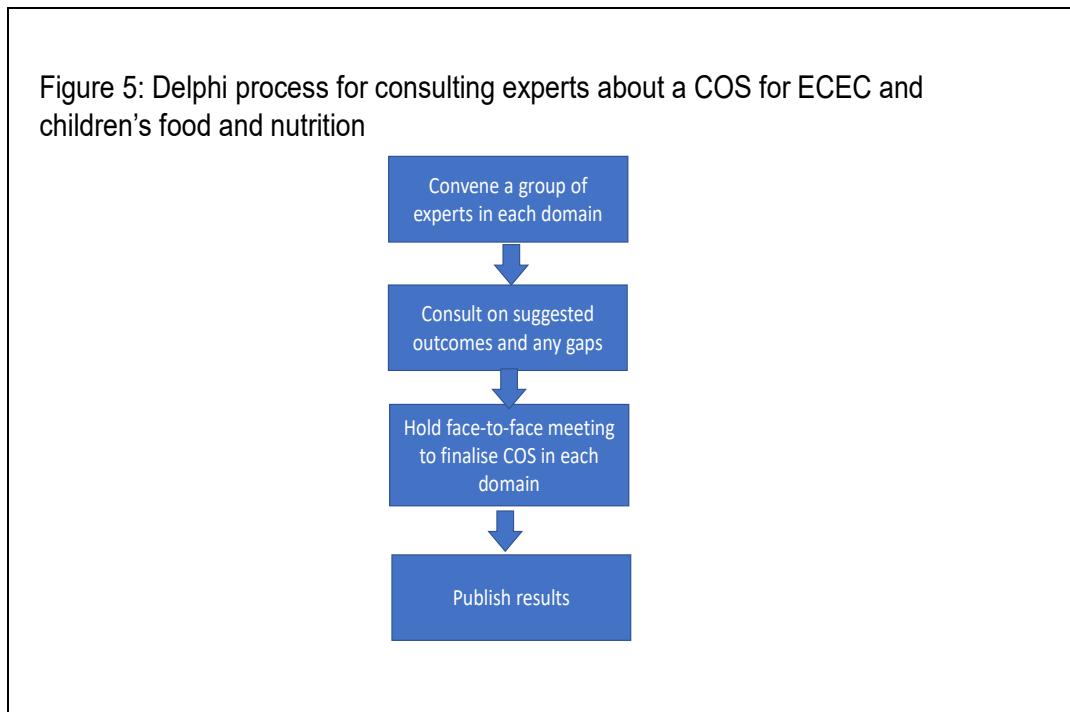
to occur in specific policy environments and does not consider dynamic change between them (ibid).

My work, being centred in two important areas of child development (ECEC and children's food and nutrition), offers an important contribution to the existing evidence base methodologically and theoretically, by bringing together the collection of measures (and encouraging the future analysis of them) that could be used in analysis to explain *how* and *why* policy in multiple areas interact to influence child outcomes.

Yoshikawa and Hsueh (2001) point to three particular benefits of having a dynamic systems approach to measuring outcomes across family policy areas. First that dynamic findings may help revise underlying policy implantation assumptions, such as transition to work policies being beneficial to all parents, and it may offer nuanced understanding of the pathways and mechanisms behind behaviour change. Second, research that is able to track changes across multiple systems and levels 'may begin to suggest productive directions for the integration of public policies and prevention and promotion programs, aimed directly at enhancing children's development' (p. 1899). Third, a dynamic systems approach allows for the intersection of child development time with policy timescales. The example they give is childcare arrangements having substantially different impacts on children depending on their age. Yoshikawa and Hsueh (ibid) further argue that such efforts have the potential to generate new hypotheses in developmental studies of public policy by clarifying the processes by which policy formative and implementation links to child development.

The two COS I propose in this thesis are the beginning steps and need to be further developed and refined after using the DELPHI process for consulting with relevant expert groups about the usefulness of the proposed indicators, the data gaps and any suggested additions (again, following the COMET framework recommendations). The intention is to identify indicators which currently exist as a starting point from which further indicators can be added in the future. Although I suggest the identification of a separate COS for ECEC and children's food and nutrition respectively, together they demonstrate that a wide range of outcome indicators can be operationalised using large-sale datasets, and if brought together, using a dynamic systems approach, underpinned by Bronfenbrenner's theory, they have the potential to provide a holistic and joined-up understanding of the measures

needed to unpack the processes by which policy influences and impacts child development. Figure 5 is an illustrative attempt at showing the steps of consultation needed to bring about this process.



Source: authors own work.

Having carried out the critical review of literature and my papers, below I turn to briefly discussing some conclusions of my integrative summary.

Section 7. Conclusion

This thesis provides a critical review of my work over the past five years. My research predominantly uses secondary analysis methods to examine large-scale datasets within the UK and Europe to address research questions within the field of social policy. I have undertaken research using secondary methods as a standalone method (papers 1-4) or as part of wider mixed-methods research studies (papers 5-7). My work reviewed here serves as an important and original methodological contribution to the field of social policy because it critically assesses the opportunities and challenges of using secondary data analysis of large-scale UK data for addressing social policy questions within Early Childhood Education and

Care (ECEC) and children's nutrition (two areas of my research and which both focus on aspects of childhood wellbeing).

I argue that secondary analysis (as a standalone method or as part of mixed method research) has enormous potential for monitoring outcomes for children and families. However, there are problems of data fragmentation (indicators spread across different datasets) which make secondary analysis using large-scale datasets of these indicators problematic. I have also discussed how concepts can be problematic to operationalise using secondary data analysis of large-scale data. Some concepts might be more successfully operationalised within mixed method studies which consider depth, such as reasons young people consume the foods they do, as well as breadth, such as the range of foods young people consume.

One way I have discussed these data problems, particularly of fragmentation, could be overcome is through the identification of a 'Core Outcome Set' (COS) of indicators within ECEC and children's food and nutrition (separately). A COS in these areas could bring together indicators which I have reviewed to be important within the literature in the respective areas across existing large-scale UK data within each area. I have suggested the indicators in the COS for ECEC and children's food and nutrition should be pragmatically identified using research evidence and the COMET framework, underpinned using (1979) ecological theory, and grouped using Bronfenbrenner's 'distal' and 'proximal' factors.

I consider the success of these COS's is reliant on three key things. First, common understandings of definitions. Here more work is needed in accordance with the COMET framework to consult with expert groups over the suggested indicators using a DELPHI process. Second, use of indicators that are sensitive to the context in which they are being developed and applied. Third, a clear understanding of the purpose or aims of the indicators being included. The latter could be achieved through using a guiding theoretical framework such as Bronfenbrenner's ecological theory (1979) and the 'proximal' and 'distal' factors, supported by a dynamic systems approach and underpinned by concepts of hybridity and agency, as I have discussed and applied in this thesis. As section 3 of my thesis argues, the measures considered within this thesis are important not only for understanding aspects of 'quality' but also for understanding what children need for their development.

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Appendix 1

Table 1: A critical summary of the key findings, contributions, challenges and research gaps identified within my papers

Ref	Title of paper	Methods used	Key Findings & gaps	RQ2: Measures used	RQ3: Key strengths & limitations
Early Childhood Education and Care					
1	A critical review of the advantages and limitations of using national large-scale data to examine childcare patterns in Britain	Meta-analysis of previously published papers, drawing out the strengths and limitations of the datasets in papers 2 and 3	<u>Findings:</u> In datasets: 'education' separate from 'care, differing geographical coverage, varying details on provision and usage. Not all data within a single dataset. <u>Gaps:</u> Lack of data about informal caring.	N/A see papers 2-3	Ditto findings
2	Is the 'quality' of preschool childcare, measured by the qualifications and pay of the childcare workforce, improving in Britain?.	Secondary analysis of childcare provision using the Labour Force Survey (LFS), the Annual Survey of Hours and Earnings (ASHE), the Childcare and Early Years Providers Survey	<u>Findings:</u> A highly gendered (98% female) workforce. Qualifications modestly rising (12% increase over time in NVQ level 3). Persistent low pay (on average £6.60 per hour). Shrinkage in the workforce - of around five per cent in Britain since 2005.	Staff qualifications (NVQ level 3+)	<u>Strengths:</u> can show detailed workforce patterns. <u>Limitations:</u> can't say why patterns are occurring.

		(CEYPS) and Office for Standards in Education, Children's Services and Skills (Ofsted) data.	<u>Gaps:</u> <u>Gaps:</u> Difficult to look at education and care occupations together. More people describe themselves as childminders in the LFS than are registered with Ofsted, suggesting a possible growth in illegal childminding. But cannot study this further with available data.		
3	Is targeting formal childcare the best way to meet the needs of families in Britain?	Secondary analysis of the combinations of formal and informal forms of childcare used by families using data in the Childcare and Early Years Survey of Parents (CEYSP) and the Family Resources Survey (FRS) between 2006 and 2011.	<u>Findings:</u> Parental reliance on informal care, to meet childcare needs. Childcare use is related to family circumstances, e.g., formal care used more by employed, higher income families, whilst informal care used more by mothers who are not employed, less well educated and by younger mothers. <u>Gap:</u> No data on childcare preferences.	Take-up rates of different types of childcare provision	<u>Strengths:</u> Detailed data on types of childcare use. <u>Limitations:</u> Data says nothing about parental childcare preferences which are needed to understand usage patterns.

ECEC4	<p>The development of a united ECEC workforce in New Zealand and England: a long, slow and fitful journey'</p> <p>Secondary analysis of LFS for 2012-14 for England. Meta-analysis of the New Zealand (NZ) 'Census 2013' Statistics on ECE Teachers and Ministry of Education's website statistics (Cameron, Dali and Simon, 2017: Table 35.2). Statistical comparisons are made between England and NZ workforces.</p>	<p>Findings: While the goal of a fully graduate workforce has not yet been achieved, NZ has the most professionalised early childhood workforce in the world. While qualifications are rising in both countries, pay has not kept pace and practitioners' sense of societal esteem for their work remains low. Numbers of home-based carers are falling in England but rising in NZ.</p> <p>Gaps: Lack of data on sector voices, had to use union membership/activity as a proxy.</p>	<p>Staff qualifications: in England NVQ level 3+, in NZ, a 'benchmark qualification'</p>	<p>Strengths: Data available to compare workforce in NZ & England.</p> <p>Limitations: Cross-country comparisons hampered by a lack data on early childhood education teachers in England, and inadequate means of counting just those teachers working in early education settings in England ('childcare' workers in England have different professional education backgrounds to NZ workforce) and differences in</p>
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					qualifications of the workforce.
Children's Food and Nutrition					
5	Designing a nutritional scoring system for assessing dietary quality for children aged 10 years and under in the UK.	Development of a diet quality index using the National Diet and Nutrition Survey (NDNS) for the year 2008/9, used to examine to compare children's diets in relation to maternal employment.	<u>Findings:</u> DQI compares dietary quality for different child age groups relative to UK dietary guidelines. DQI can also be used to explore dietary quality in qualitatively studies for small groups of children. <u>Gaps:</u> None – aimed to cover a gap.	Composite score of key nutrients – the diet quality index	<u>Strengths:</u> methodologically advantageous over 'data driven' dietary pattern approaches. <u>Limitations:</u> may mask individual components important for understanding the health impacts of children's diets.
6	Changing trends in young people's food behaviour and wellbeing in England in relation to family affluence between 2005 and 2014.	Secondary analysis of eating behaviours by family affluence using the Health Behaviour School-Aged Children Survey (HBSC) for England for 2005, 2009 and 2014.	<u>Findings:</u> Young people in the low FAS group report less healthy eating behaviours, and differences by gender such as more soft/sugary drink consumption and lower consumption of fruit and vegetables for boys. Evidence of a 'closing gap' between the FAS groups over time in	Food behaviour: counts of consumption of breakfast five or more times per week or more, consumption of fruits and vegetables and sugary drinks five or more times per day.	<u>Strengths:</u> can examine changes in individual food behaviours over time. <u>Limitations:</u> Problems with FAS score between countries and years, changes between survey years to key measures such as sugary drinks

			terms of some behaviours. <u>Gaps:</u> Dietary data insufficiently detailed to use with our DQI.		question, lack of data to explain the observed associations, whilst reported relationships are statistically significant, the relationships are weak.
7	Which types of family are at risk of food poverty in the UK? A relative deprivation approach. Social Policy and Society	Secondary analysis of family food expenditure using the Living Costs and Food Survey (LCFS) between 2005 and 2015. Uses a 'relative deprivation' approach (RDA) to examine food poverty.	<u>Findings:</u> The proportion of families spending less than expected has increased over time for most family types and for lone parents and large families in particular. <u>Gap:</u> Not enough data in LCSF to explore resource distribution within families.	Food expenditure in relation to the food budget standard UK for different family types. This is a multidimensional understanding of food poverty.	<u>Strengths:</u> can compare actual food spending for different families in relation to agreed standards. <u>Limitations:</u> Cannot tell if households are spending below the amount because of a lack of resources or for other reasons.

Changes to the SOC as a result of my work:

We raised three key questions to ONS for consideration: Issue 1: To amend the unit group titles for 'Managers and proprietors in early years and childcare services' (1233), 'Early years education practitioners' (3232) and 'Early years assistants' (was Nursery nurses and assistants) (6111) in order to join up education and care. Issue 2: To disaggregate the SOC2020 unit group for 'Early education and childcare services managers and proprietors' (1233) because managers in education and childcare generally have professional knowledge and should be coded to MG2. The result of these recommendations has been to amend the title of 1233 to 'Early education and childcare services managers and proprietors', amend the title of 3232 to 'Early education and childcare practitioners', amend the title of minor group 323 to 'Teaching and Childcare Associate Professionals', amend the title of 6111 to 'Early education and childcare assistants', amend the title of minor group 611 to 'Teaching and Childcare Support Occupations', and to move the unit groups within the new SOC2020 minor group 612 for 'Childcare and Related Occupations' to minor group 611. Issue 3: To split Managers from owners/proprietors to form two new unit groups and one new minor group. The result has been to amend title of 1233 to 'Early education and childcare services proprietors', create new SOC2020 minor group 233 'Early Education and Childcare Services Managers' and new SOC2020 unit group 'Early education and childcare services managers' (2330).

Appendix 2: Candidate Publications

Paper 1: A critical review of the advantages and limitations of using national large-scale data to examine childcare patterns in Britain.

Early yEars, 2017
<http://dx.doi.org/10.1080/09575146.2017.1291586>



OPEN ACCESS

A critical review of the advantages and limitations of using large-scale national surveys to examine childcare patterns and the ECEC workforce in Britain

Antonia Simon

ABSTRACT

OECD countries have established statistical collections to ensure quality within Early Childhood Education and Care (ECEC). Focusing on one part of ECEC – preschool ‘childcare services’ – this paper critically reviews statistical collections specifically designed to measure childcare patterns in England alongside UK data collected for other purposes which can be used to examine childcare patterns. The paper evaluates how far these data provide a reliable basis for examining the childcare workforce, how well childcare usage and provision patterns can be analysed and the degree to which the data provide comparable geographical coverage. Results show analysis is restricted by the various ways datasets count and classify occupations. Differences in geographical coverage make them difficult to compare. More refinement of occupation categories would make existing sources more useful. The themes discussed here are relevant for other countries seeking to understand how best to utilise their statistical collections for examining childcare patterns.

Introduction

A growing body of research recognises that Early Childhood Education and Care (ECEC) brings a wide range of benefits, including social and economic benefits; better child well-being and learning outcomes; more equitable outcomes and reduction of poverty; increased intergenerational social mobility; higher female labour market participation and gender equality; increased fertility rates; and better social and economic development for society at large (OECD 2006). Expenditure on ECEC services has increased over time for most member countries (OECD 2014a). OECD data show that public expenditure on childcare in the UK was 0.5% of GDP on early childhood services compared to 0.7–1.1% in the Nordic countries with higher maternal employment levels and lower levels of child poverty (*ibid*). The UK figures are likely to be inflated by the early age at which children start school

in the UK compared to elsewhere in Europe (at age five compared to age six and even age seven for other parts of Europe), so that many 4-year-olds in the UK are already in formal education (often full-time) before the age of 5 (Moss 2001). Despite the varied expenditure on ECEC across Europe, achieving 'good quality childcare' remains a key priority for many member countries. In 2011, England's Department for Education (DfE) and Department of Health (DH) for example jointly published a major strategic document, 'Supporting Families in the Foundation Years', which emphasised the fundamental importance of the early years, acknowledged the need for greater investment and recognised the importance of a well-qualified workforce. More recently, the House of Lords Select Committee on Affordable Childcare (2015) in England reinforced the need for families to access 'good quality affordable' formal childcare.

The OCED has been encouraging the creation and use of monitoring systems and statistical collections to ensure quality and accountability in ECEC across member countries (OECD 2015). These monitoring systems have provided a key platform for policy development (Fenech, Sweller, and Harrison 2010). The OECD publication, *Starting Strong IV* (2015) for example, explores how countries can develop and use such systems to enhance service and staff quality for the benefit of child development. The availability of objectives, benchmarks and indicators are also being recognised as an essential means of monitoring progress and comparing countries on progress made with different policies, such as the ECEC Quality Framework (Working Group on ECEC 2014). A growing audit culture worldwide (Shore 2008) has seen its mark in the provision of ECEC services. Evidence and data collected through surveys and other data collection tools such as those collated on the OECD Family Database are used to scrutinise local country spending and to ensure investment in ECEC continues to be made in the sector (OECD 2014b). To make effective cases for investment within the European Union (EU), data systems rely heavily on comparable data being collected between member states (ibid).

Statistical collections are additionally often set up within individual countries to collect important information to monitor progress with meeting specific policy goals. For example, in England, the Childcare and Early Years Providers Survey (CEYPS) series was established in order to provide a valuable source of evidence for monitoring progress towards meeting commitments made by the Government for childcare. This data series includes trend data on available places and planned changes which is essential information for understanding if the sector in England is building sufficient sustainable capacity to meet the continued demand for provision (DfE 2013a). This data series is also being used in England to monitor progress with the 'tax-free childcare' offer for working families, as announced by the government on 19 March 2013 (DfE 2013b).

There are a number of unique features about the UK statistical system (see Dunnell, Laux, and Alldritt 2007) which make it an interesting case study. For example, apart from births, deaths and marriage registers, the UK does not have a tradition of publicly accessible registers of information about citizens or businesses and there has been considerable resistance in the UK to the concept of population registers. UK childcare services are more numerous than early childhood provision in schools, unlike some Continental European countries, such as France and Italy, where schools are the predominant provider of ECEC (Bennett 2008).

The UK consists of four countries – England, Scotland, Wales and Northern Ireland. As childcare policy is a devolved matter in Scotland, Wales and Northern Ireland, childcare statistics in the UK are collected independently by the different constituent countries. While the Office for National Statistics (ONS) 'is responsible for many of the key economic and social/demographic statistics and has an important co-ordinating role across the UK' (ibid), the constituent countries of the UK each has a devolved statistical organisation. Statistics for education and childcare are collected by

government departments. This means separate data collections exist for each country. The Department for Education is responsible only for England. Additionally, there are more general purpose surveys, discussed in more detail below, which are collected from households and employers which can be utilised to examine childcare patterns – because they contain relevant questions as part of their general enquiry.

This paper critically reviews the value of both statistical collections specifically designed and established in England in order to measure childcare patterns, alongside other large-scale UK data which have been collected for other purposes, but which can also be used to examine childcare patterns. The specific aims are to examine how far existing data provide a reliable basis for examining the childcare workforce. It also looks to what extent existing data can provide a good picture of usage and provision. In both cases, the paper considers whether existing data can provide comparable geographical coverage. The aims of this paper represent different aspects of childcare which are often considered in isolation but which are important to consider together for a better understanding of the complexity of the childcare system. For example, provision patterns, which provide details about supply and who provides childcare, are important to consider alongside usage patterns, about parental demands for childcare. The geographical coverage can inform the extent to which the available statistical sources can be used to provide comparable information about these two aspects. It is also important to consider geographical coverage for the reasons discussed above regarding the nature of statistical collections in the UK.

The contribution of this paper is to highlight the importance of good quality national data for monitoring ongoing childcare patterns which is important for assessing progress with meeting key government childcare policies. The themes discussed in this paper are relevant for other countries seeking to understand how best to utilise their own statistical collections for examining childcare patterns, particularly those interested in using their own statistical collections beyond their original purposes for monitoring and/or assessing quality early childhood services. In particular, the paper argues that despite having an integrated governance structure (where childcare and preschool education activities are integrated), the UK's statistical systems are still split between covering aspects of education and childcare, causing problems for examining the workforce as a whole. This may resonate with other countries with recently but still not fully integrated governance systems.

Aims, datasets and methods

This paper draws on evidence from a study examining 'The Provision and usage of preschool childcare in Britain' to illustrate and address the key aims of this paper (Simon, Owen, and Hollingworth 2015). The methodology is the secondary analysis of statistical data (Dale, Arber, and Procter 1988). Two kinds of data have been analysed: administrative data and survey data. Administrative data are complete records (except for unintended errors), such as registration data for childcare providers. This contrasts with survey data, which are collected on a sample and necessarily incorporate sampling variation, which means that survey data always have a margin of error (Owen 2017). Survey data need to be weighted to give population estimates.

The Family Resources Survey (FRS) and the Childcare and Early Years Survey of Parents (CEYSP), are the main data sources for analysing parents' use of childcare. The FRS, which has been running since 1992, is a continuous survey conducted on behalf of the UK Department for Work and Pensions (DWP). It is the leading household survey for the collection of household income (Simon, Owen, and Hollingworth 2015). The CEYSP, which has been running for the past 10 years, is conducted every 2 years by the Department for Education, and therefore only includes parents using childcare provision in England. It is used to provide information to help monitor the progress of policies and

public attitudes in the area of childcare and early years education. Additionally, the study drew on Understanding Society (US), the UK household longitudinal study, to complement the results provided by the FRS and CEYSP. The FRS contains just under 4000 cases of families with children aged 0–4 for each survey year from 2006–2007 through to 2010–2011. These were sufficient sample sizes for some year-on-year analysis without needing to combine survey years. The CEYSP includes around 3000 cases per survey year for children aged 0–4.

The Labour Force Survey (LFS), running since 1992, is the largest and most comprehensive source of data on the workforce collecting data from approximately 60,000 households per quarter from across the UK. The Annual Survey of Hours and Earnings (ASHE) is based on a 1% sample of employee jobs taken from HM Revenue and Customs PAYE records. Information on earnings and hours is obtained from employers (Ormerod 2006). Both of these datasets were examined for data on the childcare workforce for England.

In the LFS people's jobs are classified using the four-digit 2010 Standard Occupational Classification (SOC). Using this classification system, three individual occupations ('Nursery nurses & assistants', 'Childminders & related occupations' and 'Playworker') were combined to make up the 'childcare' workforce. These were analysed, both separately and together, as childcare occupations. ASHE, running since 1997, also uses the SOC. The Childcare and Early Years Providers Survey (CEYPS) is the third main data source used for analysing the 'childcare' workforce. Like the Parents survey (CEYSP), the Childcare and Early Years Providers Survey (CEYPS), which has been running since 1998, is conducted every two years by the Department for Education, and so only covers childcare provision in England. Within the UK, childcare provision is a nation based competence and therefore the CEYSP and the CEYPS, which are undertaken for the Department for Education, cover England only. The CEYPS includes group-based provision, out of school provision, childminders and early years settings in maintained schools (DfE 2013a).

The study additionally included statistics collected by the government departments of England (including data on the provision for children under the age of five in the maintained, private, voluntary and independent sectors in England), and statistics on the registration of childcare provision, including full day care, sessional day care and data on childminders collected by Ofsted, the childcare regulation body for England.

The LFS, the FRS, the UK Household Longitudinal Survey (UKHLS), the British Social Attitudes Survey (BSA) and the CEYSP are key large-scale datasets for examining *informal care* of preschool children. These datasets provide some information about the volume of informal care within and outside of the child's home. There is no single agreed definition of 'informal childcare' but a useful term recently employed is: 'Childcare that is largely unregistered by the state for quality control, child protection and/or taxation purposes' (Rutter and Evans 2012). Using the definition above, informal childcare includes childcare offered by: grandparents, other relations of the child, older brothers and sisters of the child, and neighbours and friends of the child's parents. Most of this childcare is unpaid or provided on a reciprocal or bartered basis. Although childminders and nannies provide childcare in the 'home context' (the former in the childminder's home and the latter in the parent's home), these are paid for services.

Results

Below presents a critical analysis of the advantages and limitations of using key statistical collections within England that are specifically designed to measure childcare patterns alongside other large-scale UK data collected for other purposes which can be used to examine childcare patterns. The key

results of this analysis are presented in Table 1. The Table and discussion below addresses each of the questions set out above.

Table 1. Main advantages and limitations of available UK and England data sources for examining preschool childcare patterns.

To what extent do the data sources...

Data source	<i>(a) Reliable basis for examining the workforce?</i>	<i>(b) Good picture of usage and provision?</i>	<i>(c) Comparable coverage of GB?</i>
<i>Childcare provision</i>			
LFS	Occupation codes separate 'childcare' from 'education' jobs; excludes managers	Very good detail on ECEC workforce, including work patterns, qualifications and pay	UK-wide; can select different nations of the UK
CEYPS	Counts education and care together	Not as detailed as LFS, especially qualifications	Only England – so other parts of UK excluded
ASHE	same as LFS	More limited than the LFS: qualifications, pay and hours of workers	same as LFS
DfE annual statistics on early years provision for children under five years	Covers 'education' staff (e.g., primary schools/nursery class staff); no childcare (e.g., nannies, childminders)	Not as detailed as LFS. However, provides good information about relevant qualifications such as 'Qualified teacher status' (QTs) or 'Early years Professional status' (EYPS)	Only England – so other parts of UK excluded
<i>Childcare usage</i>	N/a	Good level of detail – able to compare those using and not using childcare and their characteristics	Only England – so other parts of UK excluded
FRS	N/a	Good level of detail – able to compare those using and not using childcare and	UK-wide; can select different nations of the UK

		their characteristics
Us	N/a	Very few questions and sample size very small
<i>Informal childcare</i>	N/a	Hardly any questions – used to be more detailed prior to 2009
LFS		UK-wide; can select different nations of the UK
FRS	N/a	Provides estimate of informal care. Detailed questions about carers but only for those caring for children with a disability
CEYSP	N/a	Provides estimate of informal care but nothing about the characteristics of the carers
BSA	N/a	Only England – so other parts of UK excluded
		UK-wide; can select different nations of the UK

How far do existing data provide a reliable basis for examining the workforce?

The datasets available for analysing the ECEC workforce have a number of important limitations. The categories of the Standard Occupational Classification keep separate childcare and education staff. The Childcare and Related Occupations group includes most childcare staff, but excludes nursery managers and owners: these are classified with ‘Teaching and other educational professionals not elsewhere classified’. This makes it difficult to get a full picture of the childcare part of the workforce. For the education workforce, nursery teachers are in a single category with ‘Primary and nursery education professionals’, so it is not possible to separate those teachers working with preschool children from those working exclusively with children of compulsory school age.

Another key issue to considering the reliability of these datasets is the extent to which these classifications may have changed over time. For 2005–2007 and 2008–2010, the LFS provides information using SOC 2000 codes (ONS 2000); the 2012–2014 uses SOC 2010 codes (ONS 2010). Although the occupations for classifying the childcare workforce mentioned earlier have remained largely unchanged between these two sets of SOC codes, there were some subtle changes in the labelling of some of the categories which may make some difference to how people were classified between SOC 2000 and SOC 2010. For example, code ‘6123’ labelled ‘Playgroup leaders/assistants’ in SOC 2000, became ‘Playworker’ in SOC 2010 and code ‘6121’ Nursery nurses in SOC 2000 became ‘Nursery nurses and assistants’ in 2010 (Table 2). The change to ‘Playworker’ could mean a broader category. In which case, this change is likely to be problematic for analysing childcare for preschool

children since not all 'Playworkers' are involved with working with children under five years of age. Nursery nurses have now gained assistants and so are now a broader category. However, although the job title changed, the text describing the occupation made it clear that the same people were to be included in 2000 and 2010. The SOC code '6122: Childminders and related occupations' has improved from SOC2000 (when it was labelled 'other childcare and related occupations') because it now includes explicit reference to childminders. However, it still includes a large range of other occupations such as nannies and au pairs. It would be more useful for users of these data if the SOC could be coded so that childminders becomes a category on its own and if nannies could be distinguished from other forms of childcare. This is because nannies and au pairs differ from childminders in the nature of their work and they are not legally required to be registered with Ofsted (Simon, Owen, and Hollingworth 2016). Indeed there are discrepant numbers in the LFS compared with Ofsted about the numbers of childminders working in this occupation. For example, in 2014 in England, Ofsted report 53,000 registered childminders and the LFS report 100,916. This compares in 2008 with 61,929 reported in Ofsted and 102,964 in the LFS. The decline between 2008 and 2014 in childminders is greatest in the Ofsted statistics. This difference is likely to be a result of the variation in the way 'childminders' are defined between the two sources (e.g., the inclusion of 'related occupations' in the LFS); the decline between 2008 and 2014 in childminders reported in both sources could indicate a rise in unregistered (illegal) childminding (Simon, Owen, and Hollingworth 2015).

Table 2. Comparing the preschool 'childcare' workforce codes in SOC 2000 and SOC 2010.

SOC2000 code	SOC2000 label	SOC2010 code	SOC2000 label
6121	Nursery nurses	6121	Nursery nurses & assistants
6122	Childminders and related occupations	6122	Childminders and related occupations
6123	Playgroup leaders/assistants	6123	Playgroup workers

There are some important implications of leaving out both Nursery teachers and managers from the childcare workforce. Previous research suggests teachers and managers are likely to be better qualified and paid than other childcare workers in the sector (Simon and Owen 2007) and by not including them, average levels of pay (and possibly qualification levels too) may be underestimated. This problem is especially relevant in relation to other statistics of the childcare workforce. For example, the CEYPS, which reports pay for different levels of seniority of childcare staff; pay for different grades of staff is much more useful for provider organisations than just a flat level of pay for childcare workers. The ASHE similarly uses the SOC to classify and count occupations. Therefore, it has similar advantages and limitations as discussed above with the LFS. As these examples show, the SOC therefore counts some but not all childcare workers. This is a major drawback considering government policy announcements about education and care of children combined (Childcare Act 2006).

Unlike the LFS, the CEYPS is information provided by employers in childcare establishments. This means it will only provide information about those workers employed by childcare providers but excludes some other types of childcare worker such as nannies or au pairs. In contrast, the LFS provides data reported by employees and the LFS does not entirely agree with the CEYPS in terms of the workforce numbers, characteristics and pay (Simon, Owen, and Hollingworth 2016). For

example, while the CEYPS (2013) shows an increase in childcare workers between 2008 and 2013, followed by a decrease between 2011 and 2013, the LFS suggests a decrease of 5% for the childcare workforce in Great Britain (GB) over time from 2005–2007 to 2012–2014 (Table 3). However, taking England alone, the LFS reports a decline of approximately 1% (Table 3).

Taken together, the information presented here shows that the LFS is the best source for providing detailed information about the characteristics, pay, qualifications and working conditions for the childcare workforce. However, the LFS does not allow education to be counted with childcare which is a major drawback for comparing to other European countries which commonly report education and care together.

Table 3. Comparing the preschool ‘childcare’ workforce size reported in the FRS and CEYPS in England, 2005–2014.

Data-set	Year	Geography	Size	% change
Childcare and Early years Providers survey	2008	England	264,900	1
	2011	England	297,600	
	2013	England	254,200	
	Total		816,700	
Labour Force survey	2005–2007	Britain	329,372	5
	2008–2010	Britain	328,419	
	2012–2014	Britain	313,127	
	Total		970,918	
	2005–2007	England	282,449	1
	2008–2010	England	285,436	
	2012–2014	England	273,842	
	Total		841,727	

To what extent do existing data provide a good picture of usage and provision?

The LFS and CEYPS provide very good up-to-date information about the qualifications, pay and working conditions of the ‘childcare’ workforce. For example, the LFS shows that in 2012–2014, 13% of this group had a degree level qualification or above, 73% of childcare workers had NVQ level 3 or higher (Simon, Owen, and Hollingworth 2015). While NVQ 3 only remains in use in Wales and Northern Ireland and has been replaced by the Early Years Educator and Early Years Teacher Status qualifications in England, NVQ levels are reported here because they are the common units for qualifications used in the LFS. The pay for the childcare workforce was about 10% above the minimum wage (Simon, Owen, and Hollingworth 2015). The LFS also shows the ‘childcare’ workforce had very low pay – on average only 10 pence above the national minimum wage for the UK (Simon, Owen, and Hollingworth 2016). While the LFS enables examination of overall qualification levels, such as the percentage increase in qualifications to at least NVQ level three, which remains a key government target (DfE 2013c), it does not provide any data about relevant childcare qualifications. Data on specific qualifications such as the graduate-level ‘Early Years Professional Status’ qualification would be beneficial for making assessments about increases in quality of the workforce because it would not only provide an indication of whether qualification levels were rising, but also to what extent people employed in the childcare workforce were gaining key target qualifications which offer specific quality rated training in the field.

The Department for Education in England also produces annual statistics on early years provision for children under five years in the maintained, private, voluntary and independent sectors in England (DfE 2014). There are many tables in this annual publication, most of which refer to 'education' staff, which are people involved in the provision of education for young children (such as staff working in primary schools or nursery classes) rather than staff providing services for the care of children (such as nannies, childminders, etc.). However, it is possible to separate statistics relating to staff that could be included within the childcare workforce and exclude tables that report solely on 'education' staff. The data reported in these statistics are collected through the Early Years Census and is therefore likely to be an undercount of children and providers. This is because only those providers with children receiving some funded early education are required to make an Early Years Census return; the Early Years census and the 'Provision for Children' publications do not provide a count of all children aged two, three or four in private, voluntary and Independent providers. A key advantage of the Department for Education in England's annual statistics on early years provision for children under five years over the LFS is that the former source provides a useful table specifying the proportion of staff employed within different provider settings with 'Qualified Teacher Status' (QTS) or 'Early Years Professional Status' (EYPS) which DfE uses to monitor changes in highly qualified staff delivering early education over time in England. In contrast, the LFS is limited to providing information about the highest levels of qualification of people working in the childcare workforce and does not differentiate qualifications relevant to the early years workforce.

Patterns of *childcare usage* were examined using the CEYSP and the FRS. The analysis on childcare usage patterns facilitated measurement of the extent to which childcare was being used by families, the types of childcare being used and details about the socio-demographic characteristics of the families using and not using childcare. For example, the use of childcare is very high (the FRS shows 68% of families were using some form of childcare), with around half of families using more than one type (FRS shows 42% of families are using more than one type of childcare, Table 3) (Simon, Owen, and Hollingworth 2015). The proportion of families using more than two types of childcare has increased over time with those using two or more types of childcare most likely to be combining care by grandparents with some form of formal service (Simon, Owen, and Hollingworth 2015).

Other research has shown the importance of *informal care* for preschool children (e.g., Rutter and Evans 2012) for understanding patterns of childcare usage. However, very little is known about the characteristics of those providing informal childcare and there is no available large data source currently providing information about patterns of informal care usage (Simon, Owen, and Hollingworth 2015). The FRS does provide a wealth of data about people receiving or providing informal care within and outside of households. However, the question asks: 'And how about people not living with you: do you/(or does anyone in this household) provide any help or support for anyone not living with you who has a long-term physical or mental ill-health problem or disability, or problems relating to old age?'. Therefore the data available are a subset of all children receiving care, those children with a long-term physical or mental ill-health problem or disability. Even if one looks at informal care from the viewpoint of the children receiving it, there are varying limitations with the available data. For example, the FRS provides information about the children receiving informal care but the FRS does not provide any information about what pay (if any) parents spend on informal care. The BSA provides information about informal care as provided by grandparents through questions such as: 'Do you ever look after your grandchild or grandchildren', and 'About how many hours a week do you spend looking after your grandchild or grandchildren'. However, the BSA stopped including questions on informal care after 2009, prohibiting any analysis of informal care post 2009. The CEYSP provides hours of informal care but only for parents in England and so cannot be analysed for other geographical areas.

A further issue is that most of the data available for examining preschool childcare provision and use are cross-sectional, which makes it difficult to track changes in how families utilise different forms of childcare related to changes in their circumstances (such as movement in and out of work for mothers). Understanding Society (US) has been utilised by other researchers to analyse patterns of informal care (Wellard 2011) but unfortunately only includes a small number of preschool children (the most recent data wave included nearly 4000 under 5s).

To what degree do the existing data provide comparable geographic coverage?

Statistics within the UK are collected at different geographical levels. Some statistics are for the whole of the UK, some are for GB (excluding Northern Ireland) and others for the constituent nations of the UK (England, Scotland, Wales and Northern Ireland). Although Northern Ireland is not included in the boundaries of GB, it is possible to include Northern Ireland in some of the data sources including the LFS and ASHE. While there is an annual publication produced by the 'Employers For Childcare Charitable Group' for Northern Ireland which reports on childcare costs in Northern Ireland, there are no regular surveys similar to the CEYSP available in Northern Ireland. For England, Scotland and Wales, the data sources are very varied in terms of their geographical coverage of GB. For examining *childcare usage*, the FRS, and US datasets provide good coverage of the UK but as discussed earlier, are not as detailed in terms of their content of childcare usage as the CEYSP. The CEYSP remains the best source for providing a comprehensive annual picture of patterns of childcare usage by parents but, being restricted to England only, these data do not allow comparisons with other parts of GB. This is a real limitation for making important comparisons with other localities. For example, it is difficult to compare available data on childcare usage for preschool children in GB with childcare usage in other parts of Europe because statistics for and by the EU or OECD are usually given for the UK as whole but the detailed data available in the CEYSP is for England only.

As discussed earlier, the LFS is restricted by the SOC in the examination of occupations, meaning it excludes managers. However, the LFS is still a very important data source for examining the 'childcare workforce'. Indeed, it is the only available data source to provide detailed information about the workforce in terms of its characteristics, pay and other working conditions for the whole of the UK. As the LFS also provides the same information for other workforces, this means the LFS can usefully be employed to compare the childcare workforce with other occupations not counted as childcare. Indeed, comparisons with 'all other occupations' reveals that childcare workers are poorly paid compared with other occupations (Simon, Owen, and Hollingworth 2015). By covering the UK, the LFS can be compared to the ASHE which also usefully provides information about pay for the childcare workforce for the UK. The CEYSP however, which is the largest survey specifically of childcare providers, and which usefully provides information about childcare managers, is restricted to England and so unfortunately cannot be used to compare with the LFS for GB.

In addition to examining major longitudinal and cross-sectional data, a number of statistical series which collect information about childcare provision in England exist. The Scottish government also publishes some more detailed statistics about qualifications for the childcare workforce. However, these data were only available between 2008 and 2010, making it restrictive for comparing trends over time and impossible for obtaining an up-to-date current picture of childcare specific qualifications for childcare workers in Scotland. In contrast with England and Scotland, very little data are collected about care workers by the Welsh government apart from the numbers of childcare workers in different settings (Care and Social Services Inspectorate Wales 2014).

Discussion and conclusions

Existing data are very good at examining formal childcare provision and usage but very weak for providing information about informal childcare for preschool children; data on the characteristics of people providing informal care for preschool children are practically non-existent and there is a real need for this information. The LFS is the best source for providing information about the characteristics, pay, qualifications and working conditions for the childcare workforce, allowing comparisons to be made over time and with other occupations, which is valuable for not only placing the childcare workers in the context of other workers but for making international comparisons about childcare provision. However, there are still notable limitations in carrying out analysis of childcare provision and usage using the available sources.

Despite having a partially integrated governance structure (where childcare and preschool education activities are nominally integrated in terms of inspection or curricular requirements – but not in terms of the workforce), the UK's statistical systems are still split between covering aspects of education and childcare, causing problems for examining the workforce as a whole. The limitations of using the SOC in the LFS mean managers are excluded and workers providing early education for preschool children cannot be 'joined up' with childcare. For childcare usage, certain important features, such as the number of hours children are being cared for informally by grandparents or other family/neighbours, are limited or absent in the data sources discussed in this paper.

Differences in geography between the available data sources also make them difficult to compare. Some sources have more extensive data coverage than others. For example, the CEYSP and CEYPS are very good in terms of their content but only provide coverage of England. The LFS, FRS and ASHE are more extensive in terms of their geographical coverage but are limited in terms of their content and/or sample size. Additionally, while English data sources provide good national data about childcare provision, Scottish sources, and in particular Welsh data, offer much less information, which makes it problematic to compare what is happening in terms of childcare provision and usage currently and over time.

There are some key factors that could improve existing data sources on childcare provision and usage. First, the development of SOC categories that would better capture the work of the ECEC workforce, joining up those working within educational settings with those working in other settings, along with the creation of a specific and separate SOC code for managers working in ECEC. This would give more value to the LFS by enabling those interested in childcare provision an opportunity for analysing detailed statistics about the pay and working conditions of the whole ECEC workforce and better comparison between the LFS and CEYPS than is currently possible. Second, more coherent statistics collected across the countries of GB is needed in order to allow comparable and comprehensive analysis between, within and across GB. Perhaps Scotland and Wales could consider, for example, running a survey with comparable questions to those asked in the CEYPS which would enable a much more detailed picture of childcare provision to be obtained than is currently possible with the existing data. Third, further research, and ideally the collection of routine statistics, capturing more information about parental childcare choices would enable research to better inform childcare policy about how to match services to need. Finally, the inclusion of questions in large-scale surveys such as the FRS on the characteristics of people providing informal childcare to preschool children would provide much needed information about how informal carers support formal childcare provision. The childcare workforce is shrinking over time in size and families are relying on informal care alongside formal services (Simon, Owen, and Hollingworth 2015). It is important to understand more about informal carers so that government policies can better understand the impact of this caring on people and society and so that policies encouraging more

women back to work can take account of the role played by informal carers in enabling this to happen.

Acknowledgements

I would like to thank the research team, Charlie Owen and Katie Hollingworth, for their invaluable contributions to the research and for their helpful comments on this paper. I would also like to thank the two project collaborators, the National Day Nurseries Association (NDNA), and the Family and Childcare Trust, and also the advisory group members, for support received throughout the project, especially Professor Peter Moss, chair of the project advisory group, for his very helpful comments on this paper, and Neil Leitch from the Preschool Learning Alliance for supporting the research. We are grateful to the Economic Social Research Council for funding this research.

Disclosure statement

No potential conflict of interest was reported by the author.

Funding

The 'Provision and Use of Preschool Childcare in Britain' study was funded by the Economic Social Research Council under its 'Secondary Data Analysis Initiative' phase I [grant number ES/K003690/1].

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Paper 2: Is the 'quality' of preschool childcare, measured by the qualifications and pay of the childcare workforce, improving in Britain?

American Journal of Educational Research, 2016, Vol. 4, No. 1, 11-17
Available online at <http://pubs.sciepub.com/education/4/1/4>

© Science and Education Publishing
DOI:10.12691/education-4-1-4



Is the 'quality' of Preschool Childcare, Measured by the Qualifications and Pay of the Childcare Workforce, Improving in Britain?

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Abstract

The purpose of this paper is to report on the changing qualifications, pay and working conditions of the British childcare workforce between 2005 and 2014. This is in order to contribute to current debates on the 'quality' of childcare provision for preschool children. The theoretical framework for this study draws upon concepts of 'quality' in childcare, to discuss the argued importance of increasing access to and raising standards of childcare for children's cognitive development, for women's labour market participation and for reducing poverty. The analysis comes from an ESRC funded study entitled 'Provision and use of preschool childcare in Britain'. This paper focuses on examination of childcare provision by the formal childcare workforce and presents results from a secondary analysis of the UK's Labour Force Survey, Childcare and Early Years Providers Survey, Annual Survey of Hours and Earnings, and Ofsted registration data. The 2005-2014 results show a highly gendered (98% female), low valued workforce in which qualifications are modestly rising (12% increase over time in NVQ level 3) but persistently low paid (on average £6.60 per hour) compared with other occupations (£13.10 per hour). The study also finds a shrinkage in the childcare workforce - of around five per cent in Britain since 2005 (from 329k in 2005-07 to 313k in 2012-14) – and more people describing themselves as childminders in the LFS than are registered with Ofsted, suggesting a possible growth in illegal childminding. The implications of these findings raise questions about what the British childcare workforce will look like in the future, who will do childcare work in the future, and whether it is possible to achieve 'good quality', 'affordable childcare' and 'decent pay' for British childcare workers. These issues are important for the future regulation of the British 'childcare' workforce and policy development in this vital area.

Keywords: childcare, early years, qualification, low pay, childminder, workforce

Introduction

Childcare is very high on the UK government's agenda. In 2011, the Department for Education (DfE) and the Department of Health (DH) jointly published a major strategic document, *Supporting Families in the Foundation Years*. The strategy renewed the UK government's commitment to the fundamental importance of the early years, acknowledged the need for greater investment, and recognised the importance of a well-qualified workforce for the provision of 'good quality, affordable childcare' for children. While qualifications had been linked to quality of childcare provision, little was known about how qualifications had been changing in Britain, especially since the qualifications review by Nutbrown in 2012 calling for increases for all staff, including childminders and playworkers. To contribute to current debates on the 'quality' of childcare provision for preschool children, this study carried out a secondary analysis of large-scale UK datasets to identify the occupations that make up the childcare workforce, and to examine their demographic characteristics, qualifications and work patterns. By carrying out this analysis we wanted to find out if the 'quality' of preschool childcare, measured by the qualifications and pay of the childcare workforce, was improving in Britain.

Literature Review and Conceptual Framework

Over the last 30 years maternal employment has been increasing within industrialised countries, with different national responses to the need for the increased childcare; some countries saw childcare as a state responsibility (e.g., Sweden, Norway) while others believed childcare was a private concern and gave little public funding (e.g., USA) [1]. In the UK, 'childcare' is a marketised system that embodies neoliberal rationality, making it the private responsibility of parent-consumers [1,2]. Current UK government policy is the provision of 30 free hours childcare for employed parents with children aged three and four years [3].

In Europe, government policy has focused on raising standards of Early Childhood Education and Care (ECEC), which has been considered the key vehicle for tackling social problems and reducing poverty (e.g., 2,4). Formal childcare for preschool children for example has a number of reported benefits, including allowing mothers to take up paid work [5,6,7]. There are also reported long term cognitive and emotional benefits for children for being in childcare [8]. For example, in his review of the impact of quality of childcare upon preschool children's development in 2004, Melhuish concluded that 'children who attended higher-quality childcare provision make better academic progress' [9], pp.7]. Nevertheless, some recent evidence from the USA has suggested that maternal employment in the first year may have some negative effects [10].

Enshrined in British ECEC policies is the belief that 'quality' matters [11]. However, while often assumed to be a universally understood concept, 'quality' is problematic to define and measure [12]. A feature of 'good quality' childcare that is often discussed is the qualification level of childcare staff [13]. Yet there are longstanding concerns in Britain about the low level of qualifications in this sector [1,14]. Ongoing concerns over the childcare workforce qualification levels in England led to a review of existing staff qualifications and a number of recommendations including ensuring all staff counted in DfE staff: child ratios are qualified at level three by September 2022 [15].

In the context of these debates around ECEC provision quality, we carried out a secondary analysis study aiming to examine the provision and use of preschool childcare in Britain. Drawing on the theoretical concept of 'quality' in childcare discussed above, this paper addresses three key questions from our analysis of the childcare workforce from 2006 to 2014: 1) 'Which occupations make up the childcare workforce and what is their size?', 2) 'What is the gender and age profile of this workforce?' And 3) 'What is the average qualification level, rate of pay and turnover rate for

childcare staff in Britain?'. In addressing these questions, this paper presents analysis of the current picture for the workforce as well as some trends over time (between 2005 and 2014). While much British government rhetoric speaks of joining 'education' with 'care' the historically complex patterns of childcare provision in the UK [1] means it is near impossible to find UK data covering the whole of the ECEC workforce. The analysis reported here therefore takes a pragmatic approach, focusing on the childcare in ECEC in Britain, excluding school-based education services.

Materials and Methods

The main aim of the study on which this paper draws was to inform understandings of the future shape of childcare provision and usage in Britain through carrying out a secondary analysis of a number of large-scale, quantitative datasets that provide information about childcare. Our project included three analysis modules on: childcare usage, childcare provision and informal caring for preschool children [16].

To address the research questions posed in this paper, we examined the Labour Force Survey (LFS), the Annual Survey of Hours and Earnings (ASHE), the Childcare and Early Years Providers Survey (CEYPS) and data on childminders collected by the Office for Standards in Education, Children's Services and Skills (Ofsted), the childcare regulation body.

The LFS is a national survey of private households in the UK and the largest of the government's regular household surveys, collecting data from approximately 60,000 households per quarter, classifying jobs by content and the required skill level [17]. It uses the 4-digit Standard Occupational Classification (SOC) for main and second jobs for coding occupations [18]. This can be used to identify those in childcare occupations. We included three individual occupations classified together as 'Childcare and Related Personal Services': 'Nursery nurses & Assistants' (code 6121), 'Childminders & related occupations' (code 6122) and 'Playworker' (code 6123). These were analysed, both separately and together, as childcare occupations. To increase sample size, three years of LFS data were combined: 2005 to 2007, 2008-2010, and 2012-2014. In each case, data from the first quarter of the survey (January to March) were used. 2011 was not included because the variable formats were not backwards compatible. Additionally, we compared childcare workers to 'other occupations' which is a group we derived consisting of all other occupations included in the SOC.

The ASHE is a UK-wide one percent sample from the HM Revenue & Customs 'Pay-As-You-Earn' (PAYE) records: employers are asked to provide data on their employees [19]. It includes about 180,000 employees a year. It includes SOC coded occupation information as well as the gender of the employee. The ASHE was compared with LFS estimates on hours and earnings of the childcare workforce. We analysed data for each survey year between 2006 and 2012.

The CEYPS is a survey conducted for the DfE.

Consequently it is restricted to England. It collects a wide range of information about childcare and early years provision, most recently in 2013 [20]. The survey includes group based provision, out of school provision, childminders and early years settings in maintained schools. We used this survey to examine the ECEC workforce in England in more detail; the CEYPS provides information on turnover, qualifications and pay. We compared these data with those from the LFS (England cases only). We analysed data for each data year between 2008 and 2013 (there was no survey in 2012).

Most childcare providers caring for children aged below eight years of age in England must register with Ofsted unless the law says they are not required to do so. Childcare providers not required to register with Ofsted may choose to do so by joining the voluntary part of the Childcare Register

(VCR). Every six months, Ofsted publishes statistics on the number of registered providers. Childminders are identified separately, but other childcare occupations are not, meaning other categories of childcare worker we have analysed in the LFS cannot be compared directly with Ofsted. Nannies and au pairs are not required to be registered with Ofsted so Ofsted statistics will underestimate their numbers. We compared Ofsted statistics for 2008 and 2014 with the LFS.

The ECEC workforce is, for historic and structural reasons, difficult to classify, count and characterise as a whole. While it would have been preferable to present a 'joined up' approach in the analysis that follows, merging early education with childcare, this has not been possible because most data sources still divide education and childcare in terms of the way they classify this workforce. We have therefore had to take a pragmatic approach led by the information available in the data we could access.

Unlike the CEYPS, the LFS does not cover ECEC as it is commonly understood in the British context, grouping together childcare and nursery education [21]. For example, the SOC unit group 'Nursery nurses &

Assistants' includes job roles such as nursery officer, preschool assistant or crèche helper but nursery teachers are not grouped here but are instead counted together with primary teachers. As nursery teachers cannot be distinguished from primary teachers, it is not possible to include them in our definition of the childcare workforce. The SOC also doesn't include a specific category for childcare managers; Nursery managers and owners are assigned to the SOC unit group 'Teaching professions not elsewhere classified' [20], which includes jobs not part of this workforce.

Results

4.1. Which Occupations Make up the Childcare Workforce and what is Their Size?

4.1.1. Workforce Size

The British childcare workforce decreased over time by five per cent between 2005 and 2014;

Occupation name (SOC 2010)	Numbers: 2012-14	Numbers: 2008-10	Numbers: 2005-07
Britain:			
Nursery nurses & assistants	170,490	156,152	157,991
Childminders & related occupations	113,427	123,488	118,420
Playworkers	29,211	48,779	52,962
Total	313,127	328,419	329,372
England	273,842	285,436	282,449
Scotland	25,982	29,476	31,256
Wales	13,304	13,507	15,668

Table 1. Population sizes (Britain, England, Scotland & Wales)

Scotland has had the largest decline, followed by Wales and England (See Table 1). Within the British childcare workforce, the number of nursery nurses and assistants has increased over time, and the number of playworkers decreased over time (See Table 1). The childminders and related occupations increased in size between 2005-07 and 2008-10 but then decreased later in 2012-14 (See Table 1). Both the LFS and the CEYPS suggest shrinkage in the workforce since 2008. However,

while the CEYPS (2013) for England reports a one per cent decrease in the childcare workforce between 2011 and 2013, the LFS for Britain suggests a decrease of five per cent over time (Table 1). At first glance, these two sources appear discrepant. However, taking the LFS figures for England alone, we also find a decline of approximately one per cent (the LFS reports a drop of 8,607 between 2005 and 2014 for England).

Ofsted figures show a decline in numbers of childcare providers registered (compulsory or voluntary) with Ofsted, especially for childminders: Ofsted reports a decline of nearly eight per cent (See Table 2). The LFS also reports a decrease between 2008 and 2014 but only of nearly four per cent (England only, see Table 2). The difference (of 3%) can mostly be explained by the fact the Ofsted figures are only capturing information about members of the workforce who register with Ofsted. However, the LFS workforce numbers do not agree with statistics published by Ofsted for childminders. Although there was a decline in the number of 'home childcarers' registering between 2013 and 2014, before that there has been a steady increase in voluntary registrations for this group. This pattern could reflect an uptake in employer related benefits such as childcare vouchers which can only be redeemed by parents who use registered childcare. These findings more likely suggest a possible growth in illegal (unregistered) childminding.

Number of childminders in England	Ofsted	LFS
2008	61,929	108,888
2014	53,000	100,916
Total	114,929	209,804
Difference	8% (8,929)	4% (7,972)

Table 2. Childminder numbers in Ofsted statistics and in the LFS

4.2. What is the Gender and Age Profile of This Workforce?

Childcare workers are young relative to other occupations (with a mean age of 36 years compared to 41 years for other occupations); nursery nurses & assistants are the youngest (34) followed by playworkers (37) and childminders and related occupations (38). Despite drives to increase men in nurseries [22], the overall childcare workforce is overwhelmingly female (98%) compared with other occupations (46%), and hasn't changed at all between 2005-14 or from that found previously [14]. Over half (62%) of the childcare workforce is married or living with a partner; 30 per cent are single, which is slightly higher than for other occupations (of whom 23% are single). Within the British childcare workforce, a higher proportion of childminders and related occupations are married or living with a partner (66% compared with 60% of nursery nurses and assistants or 57% of playworkers).

4.3. What is the Average Qualification Level, Rate of Pay and Turnover Rate for Childcare Staff in Britain?

British childcare workers are poorly paid compared to other occupations (earning on average ten pence per hour above the National Minimum Wage level in 2014 in the UK for those aged 21 years or over (See Table 3). Hourly pay is generally higher for British childcare workers employed in the non-private (public and voluntary) sector but differs according to the childcare occupation (See Table 3). Average gross pay for the British childcare workforce increased over time from £8,586 gross per annum in 2005-07 to £10,324 gross per annum in 2012-14 but £8,586 expressed in 2013 prices equates to £10,839 so wages have actually decreased in recent years.

Relative to inflation earnings increased slightly from 2005-2008 and then declined between 2008-10 to 2012-14 when recession took hold (gross annual earnings after inflation declined for all occupations on average from £26,508 to £24,129 between 2008 and 2014 – in 2013 prices). Between 2008-10 and 2011-14, the childminders and related occupations group saw their earnings increase and only in the private sector (in 2013 prices, see [Table 3](#)); play workers saw the biggest decrease in their wages (of £2,830 in the private sector), which is at least in part related to their decrease in hours (See [Table 3](#)).

	All Childcare workers	Nursery Nurses	Childminders and related occupations	Playworkers	Other occupations	National minimum wage 21 years and over (35 hours per week)	Living wage: UK (35 hours per week)
Average gross annual earnings	£10,324	£10,647	£ 11,474	£5,801	£24,128	£11,830	£14,287
Average usual hours	32	31	40	19	42	/	
Average usual gross earnings per hour	£6.60	£6.40	£6.10	£8.00	£13.10	£6.50	£7.85
Average gross earnings per hour: private sector	£5.60	£5.60	£6.20	£5.50	£12.69	/	
Average gross earnings per hour: non-private sector	£7.80	£7.60	£5.80	£9.70	£13.70	/	

Table 3. Childcare workers: average earnings and hours, LFS 2012-14, in pounds sterling

The ASHE provides higher earnings estimates than the LFS for each occupation in the British childcare workforce; the difference between the two data sources in estimated wages is highest for the playworkers (See [Table 4](#)). There are some important differences that could explain differences between the earnings estimates between the LFS and ASHE. First, because the ASHE comes from the 'Pay As You Earn' (PAYE) register, it does not include the self-employed or those below the PAYE threshold, and these will be included in the LFS. This is an important difference for childcare workers since in the LFS for 2012-2014 64 per cent of childminders described themselves as self-employed, compared to 15 per cent of all workers. Also, while the LFS data is reported by workers, the ASHE data is supplied from employers. It is possible therefore that the two surveys do not entirely agree on what the job involves, including the pay and hours involved. Finally, while the LFS estimates in table two are for Britain, those in the ASHE are for the UK.

	LFS (GB) 2012-2014	ASHE (UK) 2012	Difference (ASHE-LFS)
Nursery nurses	£10,647	£11,983	£1,336
Childminders and related occupations	£11,474	£13,041	£1,567
Playworkers	£5,801	£7,926	£2,125

Table 4. Comparing mean gross annual pay between the LFS & ASHE, 2012-2014, in pounds sterling

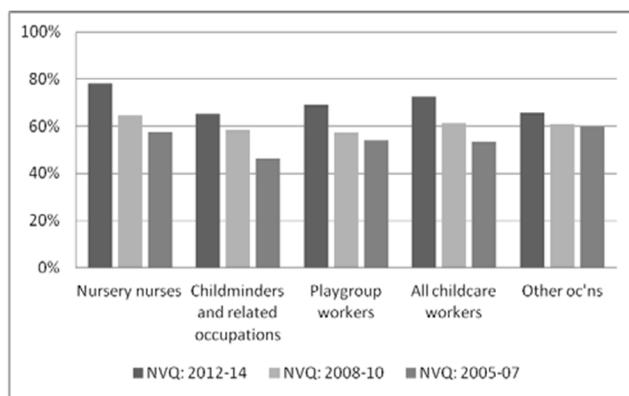


Figure 1. % of childcare workers with NVQ level 3 or higher (2005-07 to 2012-14) in the LFS

The LFS reports around 73 per cent of British childcare workers now have National Vocational Qualification (NVQ) level 3 or higher, which represents a 12 per cent increase over time (See Figure 1). This shift has been particularly dramatic for nursery nurses and assistants, of whom 48 per cent now have NVQ level 3. While many European countries require staff working with preschool children to be educated to tertiary level (Bachelor's level), the UK is one of 10 European countries that does not require this [23]. Only thirteen per cent of childcare workers are educated to degree level or above compared to over 33 per cent of other occupations (LFS 2012-14).

The LFS reports two-thirds of the British childcare workforce is reported as working in the private sector in 2012-14; of those in the non-private sector, over half are employed in local government. There has been a shift towards a greater proportion of the British childcare workforce employed in the private sector (from 65% in 2005-07 to 74% in 2012-14), with the greatest change for the nursery nurses (9% more working in the private sector in 2012-14), followed by the childminders and related occupations (6% more working in the private sector in 2012-14) and the playworkers (3% more working in the private sector in 2012-14).

The LFS reports stability in turnover between 2005-07 and 2012-14. Turnover can be examined in the LFS through a variable asking employees how long they have been continuously employed in their current job. In 2012-14, British childcare workers reported being continuously working in their current job on average for five years and seven months (5 years 3 months in 2005-07) - similar to that reported in the CEYPS (6y 7m in 'Full day care settings'). These mean length employed estimates are higher than for other occupations (3 years on average in the LFS for 2012-14). The CEYPS also reports annual turnover rates of between 12-16 per cent between 2006 and 2013. These are lower than previously found for this workforce – a rate of 22 per cent was reported in 2001 for nursery workers in England [24]. While average hours worked did not change over the time period we examined, the proportion working full-time did change for some of the individual occupations. For example, while three per cent more of the childminders and related occupations were working full-time in 2012-14 than in 2005-07, nine per cent fewer of the playworkers were working full-time in 2012-14 than in 2005-07.

Discussion

Using the SOC, we defined the childcare workforce as including three occupations within LFS data: 'Nursery nurses & Assistants', 'Childminders and related occupations' and 'Playworkers'. However, this classification of the workforce does not capture all workers within ECEC, particularly nursery

nurses and assistants working in school settings and nursery managers. There are some implications with leaving out nursery teachers and nursery managers. As teachers are better qualified and paid than others in the ECEC sector [14], not including them is likely to underestimate the average level of pay (and possibly also the qualification level). However, as ‘neither teachers nor managers constitute a large proportion of the childcare workforce’ [21], pp. 101], the impact of excluding them is likely to have been minimal when considering the whole childcare workforce. Nevertheless, we think the SOC could benefit from a review to consider including a new code for managers working within and across ECEC.

The difference of around three per cent between Ofsted registration statistics and the LFS of people working as childminders means that more people are reporting working as childminders than are currently registered with Ofsted. As registration is a legal requirement for childminders in England, the discrepancy in the number of childminders between the two data sources suggests illegal childminding may be taking place (practice without registration). If this is the case, and people are working unregulated as childcare workers in England, this finding raises important questions about why this is occurring – is it cost driven or related to problems with registration? It seems plausible that some people may be confused or ignorant about the requirement to register with Ofsted and that raising public awareness about the registration rules and perhaps making the registration process simpler may address this discrepancy.

The increase in qualification levels noted earlier suggest British policy initiatives to professionalise the workforce through increased qualification have been modestly successful at upskilling the British childcare workforce to the recommended levels. This is a positive finding in relation to the debates around the importance of quality in ECEC and the reported links between ‘quality’ and well qualified childcare staff [14]. Low pay however, continues to be a feature of the British childcare workforce. A recent report by the Low Pay Commission reported 41 per cent of the UK childcare sector is paid less than £7 per hour [25], which supports our analysis of the LFS suggesting childcare workers are still poorly paid compared with other occupations. This feature of low pay could in part be attributed to the predominately female and young age profile of the workforce. However, another reason for this the low pay of the childcare workforce is due to the fact the childcare system is marketised, making it the private responsibility of parents, not all of whom can afford the rising cost of childcare in Britain [26]. A recent report for example found that the price of childcare has continued to rise at levels above the rate of inflation and argued that “for too many families it simply does not pay to work” [26], pp.3].

Conclusions

The purpose of this paper was to report on the changing qualifications, pay and working conditions of the British childcare workforce between 2005 and 2014. This paper uniquely brings together analysis from several large-scale datasets to address three key questions about the British childcare workforce from 2005 to 2014 in order to inform understandings of the future shape of childcare provision: 1) ‘Which occupations make up the childcare workforce and what is their size?’, 2) ‘What is the gender and age profile of this workforce?’ And 3) ‘What is the average qualification level, rate of pay and turnover rate for childcare staff in Britain?’. These questions matter because they are posed at a time when much public policy and media debate surrounds how ‘quality’ of childcare provision, as measured by workforce qualification levels, can be improved whilst making childcare affordable for parents who are struggling to afford childcare fees, especially in a time of austerity in Europe.

Employment in childcare may offer people working in the childcare sector other nonfinancial benefits such as satisfying work and the opportunity for part-time employment that can be combined with family life. These factors may explain the long periods of service among workers we found in the LFS and CEYPS, given the low pay. It is important to note that the period of analysis we examined coincides with the recession, growing youth unemployment and job cuts in the public sector in the UK. This means alternative job opportunities may have been reduced for young women working in the childcare workforce. The lack of alternative work opportunities for young women is not an unchangeable condition and in future, low pay may act to limit recruitment and retention of the childcare workforce and its upskilling. We would argue that an urgent review of pay for British childcare workers should be undertaken, especially in light of current underfunding from the 'free childcare policy' [27] which means childcare places are likely to be difficult to fund by childcare providers. Indeed, it is likely that funding will need to be increased in the future to cover the increasing cost of providing these free places [28].

As we have discussed earlier, there are important inherent contradictions in the current British childcare system between making childcare the private responsibility of parent-consumers who are restricted in what they can pay and yet the demand for high 'quality' childcare which depends on highly qualified staff. The childcare system is over-reliant on private funding sources, especially parental fees and demand-side funding [1,2]. While good, quality, childcare for all remains a key goal for British public policy, these contradictions in the childcare system are very likely to make it problematic to achieve improved 'quality' of childcare provision (through raising qualifications levels of childcare staff) and 'affordability' of childcare provision for parents and 'decent pay' for childcare workers, which is an important incentive for the future recruitment and retention of the childcare workforce.

Acknowledgement

The 'Provision and Use of Preschool Childcare in Britain' study was funded by the Economic Social Research Council under its 'Secondary Data Analysis Initiative' phase I, grant number ES/K003690/1. We would like to thank the ESRC for funding this study. We would also like to thank our two project collaborators, the National Day Nurseries Association (NDNA), and the Family and Childcare Trust, and our advisory group members, especially Professor Peter Moss, for the helpful comments we received from them throughout the project.

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List of Abbreviations

Annual Survey of Hours and Earnings (ASHE)

Childcare and Early Years Survey of Parents (CEYPS)

Department for Education (DfE) Department of Health (DH)

Early Childhood Education and Care (ECEC) Labour Force Survey (LFS)

National Vocational Qualification (NVQ)

Office for Standards in Education, Children's Services and Skills (Ofsted)

Pay As You Earn (PAYE)

Standard Occupational Classification (SOC)

The Organisation for Economic Co-operation and Development (OECD)

Voluntary Childcare Register (VCR)

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Paper 3: Is targeting formal childcare the best way to meet the needs of families in Britain?

Abstract

The overall aim of this paper is to examine the types and combinations of childcare being used by parents in Britain, and to compare how this childcare usage may vary between families, in order to critically examine parental childcare needs. The three specific research questions were: 1) 'What types and combinations of childcare are being used by families?', 2) 'What are the socio-demographic comparisons between families using and not using childcare?' And 3) 'How do types of childcare vary between families?'. These questions were addressed by carrying out a secondary analysis of large-scale nationally representative datasets which provide information about patterns of childcare usage in the UK. Two main datasets were used: the Family Resources Survey and the Childcare and Early Years Survey of Parents, with analysis carried out for the years 2008 to 2013. The analysis carried out comes from a wider study seeking to examine the provision and use of preschool childcare in Britain. The findings show that despite policies to increase the use of formal childcare, parents continue to be reliant on informal care, especially grandparents, to supplement their childcare needs. Furthermore, childcare use is not equally distributed, but is related to family circumstances. For example formal care is used more by employed, higher income families, whilst informal care is used more by mothers who are not employed, less well educated and by younger mothers. The results overall suggest that formal and informal childcare in combination will better support maternal employment. Future government policy needs to address supporting this mixed provision. The data however says nothing about parental childcare preferences which are needed to unpack the observed patterns of childcare usage in the UK.

Keywords: early childhood education, childcare, early childhood policy, secondary analysis

Introduction

From September 2017 the UK government will implement plans to provide 30 hours 'free' *formal* childcare to all families with three and four year olds, supported by research that good quality affordable childcare is key to encouraging women back into employment. These childcare policies are based on an assumption that formal (usually paid for) services are key to achieving the desired educational and development outcomes for young children. However, recent evidence suggests children in the UK do not have access to childcare of a sufficient standard to achieve desired developmental outcomes [1].

This paper contributes to these important debates through examining patterns of childcare use for different families in Britain. By carrying out this analysis we wanted to find out what childcare was being used in Britain in order to inform debates surrounding the impact of targeting government resources towards only formal childcare provision.

Literature Review and Conceptual Framework

In the UK, 'childcare' is a marketised system that embodies neoliberal rationality, making it the private responsibility of parent-consumers [2]. Uptake of formal childcare is reported to vary considerable according to income group across European countries, with the least use by families in the lowest income quintile (the poorest) - for the UK, 20% of children up to 3 years of age cared for in formal care come from the lowest quintile, which increases to 53% of children in the highest income quintile [3]: 38]. OECD data show that public expenditure on childcare in the UK was 0.5% of GDP on early childhood services compared to 0.7–1.1%

in the Nordic countries with higher maternal employment levels and lower levels of child poverty [4].

Despite the different way in which childcare is provided in the UK (through market forces rather than a state service), the UK government remains committed to supporting 'good quality, affordable childcare', with the emphasis on the value of formal preschool childcare, not least because children's access to good quality affordable childcare reduces their long-term risk of poverty [1]. For example, a report laying out plans for an expansion of childcare describes its benefits as follows: "More great childcare is vital to ensuring we can compete in the global race, by helping parents back to work and readying children for school and, eventually, employment. And it can help build a stronger society, with more opportunities for women who want to work and raise children at the same time, and better life chances for children whatever their background". [[5]: 6].

To achieve the goals above, in June 2015, the UK government created the Childcare Implementation Taskforce December 2015 to increase provision of free childcare and in December 2015 the Childcare Bill set the government's election manifesto commitment to giving families where parents are working (at least 16 hours per week) an entitlement to 30 hours of free childcare for their three-and four-year olds [6]. This free childcare place entitlement will be fully implemented in September 2017. Additionally, in November 2015 the government announced it would invest an extra £1 billion per year by 2019-20 in the early education entitlements [6]. The impetus behind these childcare policies is an economic one: to increase maternal labour market participation and support parents to work more hours by improving the affordability of childcare, especially for those not currently using childcare because of a perceived cost barrier.

This ideology was set out in the government document 'Fixing the Foundations: Creating a more prosperous nation' in which it was stated that there are too many people for whom there are unfair or distorting barriers to work, including women whose high levels of skill are too often underused [7]. However, while use of childcare has risen over the past 30 years in line with increased female labour participation, the uptake has not just been of formal childcare. Moreover, recent evidence suggests much of the rise in the use of formal childcare since 1999 has been in part-time places and that consequently some of the rise in childcare reflects informal childcare being used in conjunction with formal childcare [8]. It was this combination in childcare use by parents and/or carers that we were interested in exploring further and on which we discuss the key findings for in this paper.

Materials and Methods

The overall aim of this paper is to examine the types and combinations of childcare being used by parents in Britain, and to compare how this childcare usage may vary between families, in order to critically examine parental childcare needs. The paper reports on part of a wider secondary analysis study 'The provision and use of childcare in Britain' examining national statistics between 2005 and 2014. This paper sets out to address three specific research questions: 1) 'What types and combinations of childcare are being used by families?', 2) 'What are the socio-demographic comparisons between families using and not using childcare?' And 3) 'How do types of childcare vary between families?'. We did this by carrying out a secondary analysis of large-scale nationally representative datasets which provide information about patterns of childcare usage in the UK.

The datasets we used were the Childcare and Early Years Survey of Parents (CEYSP) and the Family Resources Survey (FRS) between 2006 and 2011 (the latest year available at the time of carrying out this analysis). While the FRS covers the whole of the UK, the CEYSP covers England only. This means geographical coverage between the two data sources is

not consistent. However, both sources are useful (in different ways) for examining childcare usage (more discussion about the strengths and weaknesses of using these datasets is described elsewhere, [9]).

For the FRS, just under 4,000 cases of families with children aged 0-4 years were identified for each survey year from 2008 through to 2013. These were sufficient sample sizes for some year on year analysis without needing to combine survey years. Children could be using more than one type of care, so for the questions concerned with the types of childcare used, the analyses were conducted at the 'childcare level'. For example, the proportion of all childcare that is grandparent care - rather than the proportion of children being looked after by grandparents. For other questions concerned with comparing the demographic characteristics of mothers using and not using childcare, the analysis was conducted at the 'child level'. For example, the proportion of preschool children with mothers qualified to degree level or above.

The CEYSP study aims to provide information to help monitor the progress of policies and public attitudes in the area of childcare and early years education in England. The data provide detailed information about what childcare is used by different types of families through two sets of data: family-level information about childcare used by all children in the sampled addresses and child-level information about a randomly selected child within that address.

This randomly selected child is selected at the sampling stage. The main difference between the two CEYSP samples is that the selected child is the focus of the detailed childcare section of the questionnaire. Our analysis used the data for the selected child rather than the 'all family' dataset because it provided more detailed information about childcare. Around 3,000 cases per survey year provided information about the randomly selected children aged 0-4 years between 2008 and 2013. The child weight variable from the dataset was used to gross the sample to represent the population.

We aimed to explore the types and combinations of childcare families use, to compare the socio-demographic characteristics of families using childcare with those that have preschool children, but who do not make use of childcare, and to examine variations in childcare types being used. These analysis themes are addressed in turn in this paper before discussing the implications of these findings for future childcare policy development. The interest in comparing families using and not using childcare is in order to inform understandings about what may encourage take-up of childcare in the future and where resources for childcare may be best placed.

Results

4.1. What Types and Combinations of Childcare are Being Used By Families?

The FRS showed in 2012-13 that 68% (2,462) of families with children aged 0-4 years were using some form of childcare (consistent proportion across the other survey years). For the same year, the CEYSP reports 89% (2,382) of children aged 0-4 years were in some form of childcare. Around half of families used more than one type of childcare (the FRS for 2012-13 showed 42% of families used more than one type of childcare, [Figure 1](#)). The single largest category of usage by families was care by grandparents (FRS 2012-13 showed 31% of all usage is by grandparents). Families combining different types of childcare typically used grandparents plus some formal provision. These findings support research by Bryson et al. [8] suggesting that formal childcare is not being used instead of informal care but rather that formal childcare is being used in combination with informal childcare.



Figure 1. Comparing childcare that comprises one source or multiple sources (e.g., grandparents, with different types of formal provision), in percentages (CEYSP 2008-12 Department for Education 2014)

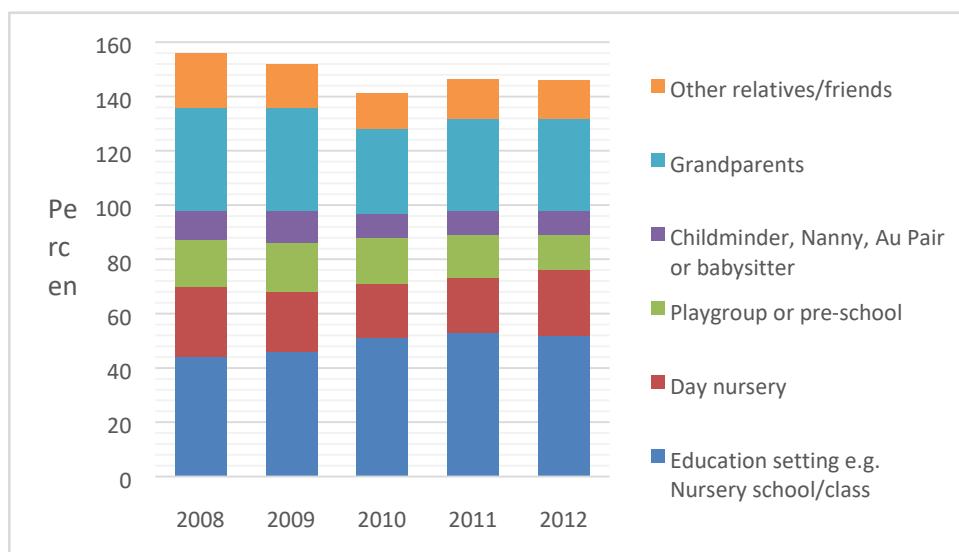


Figure 2. Types of childcare used by families with preschool children (FRS, 2008-12)¹

¹ Day nursery or crèche is a category given in the FRS and not our title.

After grandparents, 'education or other formal childcare setting' was the highest proportion reported being used by parents/carers in the FRS (22% in 2012-13). 'Education or other formal childcare setting' is a category we have created using the following given categories in the dataset: "Nursery school"; "Infant school (Reception)"; "Infant school (Nursery)"; "Primary school (Reception)"; "Primary school (Nursery)"; "Out of school club"; "Holiday scheme"; "Family/combined centre"; "Boarding school". A quarter of all childcare used was 'Playgroup or pre-schools' (14%) or 'Day nursery or crèches' (13%) and only six per cent of childcare was a 'childminder & nanny/au pair' ([Figure 2](#): the percentages add up to more than 100% because the childcare options are not mutually exclusive and respondents could select more than one option). These findings were consistent over time. A similar proportion of grandparents used for childcare (around a third) was also reported in the CEYP but unlike the FRS, the use of grandparents for childcare is second only to 'education or other formal childcare setting' in the percentage use.

4.2. What are the Socio-Demographic Comparisons between Families Using and Not Using Childcare?

Earlier research suggested that childcare use is associated with family work status [[10,11](#)], maternal age, maternal education and household income [[8](#)], so our analysis focused on these factors in relation to childcare usage. In line with Bryson et al. [[8](#)], we identified that childcare usage is not evenly distributed but is related to family circumstances. For example, from our analysis of the FRS 2010-11, we found that formal childcare is used more by employed, higher income families whereas informal care is used more by mothers who are not employed and by younger mothers. Couples where both partners were in employment were also most likely to use childcare ([Figure 3](#)).

4.3. How do Types of Childcare Vary Between Families?

Part-time childcare use – for 25 hours or less – varies according to hours worked by mothers, from 20% of mothers working full-time (35 hours or more per week) using more than 40 hours of childcare to four per cent of mothers working part-time using more than 40 hours of childcare. Households where the child's mother was working part-time have been found to be the most likely to be using some form of childcare [[11](#)]. Our analysis of the CEYP supports this, showing children's length of time spent in childcare increases with hours of

maternal employment and is greater in working couples (e.g., 19% usage where both are working) or for working lone families (25% usage) than for non-working families (13% usage for non-working couples and 14% for non-working lone parents). This pattern was consistent over time.

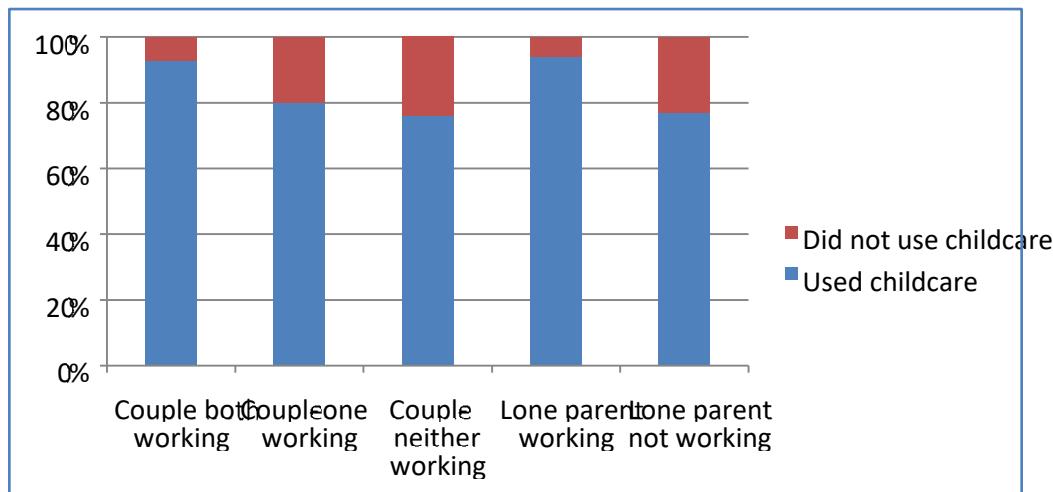


Figure 3. Childcare use by parental work status (CEYSP 2012 Department for Education 2014)

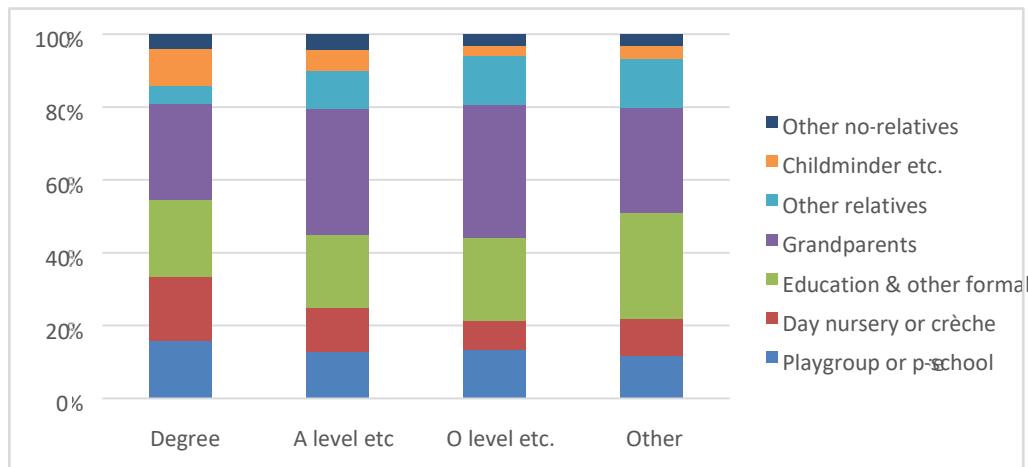


Figure 4. Types of childcare used by families with preschool children by highest level of maternal education (FRS 2012)

Analysis by Bryson et al. [8]: 75] found that “preschool children whose mothers have Higher Education qualifications are least likely to be looked after by their grandparents (either solely or in combination with other childcare) than other preschool children”. Our analysis of the CEYSP corresponded with that by Bryson et al [8], showing that the use of grandparents increased with higher levels of maternal education. Use of grandparents for childcare was greatest among mothers with less education.

While the analysis by Bryson et al. [8] was confined to comparing ‘centre based’ childcare with care by grandparents, we analysed more childcare types in order to examine variations within formal and informal childcare types. Our analysis of the FRS for example identified variations of use by maternal education between formal childcare types (Figure 4): a higher

proportion of childcare arrangements for mothers educated to 'Higher educational qualification below degree level/A levels/BTECS/ONC' and 'O/GCSE equiv. (A-C) or GCSE grade D-G' was 'Playgroup or preschool' (16% compared to 14% of all childcare arrangements) or 'Day nursery or crèche' (18% compared to 13% of all childcare arrangements) or a 'childminder & nanny/au pair' (10% compared to 6% of all childcare arrangements).

Our analysis of the FRS also showed the type of childcare used also varies with the age of mothers so that a higher proportion of childcare arrangements for older mothers (aged 45 years or over) were 'education or other formal childcare services' (42% compared with 22% of all childcare arrangements) and a 'childminder/au pair' (11% compared to 6% of all childcare arrangements). In contrast, a higher proportion of childcare arrangements for younger mothers (aged 16-24) involved 'Grandparents' (41% compared to 31% of all childcare arrangements) or 'Other relatives' (20% compared with 10% of all childcare arrangements). This pattern is also found by other research in Scotland which reported 'younger mothers were particularly likely to be using grandparents for childcare' [11]: 162 and research by Bryson et al [8]: 74 which also found that 'Children of younger mothers (under 30) were more likely to be looked after by their grandparents than children with older mothers'.

Discussion and Conclusions

Our analysis has been valuable for highlighting variations within types of formal childcare provision by these factors which suggests it is too crude to compare 'centre based' childcare provision with informal care. This is especially important when relating this analysis, which comes from a 'demand side' perspective, with analysis about the childcare workforce (which is about provision) from sources such as the Labour Force Survey and The Childcare and Early Years Providers Survey which is not generally not grouped into centre-based or non-centred based childcare types.

The analysis carried out by us and earlier research demonstrates that patterns of childcare use are not uniform but vary by a range of socio-demographic factors between families, especially by income, maternal education, maternal age and work status. However, some of these associations are difficult to unpack because they are conflated with other factors. For example, differential type of childcare use by maternal education can partly be explained by the fact that older mothers are more likely to work full time and to be higher earners. Income and work status (including hours worked) have been found to be associated with greater use of formal childcare. It is possible also that the lower use of informal childcare by older mothers could be to do with children in such families having older mothers who may be less able or willing to take on a major childcare role. What would help with unpacking these findings would be information on childcare preferences in order to understand what may be motivating the patterns of childcare usage we found and if parents prefer to use this combination or are forced into using this combination because current childcare provision is insufficient to meet their needs or preferences.

A possible attraction of using informal childcare in combination with formal provision is that it is often provided not for a fixed amount of time, and can therefore be used flexibly around formal childcare [12], which may be particularly needed for parents working atypical hours [13]. However, data on childcare preferences is currently not available and is an area for further research that is very much needed [8].

Despite policies to support the use of formal childcare, parents continue to use informal childcare, especially grandparents, to supplement their childcare needs. Although parents are not asked about reasons for their choice of care in the national data sources, it seems

plausible that grandparents may be covering the gaps in formal childcare provision. Informal childcare might be a particularly attractive option for those parents struggling to afford the soaring costs of UK childcare [14], especially unemployed and younger mothers whom we found were most likely to use informal childcare.

Conclusions

The purpose of this paper was to examine childcare usage patterns in Britain and to compare families using childcare with those not making use of childcare. This paper uniquely brings together analysis from several large-scale datasets to address three key questions: 1) 'What types and combinations of childcare are being used by families?', 2) 'What are the socio-demographic comparisons between families using and not using childcare?' and 3) 'How do types of childcare vary between families?'. These questions matter because they help inform understandings of the types of provision that are needed by families so that governments can target resources in an appropriate way.

Our finding of families using multiple sources of childcare has potential implications on the number of hours mothers can work because it necessitates more time for mothers to take their children to and from different childcare providers. A lack of access to flexible childcare may force parents to choose low-quality part-time jobs, trade down roles or leave work altogether, which would place more parents at risk of poverty [1]. The recent UK government policy of extending the free childcare provision to 30 hours for three and four year olds will not address these concerns around flexibility unless this provision can be used by families to provide wrap-around services for those working a variety of hours [15].

The childcare market makes preschool childcare the private responsibility of parent-consumers, and yet parents are limited by the availability of quality childcare at times which are suitable to them – a point that is especially important for parents working atypical hours. Furthermore, there are significant gaps in state supported benefits for those parents who are looking for work or skills building through education and training [1] which mean parents in these situations face greater potential risk of poverty.

Acknowledgements

This research was funded by the Economic Social

Research Council under its 'Secondary Data Analysis Initiative' Phase I, grant number ES/K003690/1. We would like to thank the ESRC for funding this study. We would also like to thank our two project collaborators, the National Day Nurseries Association (NDNA), and the Family and Childcare Trust, and our advisory group members, for their support throughout the project. In particular, Professor Peter Moss. We wish to acknowledge our gratitude to all those who have made these data available for secondary analysis. All the datasets analysed in this project were made available by the UK Data Archive, University of Essex. Data were supplied to the Archive by the various government departments responsible for the data collections. None of those involved are responsible for the analyses or interpretations presented here.

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Statement of Competing Interests

The authors have no competing interests.

List of Abbreviations

Childcare and Early Years Survey of Parents (CEYSP)

Family Resources Survey (FRS)

Labour Force Survey (LFS)

Organisation for Economic Co-operation and Development (OECD).

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Paper 4: 'The development of a united ECEC workforce in New Zealand and England: a long, slow and fitful journey'

Claire Cameron, Carmen Dalli and Antonia Simon

Introduction

Professionalisation of the ECEC workforce in both New Zealand (NZ)¹ and England has been a longstanding policy concern (e.g., Dalli & Urban, 2010; Miller & Cable, 2008). One developmental trajectory has been efforts to unite the 'care' and 'education' workforce conceptually, administratively and in practice. In NZ this began in the 1980s (Meade & Podmore, 2002) and in England from 1997. A united care and education workforce is associated with benefits such as conceptual coherence, integrated curricula, more access to services for younger children, and a levelling of historic inequity between care and education workers. In six case studies of ECEC integration, all reported positive results (Kaga, Bennett & Moss, 2010).

This chapter traces the different policy trajectories of ECEC workforce development in NZ and England. After setting out some issues in common we use current workforce data to illustrate the impact of policy in the two countries. We then focus on three illustrative issues to examine: (1) the complexities of uniting workforce models of the 'new teacher' in NZ and the (now deleted) 'early years professional' in England; (2) the pay and conditions of work of the ECEC workforce in the two countries; and (3) home-based ECEC, called family daycare in NZ and childminding in England.

Drawing on what we call 'sector voices' we track the impact of political advocacy, union activism and eventual conservative backlash in creating the current profile of the ECEC workforce in each country to evaluate the extent to which a truly united workforce has been achieved. We argue that despite major steps forward through qualifications and, in New Zealand, pay, historical tensions about the relationship between care and education continue to take their toll on the ambition of a wholly professionalised workforce in the ECEC sector.

Throughout the chapter we refer to the whole sector as early childhood education and care or ECEC, in keeping with OECD tradition and the dominant practice in NZ. Yet we are aware that this broad term covers a range of services whose names serve to indicate their historical origins and scope. ECEC includes 'childcare' such as day nurseries, childminders or family daycare and playgroups or playcentres, as well as 'early education' services such as preschools, kindergartens and schools.

A common heritage and Integrationist policies

In common with many other countries, both NZ and England had – until the late twentieth century – a split workforce based on a division between early education services for children aged 3 and over, supported by public funding, and services for children up to 3 years based on a model of care or 'minding' the children while parents worked. Typically, services for children under 3 received much less public funding, if any. The different services were associated with the priorities of different government departments (typically 'education' and 'welfare'); further differences have been noted related to 'access, regulation, funding and workforce, lead[ing] to problems of inequality and lack of continuity for children, parents and workers' (Kaga et al., 2010, p. 7; Kamerman, 2000).

Within NZ, the first formal step to integrate the childcare and preschool education workforce was taken on 1 July 1986 when, following years of lobbying by childcare activists, administrative and policy responsibility for childcare services was transferred from the Department of Social Welfare to the Department of Education (Meade & Podmore, 2002). This break from the welfare principle as the driving force behind childcare policy was justified as a way to achieve 'equitable funding for childcare' (State Services Commission, 1980, p. 91). It was also consistent with a growing consensus within the early childhood field that it was very difficult to separate care and education (e.g., Smith, 1988). As the integration of childcare policy and administration into the Department of Education was effected, a terminological shift also occurred in the official discourse with the terms 'childcare', 'daycare' and 'preschool' replaced by the more inclusive term 'early childhood education and care' (May, 2007).

The historical integration of childcare and preschool services at the policy level was followed in 1988 by the integration of the previously separate training pathways for work in childcare centres and kindergartens into one three-year early childhood teacher education diploma programme in Colleges of Education. The result was that by the end of 1990, new cohorts of early childhood teachers were graduating with a shared history of integrated study and practicum experiences gained across different ECEC settings. As these graduates took up positions in diverse parts of the sector, met at cross-sector conferences and attended the same in-service professional learning courses, historical, philosophical and organisational boundaries started to dissolve and a new sense of sector unity emerged (Dalli, 2010). With the subsequent merger of Colleges of Education with university departments of education in the early 1990s, three-year diploma-level courses at Colleges of Education were phased out and replaced by a new three-year Bachelor of Education degree, making early childhood teaching in NZ a graduate profession.

In the late 1980s, the ECEC sector was also included in widespread reforms of education aimed at creating a seamless education system. In the ECEC sector this led to the *Before Five* (Lange, 1988) policies which sought to remove long-standing funding inequities between previously called 'childcare' and 'preschool' services, and to improve quality and equity of access. These policies were widely welcomed (Meade, 1990) though short-lived. In 1990, within months of the election of a neoliberal National government, the *Before Five* funding policies were dismantled, leaving the integration of childcare administration under education, and the introduction of integrated training for work across the ECEC sector as the main policy achievements of the 1980s.

One of the strengths of the NZ ECEC sector has been the mobilisation of the centre-based early childhood workforce into professional organisations and trade unions, with union mergers in the early 1990s strengthening the negotiating ability of the workforce. First, the Early Childhood Workers' Union and the Kindergarten Teachers' Union joined forces to become the Combined Early Childhood Union of Aotearoa New Zealand (CECUA), and, second, CECUA amalgamated with the primary school teachers union, the NZ Educational Institute (NZEI) – Te Riu Roa. This strategic alliance was instrumental in facilitating a job-sizing exercise between kindergarten and primary-school teaching, resulting in a campaign for pay parity between them. Negotiated in 2002, pay parity for kindergarten teachers was later extended to all qualified early childhood (EC) teachers working in education and care centres – formerly called 'childcare' (May, 2007).

As three-year integrated training for new ECEC teachers was becoming the norm, the need for coherent policies to upskill the existing early childhood workforce remained a key preoccupation throughout the 1990s (Early Childhood Group, 1994). An important

development was the implementation of a point system (NZ Government, 1990) through which ECEC staff across the sector could have their very diverse training background, qualifications and experience evaluated by the New Zealand Qualifications Authority (NZQA). The point system provided a focus for the ECEC workforce and a means for assessing progress towards training goals; it also helped to identify the desirable elements in a 'benchmark' qualification for work in ECEC (Meade & Dalli, 1992; NZQA, 1996).

The imperative for a benchmark qualification became more urgent with the launch of *Te Whāriki* (Ministry of Education, 1996), the internationally acclaimed NZ early childhood curriculum. Simultaneous professional development initiatives to support implementation of the curriculum fostered the growing sense of workforce unity brought about by the integrated initial training and the union amalgamations.

Slowly, but surely, a 'new teacher model' for ECEC work was taking shape.

The new teacher model was most fully articulated in the ten-year strategic plan (SP) called *Pathways to the Future: Nga Huarahi Arataki* (Ministry of Education, 2002), launched by the Labour-led coalition government elected in 1999. Building on sector recommendations, the SP set a goal that by 2012 all staff in 'teacherled' early childhood services for 0 to 6-yearolds would be fully qualified and registered teachers with parity of pay with primary school teachers. Teacher-led services are services like kindergartens and education and care centres which are staffed by trained teachers. They are distinct from parent/whānau-led services – like play centres or *nga ko hanga reo* – where family members are present alongside their children during the hours of operation. The qualification goal in the SP did not apply to these parent-led services. It also did not apply to home-based educators or caregivers who work directly with children. However, since home-based networks are co-ordinated by qualified teachers, and are part of the teacher-led part of the ECEC sector, the qualification requirement did apply to the home-based network co-ordinators. The implementation of the SP was brought to a premature halt by the election in 2008 of a conservative-led neoliberal coalition government. Nonetheless, by then a major milestone had been achieved: the new ECEC teacher model was firmly in place in teacher-led ECEC settings.

In England, the story of integration started later and was one of stutter and stall rather than steady progression through streamlined policy. In 1997, the new Labour administration inherited a fragmented system of 'daycare' and 'early education' that was largely ignored by policy and split between health and education departments. Over the preceding 20 years, child poverty and inequality had been rising with lone parents particularly likely to be at risk. At the same time, demand for full 'daycare' was on the increase, principally among working mothers earning higher incomes (Moss, 2014).

Provision was inadequate to meet demand, and – apart from nursery schools and classes which employed teachers – staffed by low paid and low qualified 'care' workers with a confusing array of job titles (McGillivray, 2008). The Labour government advocated early childhood education and care services as a means to encourage parental (principally mothers') employment and so address child poverty. In three main ways, the integration of care and education was pursued. First, in 1998, an important integrationist step was taken when governmental responsibility for ECEC was consolidated in one department, education, in the National Childcare Strategy (DfEE, 1998). In 2007, local administrative areas (called local authorities) mirrored this step, establishing Departments of Children's Services. Second, an early years curriculum was introduced for all children attending ECEC services. First named (in 2000) as the Foundation Stage, the curriculum was for children aged 3 to the

end of the first, reception, year in primary school (usually aged 5). In 2008 this was extended to all children aged

0 to 5 and called the Early Years Foundation Stage (EYFS). The EYFS was clearly positioned within an 'educational' framework; it predefined early learning goals in areas of learning and development that were seen as 'useful for school' (Bennett, 2006), and all care and education practitioners, regardless of their qualification or background, were expected to deliver it. In 2012, the EYFS was modified, and the number of learning goals reduced. But, as Moss (2014) points out, the focus on a narrow definition of education, mainly on literacy and numeracy, sharpened in this iteration, with an emphasis on the role of ECEC services in preparing children for school, or 'school readiness'.

The third dimension of integration in English ECEC was that of regulation. In 2002, the schools inspection agency, Ofsted, adopted responsibility for regulating all childcare services (apart from nannies and au pairs who are employed by parents in their homes) as well as early childhood services in schools. All three dimensions of integration demonstrate a commitment to perceiving ECEC as 'education' services at a time when education was increasingly seen as driven by standards of academic performance. It appeared to be less of an equal status 'integration' of care and education and more of an unequal subsumption of care under a schools agenda.

The introduction of children's centres by the Labour government (in 1998, when they were known as Sure Start local programmes) is a good example of working with concepts of integration in England. Building on earlier experience of combined nursery/family centres (OECD, 2000), children's centres were envisaged as a universal neighbourhood service to cater for children of working and studying parents as well as supporting parents who needed additional help. By 2010, there were 3,500 Children's Centres in England. Their main role was to provide advice, guidance and support for parents, and, in the most deprived areas, to provide care and education sessions. At their best, Children's Centres brought together, under one roof, full-day nursery education and childcare, with health and employment advice and support for parents. But, by 2010, only 800 of the 3500 Children's Centres offered care and education places. They complemented, but did not replace, existing ECEC services.

However, in other respects, integration did not take place. The workforce, as we shall see in the next section, is still characterised by *teachers* working in school-based services and *care workers* (and others) in nurseries and in domestic premises. In contrast to NZ, there has been little integration of qualifications for those working with children under compulsory school age and no discernible sector strength derived from trade union organisation and membership. We discuss one integrationist occupational model, now discarded (and replaced), called the Early Years Professional, later in the chapter.

There have been shifts in government funding. Tax credits were introduced to support families 'childcare' costs, and, most recently, extending an entitlement to free 'childcare' from 15 to for 30 hours per week for children aged 3 and 4, and for the most disadvantaged 2-year-olds (DfE, 2015) in registered provision which can be schools, nurseries or other registered services. This entitlement is for children of employed parents, effectively subsidising childcare, not education, and the arrangement still leaves many parents funding places themselves. Clearly, the terminology used in this financial support reflects a split between care and education rather than a united field of ECEC. At the time of writing, ministerial responsibility for 'childcare and early years' sits with the portfolio of the minister responsible for women and equalities, child poverty reduction, mental health services for children, school funding, and careers advice (DfE, 2016). It is too early to tell what this will mean for the integration of the care and education agenda in EC services.

Overall, the story of integration of previously split early childhood workforce occupations in NZ and England can be illustrated through Tables 35.1 and 35.2. Rather more progress towards integration can be seen in NZ in Table 35.1, which shows services designed for children of the entire preschool age range (rather than being split between older and younger age groups), and fewer occupational titles than in England.

In Table 35.2, we compare, so far as is possible, the size and characteristics of the ECEC workforce. Caution is needed in comparing England with NZ because of the way the data sources compiled vary between the countries. For example, there is no adequate means of counting just those teachers working in early education settings in England, as all teachers in preschool services are counted within a category called 'primary and secondary teachers'. This leaves us with 'childcare' workers. Comparing

Table 35.1 ministry responsible, service types, age attending and occupational titles in England and New Zealand

Ministry responsible	Services	Age range attending	Occupations
England Department for Education	Day nurseries	0 to 5	Day nursery worker Nursery nurse
	Playgroups	2.5 to 4	Playgroup worker
	Childminders	0 to 7	Childminder
	Nursery schools; primary schools with nursery classes	3 to 4 (plus some 2-y-o)	Teacher Nursery nurse
	Primary schools with reception classes but no nursery classes	4 to 5	Teaching assistant
	Children's centres	0 to 5	Outreach worker, playworker
New Zealand of Education	Teacher-led services:		
	Kindergartens	1 to 5	Teacher
	Education and care services	0 to 5	Teacher
	Home-based (H-B) education and care	0 to 5	Teacher (for H-B network co-ordinator); H-B educator
	Parent-led services:		
	Playcentres	0 to 5	Educator
	Te KōhangaReo/Maori language nest	0 to 5	Kaiako
	Playgroups	0 to 5	Educator

Table 35.2 numbers of childcare workers (England) and ECE teachers and home-based educators/co-ordinators (New Zealand)

	England: childcare workers	NZ: ECE teachers
England numbers (2012–14):		
Childminders and related (including nannies and au-pairs)	100,916	–
Nursery nurses and assistants	149,522	–
Playworkers	23,404	–
NZ numbers 2013:		
Kindergarten teachers	–	2,806
Home-based co-ordinators of services	–	628
Home-based educators (part of an organised network; under the supervision of home-based co-ordinators)	–	6,486
Education and care services (previously childcare)	–	18,620
Casual education and care services	–	76
Hospital-based services	–	49
Correspondence school	–	16
Characteristic (%) Age:		
Under 24 years	24%	12%
25–34 years	27%	26%
35–44 years	21%	26%
45–54 years	18%	21%
55–64 years	9%	12%
65 years and over	1%	2%
Total	100%	100%
Sex:		
Male	2%	3%
Female	98%	97%
Total	100%	100%
Ethnicity (England):		
White	89%	–
Black and Minority Ethnic	11%	–
Total	100%	–
Ethnicity (NZ): European		
–	–	75%
Maori	–	14%
Pacific Peoples	–	6%
Asian	–	12%
Other	–	2%
Total	–	100%
Highest level of qualification of childcare workers (England):		
Degree level or higher	11%	–
Post-school qualification	16%	–

Other	71%	—
None/Don't know	2%	—
Total	100%	—

(Continued)

590

Table 35.2 numbers of childcare workers (England) and ECE teachers and home-based educators/co-ordinators (new Zealand) (continued)

	England: childcare workers	NZ: ECE teachers
Education NZ with benchmark qualification of a 3-year post-school/undergrad diploma or degree: % of staff in licensed teacher-led services	—	76% (n = 16,917)
Hours worked a week: 1–9	4%	5%
10–19	17%	9%
20–29	20%	14%
30–39	29%	26%
40–49	22%	41%
50–59	6%	3%
60 or more	2%	2%
Total	100%	100%

Source: Data sources for New Zealand are 'Census 2013' Statistics on ECE Teachers (Morrison, 2014), and from the annually updated ECE statistical reports on the Ministry of Education's website

Data source for England: The UK Office for National Statistics Labour Force Survey (LFS). This survey provides self-reported data by workers collected annually from around 60,000 households. Occupational groups in the LFS group together staff in private day nurseries, playgroups and as childminders and related occupations (including nannies and au-pairs) to form 'childcare'. 'Education' includes teachers in primary schools and nursery classes as well as secondary teachers, special education teachers, educational assistants, teaching professionals and school midday assistants. Not all of the occupations in this 'education' group are therefore relevant to the ECEC sector in England as they cover provision for children beyond 5 years of age (e.g., including secondary school teachers).

This group with 'teachers' in NZ means including those working with rather different professional education backgrounds. In some cases it has been possible to make comparisons between workers in England and teachers and educators in NZ and these are given in Table 35.3. However, it is not possible to compare the two workforces on education levels: while in England it is possible to establish a 'highest level' of qualification, the discourse in NZ is rather different, with national statistics distinguishing between holders and non-holders of the benchmark qualification of a three-year diploma or undergraduate degree (see Table 35.2). Thus NZ statistics only show the proportion of qualified teachers within the total workforce and not the different levels of training.

There is a clear difference regarding qualifications between the two countries. There is missing data, as we know that almost all nursery and primary teachers in England have a relevant degree-level qualification and a recognised teaching qualification but we do not

know how many nursery teachers are in employment. Looking at the qualifications of English childcare workers (Table 35.2), we see a high proportion in the 'other' category (which includes school-leaving and workplace-based qualifications), and around a quarter have a post-school qualification including bachelor degrees. Among EC practitioners in NZ, at the end of 2013, over three quarters (76%) of staff in licensed teacher-led services held the benchmark qualification of a three-year bachelor degree or diploma programme (Ministry of Education, 2014).

It is notable that, as workforce integration has progressed in NZ, the points of crossover with English childcare workers have decreased. Childminders in England, for example, are largely self-employed with minimal requirements for keeping written policies or supervision (DfE, 2014), although they must adhere to the early years curriculum. Home-based educators in NZ, by contrast, are members of local networks, and their practice is supervised and supported by home-based coordinators who hold a teaching qualification, making homebased ECEC a 'teacher-led' service. Arguably, the two roles, and expectations of them, are diverging. What is also clear is that teachers in NZ, which include those working in services previously considered 'childcare', are older than childcare workers in England overall. While nearly all workers in both countries are female, there seems to be greater ethnic diversity among staff in NZ.

Table 35.3 Annual income comparison, England and new Zealand

Income bands England (PPP converted) England 2012–2014 (LFS)		Income bands NZ	NZ 2013 (Census)
£2,450 or less	6%	\$5,000 or less	4%
£2,451–4902	15%	\$5,001–10,000	5%
£4,903–9,804	31%	\$10,001–20,000	13%
£9,805–14,706	28%	\$20,001– \$30,000	17%
£14,707–24,510	18%	\$30,001– \$50,000	36%
£24,511+	2%	\$50,001+	25%

Source: <https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm>.
PPP value for UK has been divided by PPP value for NZ to create a multiplier which has been applied to the cash values in NZ dollars and rounded

Note: Data on pay from LFS has been converted using Purchasing Power Parities so that the income categories are directly comparable to those for the NZ ECE workforce given in the Census.

Clear differences between ECEC practitioners in England and NZ are visible when we examine pay. Table 35.3 sets out the annual income of childcare workers in the English Labour Force Survey and early childhood teachers in the NZ census for 2013 (Morrison, 2014).

Childcare workers are very low paid in England. Using Purchasing Power Parity (PPP) conversion, Table 35.3 shows that over half of childcare workers in England are earning less than £10,000 per annum (or NZ\$20,390, converted using PPP for 2013) compared with 22% of the NZ ECE workforce. The low pay is in part explained by the high proportion of childcare workers in part-time employment (especially among playgroup workers, where the number of hours has declined sharply in the last ten years) (Simon, Owen & Hollingworth, 2016). Table 35.2 shows that 41% of childcare workers in England work fewer than 29 hours compared with 28% of NZ ECE teachers. The overall low level of pay could also be explained by the

young age profile of the English workforce (around a quarter of workers are under 24 years of age – see Table 35.2). This picture of low pay is supported by findings from the UK's Low Pay Commission (2014): 41% of the childcare workforce are paid less than £7 per hour (\$NZ14.27, converted using PPP for 2013).

Figures presented here show some impact from the highly integrationist policies in NZ, compared to a rather more piecemeal approach in England. In both countries, however, there are complexities in uniting the ECEC workforce, illustrated below using three examples: the occupational models of the 'early childhood teacher' in NZ and the Early Years Professional in England; the role of advocacy and unionisation in shaping integrationism; and the particular issue of childminders/family daycarers and how they embody (or not) care and education.

Uniting Care and Education through occupational models

The 'Early Childhood Teacher' in NZ

As noted earlier, the ten-year Strategic Plan (SP), *Pathways to the Future* (Ministry of Education, 2002), envisaged the 'early childhood teacher' as the main occupation working with young children in centre-based provision and co-ordinating home-based networks. This was in contrast to the earlier separate roles of 'kindergarten teacher', 'childcare worker' and 'early childhood educator'.

The SP laid out target percentages of fully qualified and registered teachers to be achieved incrementally in teacher-led services over a ten-year period to 2012. The benchmark qualification was deemed to be a three-year diploma or undergraduate degree and could be acquired in a variety of ways. An array of qualifications, ranging from equivalency to a three-year Diploma of Teaching through to four-year degrees and one-year graduate programmes, was subsequently approved for registration with the NZ Teachers Council (renamed the Education Council in 2015). Teacher registration is achieved through successful completion of a post-qualification induction programme through which applicants are mentored by a registered teacher to meet registration criteria. Until this milestone is reached, newly qualified and employed teachers are called 'provisionally registered teachers'. From 2011, primary school teaching qualifications also became acceptable for registration as an EC teacher.

Throughout the implementation of the SP this inclusive approach to qualification and registration was supported through a range of financial incentives, including staff scholarships, higher funding rates for ECEC services meeting target levels of qualified staff; and loans and grants for students. However, in 2009, a new centre-right government elected just as the effects of the global financial crisis started to impact NZ, announced that it would no longer pursue the goal of 100% fully qualified teaching staff by 2012 and capped the top funding rate at the level of 80% qualified staff. Thus, from the budget of 2009/2010, the different funding streams – and those for other professional development initiatives – were withdrawn including for the flagship Centre of Innovation (COI) action research programme. The COI programme had created models of good practice which were disseminated nationally and internationally (Meade, 2010), with research teams recording the professional benefits of becoming teacher-researchers (e.g., Simmons et al., 2007). By 2009, when implementation of the strategic plan was prematurely halted, 20 teaching teams had been part of the COI programme and an unpublished evaluation of the programme was anecdotally reported to have documented extensive impact on improving sector morale and engagement with initiatives to enhance practice. Additionally, by 2010 the proportion of staff holding the recognised 'benchmark' teacher qualification had risen impressively to 66.8% of

all staff in teacher-led services (Ministry of Education, 2014) compared to the 50.8% figure in 2004 (Ministry of Education, 2014), with the biggest increase occurring amongst teachers working in education and care centres versus kindergartens – which had always been staffed by qualified teachers. The termination of the SP policies significantly slowed the momentum of change within the sector (Dalli, 2010). While the figures of qualified staff continued to rise over subsequent years to reach 74.6% of the workforce by 2014, this 30.5% increase over 2004 figures (Ministry of Education, 2014) fell significantly short of the expectations of 100% qualified staff in teacher-led services by 2012. Many believed that with a sustained supportive policy infrastructure, the 100% target would have been achievable.

A concerning trend by 2014 was evidence that life as an early childhood teacher remained less lucrative than in other education sectors (Morrison, 2014). In a report which integrated 2013 national census data with workforce data gathered by the Ministry of Education, Morrison showed that only 25% of ECE teachers earn more than \$NZ50,000 (£24,522, converted using PPP for 2013) compared to 39% of all employed adults, and 67% of school teachers. This suggests that despite progressive introduction since 2002, pay parity has not been wholly achieved for the ECEC sector. One likely consequence is that qualified EC teachers, particularly younger ones, will leave the sector. With the 80% qualified staff now seen as the new target, and with qualified staff making up 74.6% of the ECEC workforce in teacher-led services (Ministry of Education, 2014), EC teachers are finding themselves working with unqualified staff on a more regular basis, with concerns about rising workplace stress. One cannot expect qualified teachers to carry the responsibility for ensuring a quality experience for children and families by themselves (Meade et al., 2012). A recent survey of qualified EC staff found that despite increased professionalisation through qualifications, EC teachers were experiencing a renewed sense of low societal esteem for their work and low occupational value (Dalli & Cherrington, 2015; see also Kane & Mallon et al., 2006).

Early Years Professional Status (EYPS)

Early Years Professional Status (EYPS) in England was an attempt to build a graduate-level occupational model that combined care and education with the equivalent status of qualified teachers. This is similar to its NZ counterpart, and the 'new teacher' was one model considered during consultation (DfES, 2003), the other being the continental European social pedagogue. Introduced in 2007, by 2014 there were approximately 13,300 EYPs in England (Taylor, 2014). The model arose 'out of thin air' (Moss, 2008, p. 127), being neither the new all-graduate teacher model nor the holistic model of pedagogue with applicability across children's services. But the need for a graduate status arose from influential research by Sylva et al. (2003, 2010) linking the quality of ECEC provision with the quality of staff. The effect of high quality staff was particularly marked for the social and learning gains of children living in economically disadvantaged areas. Sylva et al. (2003, 2010) had recommended there should be a high proportion of trained teachers, or equivalent, holding lead positions in ECEC settings in order to achieve good outcomes. Equivalence, however, was never defined. The EYP model sought to integrate care and education, to be applicable across the whole 0 to 5 year age range, and to be attractive to employers in private, voluntary and independent (PVI) and public sector provision. Each setting was supposed to have one graduate or EYP and two in settings in areas of high levels of social disadvantage. Four routes to attaining the Status, dependent on prior experience and qualifications, were introduced, taking 3 and 15 months to complete.

The EYP was to lead practice and be a change agent in the setting. Training was a collaboration between training providers, including universities and employers. The implementation of the EYP model was part of a wider investment in ECEC, including a

Transformation Fund, later superseded by a Graduate Leader Fund (GLF), as 'ring-fenced funding to support all full-day care PVI sector providers in employing a graduate or Early Years Professional by 2015' (Mathers et al., 2012, p. 12). The GLF was intended to support locally designed professional development. Outcomes were measured against the baseline of the number of graduates leading practice in PVI full-day care settings in each area (Mathers et al., 2012).

Overall, the EYP role brought significant gains to children's care and education, particularly those in the age range 30 months to 5 years. Mathers et al. (2012, p. 6) found improvements in 'positive staff-child interactions; support for communication, language and literacy; reasoning/thinking skills and scientific understanding; provision of a developmentally appropriate schedule; and providing for individual needs and diversity'. The EYP was also often a catalyst for improvements to children's learning and structural changes such as a key worker system or parental involvement. Fewer gains from EYP presence were noted in the quality of provision for younger children (birth to 30 months) (Mathers et al., 2012).

There were professional development advantages from attaining EYPS. Trainees noted increased professional confidence and new knowledge and skills (Hadfield et al., 2012; Roberts-Holmes, 2013), particularly theoretical knowledge and its relationship to practice. However, qualified teachers, who might have undertaken the EYP training to better equip themselves in relation to the 0 to 3 age group, felt it confirmed what they already knew and represented 'jumping through more hoops' (Roberts-Holmes, 2013, p. 345).

One intention of the EYP was that practitioners would be equipped to lead practice in the workplace and inspire other practitioners (CWDC, 2010, cited in McDowell Clark, 2012) through modelling good practice. Early studies indicated that the 'change agent' role was proving difficult (Simpson, 2010), particularly for those not already in senior positions (Cameron and Miller, 2016; McDowell Clark, 2012). Most EYPs reported that holding the Status had improved their ability to carry out improvements in their settings, and that colleagues were more receptive to their ideas (Hadfield et al., 2012). McDowell Clark (2012) characterised the EYP role as exercising 'catalytic leadership' where the practitioner has influence but not authority. In theory, this accords with the position of teachers in terms of being free from financial, administrative and managerial demands to focus on pedagogical leadership (Aubrey, 2007; Roberts-Holmes, 2013). In practice, the roles of EYP and manager were often combined, particularly for those working in the PVI sector (Hadfield et al., 2012).

While the EYPS did address pedagogical coherence, it did little in terms of workforce professionalisation. There was a lack of parity with early childhood teachers, in terms of pay and conditions, and professional status. The EYPS did not convey the Qualified Teacher Status that qualified teachers enjoyed. Despite the assertion of broad equivalence between the two Statuses they were in fact quite distinctive. Holders of the EYPS are counted as part of the childcare workforce, which, as noted in Table 35.2, is characterised by low salaries. In the PVI sector, salary is closely linked to the ability of parents to pay fees. Despite some tax credit subsidies, parents in England spend more of their net income on ECEC costs than in other OECD countries, meaning limited room for salary increases for the introduction of EYPS. Working as a graduate in the PVI ECEC sector meant earning little more than half the national (graduate and non-graduate) mean hourly wage for the UK (Brind et al., 2014). The EYP model threatened to 'ghettoise' EYPs in the lower paid private and voluntary sector (Hevey, 2007). With prescience, Hevey (2007) questioned the long-term affordability of EYPs once initial government funding ended. In 2013, new occupational models were introduced and EYPs were replaced by Early Years Teachers. The latter were designed to

be teaching 'specialists in early childhood development, trained to work with babies and young children'. They had to meet 'the same entry requirements as primary classroom trainee teachers' (DfE, 2013, p. 27), and were supported by Early Years Educators, whose entry criteria were less stringent. These new models employed the terminology of education but were not accompanied by new measures to address unity across the care and education workforce. By May 2016, EYT training providers were closing courses due to lack of demand (Crown, 2016).

Union representation and professional advocacy in ECEC

The second illustrative issue of workforce integration is collective action in the ECEC sector and, within NZ, the winning of pay parity for early childhood teachers with their primary school peers.

Unionism for NZ ECEC staff has a relatively short history with the first early childhood professional organisation, the Kindergarten Teachers' Association (KTA), established in 1952. In 1958, KTA was recognised as a service organisation able to enter into salary negotiations on behalf of its members. During the 1960s and 1970s, the rapid expansion of the kindergarten service saw the KTA become a significant political force with salaries and staffing as the key issues (Clark, Cook & Pearson, 1983).

By contrast, unionisation of childcare workers did not start till 1982 with the setting up of the Early Childhood Workers' Union (ECWU) by a group of women activists building on 20 years of activism and lobbying to improve the training and public perception of childcare workers.

Clark, Cook and Pearson (1983) argued that without a common background of training, childcare workers typically had stronger relationships with the parents in their centre – who paid their wages – than with other childcare workers. But this close relationship with parents also made collective action to improve pay harder to achieve than for kindergarten teachers who had trained together, belonged to regional associations, and negotiated salaries with the government. At the same time there was much in common, not least their female membership and common concern with the care and education of children. Clark et al. (1983, p. 19) called for an 'effective forum for the debate over the values and beliefs surrounding the role of men and women, community and state, and their responsibility for child-rearing'. This was a strongly activist, feminist movement, concerned with advancing the cause of quality provision for children, and an enhanced status for early childhood work. In 1990, ECWU amalgamated with KTA to form the Combined Early Childhood Union of Aotearoa (CECUA). One KTA member, interviewed in 1994, recalled of this time:

What was emerging was a group of young women who were actually starting to look at the job as a profession and that was a key thing that started the change ... We had to make political stands against the government of the day because of the appalling wages and our conditions of employment. (Reported in May, 1997, p. 7)

The professional aspiration captured in this teacher's statement reflected the need to improve employment and pay conditions and was strongly connected to political action. The merger of CECUA with NZEI in 1994 laid the ground for this aspiration to take shape: by the end of the year NZEI had already published two reports to build the pay parity argument for both kindergarten teachers (NZEI, 1994a) and for early childhood 'workers' (NZEI, 1994b).

Meanwhile, another campaign was brewing. In 1990 NZ had elected a New Right government that, within weeks, had dismantled many of the recently-introduced *Before Five* policies (Dalli, 1994; Meade & Dalli, 1992). Under the guise of establishing funding equity across all services, this government also took away the funding base for kindergartens, and

effectively privatised them (Davison, 1997). By 1995, the funding situation of kindergartens was so dire that NZEI mounted a 17-month campaign, marshalling parents to its cause, to reverse the government's privatisation policy and to increase kindergarten teachers' salaries. In this context, the pay parity issue receded from the public eye.

By the mid-1990s the sector had lost trust in the New Right government's will to move forward the sector's integrationist agenda of ensuring quality across services. Apart from the erosion of the *Before Five* policies, and the attempt to privatise kindergartens, the sector was incensed that the results of a Ministry of Education-led national forum in 1994 – on the future of ECEC – were ignored. In response, the NZEI set up a working party to develop a statement of what the ECEC sector wanted for the future, resulting in a policy blueprint entitled *Future Directions* (New Zealand Educational Institute, 1996). The report was well received by political parties beyond government and eventually became the basis of Labour's 1999 pre-election manifesto (Wells, 1999). A key recommendation was that 'government establish a working group to progress work on a unified teaching pay scale and pay parity for early childhood teachers' (New Zealand Educational Institute, 1996, p. 24). In 2002, armed with an NZEI-commissioned pay comparison of the work of kindergarten teachers against that of primary teachers (Burns, 1999), NZEI secured a government commitment to set up a ministerial working group to establish benchmarks for pay parity of kindergarten teachers with school teachers and to recommend implementation (May, 2007; Mitchell, 2002). In a memorable statement at an early childhood conference in 2005, the then minister of education, Trevor Mallard, stated: 'Early childhood people are being regarded as professionals. They have gone from "childcarer" to "educator". This was the debate of the 70s' (Mallard, 2005).

At the time of writing, NZEI remains the only industrial union acting on behalf of early childhood teachers in salary negotiations, across 17 types of employment agreements. Its current membership includes 4782 early childhood staff, or approximately 22% of the 21239 qualified early childhood teachers registered by the Education Council at August 2016 (see Table 35.4).

Significantly, Table 35.4 shows that kindergarten teachers are the most highly unionised with approximately 71% of kindergarten teachers belonging to NZEI; by comparison only 12.5% of all other ECEC qualified and registered teachers contribute to the total ECEC membership. This raises the question of whether the goals of amalgamation in the late 1980s and 1990s have truly been achieved. An NZEI paper written in the late 1990s described the amalgamation as the result of workers recognising the need 'to hold together collectively to fend off the new right agenda' (NZEI, undated, p. 4). However, with the non-kindergarten part of the sector being the fastest growing, but having the smallest representation within the ECEC industrial union, it would appear that the new right agenda is once again on the ascendant.

Union activism in NZ is a story of commitment to goals of quality services and equality for members across several decades. Creating a single union and pay parity across the sector are arguably integrationist causes. By contrast, few childcare workers in England are members of trade unions or professional associations despite a long history of organisational presence. Early professional associations reflected the conceptual split between care and education. Different rationales for types of service underscored the evolution of different sector voices throughout the twentieth century (Penn, 2009). The National Society of Day Nurseries, founded in 1906, existed to define and improve the quality of care for young children while their mothers worked. On the other hand, the Nursery Schools Association

was founded, in 1923, for the purposes of promoting fully qualified teachers with specialist training as appropriate staffing for young children of nursery school age (then 2 to 7 years).

However, advocacy organisations have been influential in shaping the development of ECEC. In the 1960s, the Preschool Playgroups Association (now the Pre-School Learning Alliance) campaigned for part-time, parent-run sessional services to compensate for the lack of early educational opportunities in many areas of the country. Playgroups largely supported middle-class non-working mothers, and did little to support the childcare needs of poor and minority ethnic mothers, who were more likely to be employed (Penn, 2009). The prevailing ideology, on which playgroups thrived, was that mothers should stay at home with their young children until they started school. This was challenged, from 1980, by the feminist-inspired National Child Care Campaign (NCCC), which argued that mothers, fathers and children would benefit from 'Childcare for All' that combined education and care, staffed by well-trained workers in community nurseries. With some government funding in place, the NCCC spawned the Day Care Trust which ran community nurseries and campaigned on 'day care' issues. It remains an important voice for the sector.

In 2015, the (now) Family and Day Care Trust (FDCT) and the Pre-School Learning Alliance (PLA) challenged the government's planned extension of the hours of free childcare available from 16 to 30 on the grounds of financial viability for providers, particularly those in the PVI sector. They argued that government funding did not cover the cost of providing the care, and parents and providers were left to make up the shortfall. The FDCT pointed out that while parents in England already pay higher fees than their counterparts in other European countries, providers find it difficult to cover their costs.

Table 35.4 ECEC union membership in New Zealand

	NZEI members at August 2016 ⁵⁰	Qualified and registered ECEC teachers	Union membership as % of relevant workforce
ECEC teachers working in education and care settings ⁵¹	2343	18620 (2014 ⁵² numbers)	12.5% ⁵³
Kindergarten teachers	2439	3433 (at 2014)	71%
Total	4782	21239 ⁵⁴	22%

Notes:

Furthermore, in a long-running theme of differential provision for different families, the FDCT argued, in early 2016, that while ECEC can act as a protective factor against the negative effects of poverty, it is currently failing to reach its potential as the distribution of services is: less favourable to families in less prosperous areas ... childcare in the least affluent areas is dominated by (state financed) providers in schools, the majority of which do not offer

⁵⁰ Figures provided by NZEI, 16 August 2016.

⁵¹ Includes teachers working under 16 different employment contracts, ranging from the generic Early Childhood Education Agreement, a major home-based network collective agreement, and individual employment agreements.

⁵² 2014 figures were the most recently available at the time of writing.

⁵³ This is a rough estimate rather than an exact proportion since, in the absence of published 2016 figures for total number of ECE teachers and kindergarten teachers, the proportion of union membership has been worked out using 2016 data for current NZEI members, and published 2014 figures (Ministry of Education, 2014) for qualified and registered teachers working in the two different settings.

⁵⁴ In the absence of published 2016 figures for total ECEC teachers, this total figure is based on the number of practising certificates issued to EC teachers published on the sourced Education Council website, August 2016.

daycare, supported by a limited patchwork of voluntary services and childminders. Families therefore often lack access to year-round, flexible daycare. (Butler & Rutter, 2016, p. 4)

The PLA and the FDCT are just two examples of advocacy organisations across the ECEC field.

There is also BAECE (the British Association for Early Childhood Education), now Early Learning, and the National Childminding Association, now PACEY (the Professional Association for Childcare and Early Years). What is notable is that the terminology employed often retains the division of 'daycare', 'care' and 'education'. This may reflect long-held claims to separate parts of the ECEC workforce for membership recruitment purposes or it may speak to a policy agenda that has still not adopted the internationally agreed nomenclature of ECEC. Government policy, for example, still refers to 'more great childcare' and the 'childcare offer'.

While there are numerous sector voices, Cohen et al. (2004) pointed out that the main teaching unions restrict membership to graduate teachers, and emphasise the superior position of teachers within the care and education workforce. This is in striking contrast to the feminist-inspired NZ rallying cry of unity across the sector. Given the qualification profile of the workforce, the teacher unions' position makes creating a single sector voice for ECEC in England more or less impossible and inhibits the development of a strong union voice. Actual membership of unions or professional associations is not extensive. PACEY has around 30,000 members, mostly childminders, while Early Education has about 3,500 individual members. One trade union approached to request this information refused to reveal it. Overall, Table 35.5 shows that nearly ten percent of 'childcare' workers (i.e. nursery nurses and assistants, childminders and related occupations, and playworkers, so excluding early childhood teachers) in the Labour Force Survey², are members of a trade union or staff association.

Family Daycare: tensions over 'education', professionalization And Integration

Our third issue is that of family daycare. Daycare in domestic, familiar settings is a well-established but in some ways atypical form of ECEC in both NZ and England. Indeed, in the drive towards professionalisation and educationally oriented services, it might be considered an outlier. Internationally and in NZ known as 'family daycare', but as 'childminding' in England, this form of ECEC is both home-based and care-oriented in practice.

In England, there are around 100,000 childminders (see Table 35.2); and around 344,000 children have a childminder (Huskinson et al., 2016). It is overwhelmingly (98%) a female occupation, with low earnings (£11,400 p.a. on average; DfE, 2013 – \$NZ23,245, converted using PPP for 2013³). The central concept defining childminding is an overarching domestic or 'care' setting within which 'educational' activities might take place. The domestic settings give rise to a longstanding association with mothering, since many childminders take up this work when their own children are young (Everiss & Dalli, 2003; Mooney, Moss & Owen, 2001), and there are no pre-entry requirements that might mitigate, depart from or adapt the value of the mothering experience in caring for nonrelated children. These features speak to an established conceptual division between care and education that is arguably not overcome by the adoption of family daycare within integrated early education in either England or NZ.

Since 1998 there have been sustained attempts to draw childminders in England into a largely 'educational' framework. Kalitowski (2016) reports that childminders have made 'great strides' in terms of both quality (84% are now rated 'good' or 'outstanding' by the national inspection agency, Ofsted) and qualifications, since two-thirds of registered

childminders have a Level 3 award (equivalent to a school-leaving qualification at age 18 and sufficient for working unsupervised with children). Training is not mandatory, however. Qualifications are seen as a proxy for 'high quality pedagogic environments' that ensure: practitioners involve children, simulate interactions with and between children and use diverse scaffolding strategies such as guiding, modelling and questioning. [Practitioners should be engaging children] in meaningful activities that promote their conceptual understanding of the world and [helping to] construct positive adult-child relationships. (Kalitwoski, 2016, p. 4).

The argument that only high quality environments help children to make significant progress foregrounds educational objectives for childminding.

For children under 3, often seen as a particularly suitable age group for childminding (Vincent & Ball, 2006), Mathers et al. (2014) found that four key criteria around (1) interaction with sensitive and responsive adults, (2) play where children can take the lead, (3) support for communication and language, and (4) being physically active, were most likely to support high quality experiences for children. Graduate-level trained teachers are a critical ingredient in high quality early years settings (Sylva et al., 2004) and for childminders who support disadvantaged 2-year-olds, access to support from a graduate-level trained educator/teacher, strengthened networks and interactions with group provision would be highly beneficial (Mathers et al., 2014; Siraj-Blatchford & Siraj-Blatchford, 2010). In sum, recent research on the quality of early childhood settings, including childminding, foreground an educational and developmental lens, rather than a 'care' one for both the adults and children.

Table 35.5 union membership among childcare workers in England 2012–2014, numbers and percentage

		Member of trade union of staff association (number/percentage)	Total
Childcare workers	Nursery nurses and assistants	17,830/13.1	135952/100
	Childminders and related occupations	3811/4.0	95276/100
	Playworkers	3244/11.3	28620/100
Total			24885/9.6 259848/100

Source: LFS 2012–2014; analysis by Charlie Owen and Antonia Simon

Since 'educational', in England, at least, is associated with formal settings, such as schools, and since one key lever for quality is inspection and registration, the regulatory environment is a main vehicle for insisting upon (educational) requirements. O'Connell (2011, p. 783), however, argued that childminders quietly contest or even resist the 'technologies of quality' associated with inspections. In her study they: disagreed with requirements or advice, that they display posters in their homes; shared recommended resources and brought them out just for inspection visits; regarded activity plans or timetables as overly formal given children's wishes and needs at any moment in time; and believed that adopting the unfamiliar language in the new curriculum at the time (*Birth to Three Matters*) to be an

unreliable indicator of high quality practice. These childminders identified primarily with a 'care' and family ethos and articulated a tension that is not new – between the formal trappings of 'work' in a regulated environment and the informal, familial and domestic environment of family and home (Mooney, 2003). That childminders are less likely to be associated with 'education' is reflected in parental views that school-based settings are more likely to be encouraging academic and social skills (Huskinson et al., 2016).

In the quest for integration under 'education', childminding or family daycare – as currently organised on a largely individual, self-employed basis – seems to have limited potential. At a time when the English government is expanding 'free' childcare hours and relying on childminders to provide a proportion of these, especially to cover 'non-standard' working hours of parents, tensions around the concept of 'education' and 'care' endure. This may be partly due to the way 'education' is perceived as formal, documented and evaluated.

Another is the way childminders are conceptualised as autonomous and self-regulating.

Recent secondary analysis of large-scale datasets suggests that numbers of childminders are decreasing, which might be related to poor awareness of regulatory requirements, and the increasing cost of registration; alternatively it could be related to a rise in illegal childminding, since more people describe themselves as childminders than are registered with Ofsted (Simon et al., 2015).

By contrast, family daycare – or homebased education and care (HBEC) – provision is growing in NZ. Between 2004 and 2014 the number of services rose by 6.6%, with enrolment numbers in the same period almost doubling from 9,922 to 19,162. This makes HBEC one of the fastest growing early childhood provisions, especially for children under 2 years, who make up 57.8% of all HBEC enrolments (Ministry of Education, 2014). In NZ, HBEC is provided in familial homes as part of a co-ordinated teacher-led service and licensed under the provision of the *Education (Early Childhood Services) Regulations 2008* (E(ECS)R, 2008). These regulations specify an adult-to-child ratio of 1:4 children under the age of 6 years (in addition to any child enrolled at school who is the child of the person who provides the education or care). An informal and unregulated home-based sector also exists but remains hidden from the domain of public policy.

Some of the recent growth in HBEC services reflects the emergence of a diverse range of new providers, including kindergarten associations who have expanded to include running home-based EC networks under the oversight of their qualified and registered teachers, and au pair agencies who place (typically young) women wanting to travel and experience work life in NZ with a family needing a nanny. Thus, the contemporary NZ HBEC scene is very different to that in the 1970s when the first home-based family daycare services were established (St Johanser, 1980).

Despite its recent growth, home-based or family daycare remains largely neglected by researchers, not the least because of the difficulty of gaining access to the private space of domestic homes as a research site. This invisibility of HBEC provision to the public eye continues to reinforce the general perception that HBEC is primarily a custodial activity – a view shared also by parents (Education Review Office, 2009) – rather than a service that is simultaneously educational, which is the basis on which it is funded.

A commonly cited concern is that while most network co-ordinators are registered teachers, only a few home-based educators – who are the ones in direct contact with children and their families (3% in 2013; see Ministry of Education, 2014) – hold qualifications eligible for teacher registration. A government-led report to investigate issues in home-based early childhood education was abandoned in 2013, leaving concerns about the quality and wise

use of government resources in HBEC services unresolved (Early Childhood Council, 2013; Education Review Office, 2009; Smith, 2015). Such reports leave the HBEC sector in a very uncomfortable space. On the one hand, the sector benefits from funding allocated for education and care services, while, on the other hand, the available evidence suggests that parts of the sector may be using government funding in ways that were not originally intended. Even providers which are teacher-led, have networks and get good funding, continue to pay HB educators very little. This reinforces the historical image of family daycare as a vocational care activity and maintains an uneasy equilibrium between care and domesticity on the one hand, and the education policy framework that funds it on the other.

Conclusion

The two integrationist trajectories documented in this chapter illustrate the critical role of both top-down government-led policy in defining and resourcing a vision for uniting the care and education workforces in ECEC, and the no less important and complementary role of bottom-up sector-led policy advocacy activity in stimulating visionary policy and responding to policy measures.

The chapter shows that ECEC policy in New Zealand – particularly that over the ten-year period to 2010, coupled with energetic and focused early childhood sector specialist advocacy – has driven and sustained a transformation in the workforce towards conceptual coherence, graduate-level qualifications and ongoing professional development as well as higher pay. While the goal of a fully graduate workforce has not yet been achieved, with 74.6% of its EC workforce in teacher-led services qualified at the benchmark level of a three-year diploma or degree, NZ has the most professionalised early childhood workforce in the world. Comparisons on professionalisation dimensions are clearly hampered by a lack of access to data, specifically about early childhood education teachers in England; nonetheless, the direction of travel is clear. ECEC practitioners in England do not have access to a unified occupational model across the preschool age range and the policy activity towards integration has not specifically addressed the low pay for working in what is still often described in terms of ‘childcare’ and not a unified sector of early childhood education and care.

However, even within the comparatively ‘good news’ story of the NZ ECEC workforce, we also noted signs of retrenchment in policy and its impact since 2010. While the proportion of the workforce that holds a qualification is rising in both countries, pay has not kept pace and practitioners’ sense of societal esteem for their work remains low. Collective action via unions might be a way forward but our analysis shows that the scope for this may be limited: in NZ and England membership rates are low and/or organisationally fragmented. Lastly, the sense of a conceptually unified workforce is challenged by home-based early education. Numbers of home-based carers are falling in England but rising in NZ. In England, the rise of a (narrowly defined) educational framework for ECEC possibly disadvantages the (broadly defined) ‘care’ provided by childminders. In NZ, the educational framework is more broadly defined, but the ECEC work arrangements being operationalised within it give some cause for concern that a narrower understanding of care is being resurrected. The case for an integrated workforce is conceptually solid but the political and practical journey remains long and often tortuous with shifting policy directions making progress fitful and fragile.

Notes

New Zealand is also known as Aotearoa New Zealand to acknowledge its dual Maori and Pa keha (European/other) heritages.

The LFS is the largest and most comprehensive source of data on the workforce collecting data from approximately 60,000 UK households per quarter.

Data on pay from LFS for the UK has been converted using Purchasing Power Parities so that the income categories are directly comparable to that for the NZ ECE workforce given in the Census. See here for the data tables: <https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm>. A multiplier (dividing £ to NZ for 2013) has been applied to the cash values in £ and NZ dollars to arrive at the internationalised figures in this chapter. The multiplier for converting £ to NZ dollars is 2.0390173; and for NZ dollars to £ is 0.4904323.

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Paper 5: Designing a nutritional scoring system for assessing diet quality for children aged 10 years and under in the UK

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Abstract

In the UK there is no Diet Quality Index (DQI) that enables estimates of diet quality to be made for children of different age groups. This paper discusses the methodological complexities of designing an appropriate DQI for children aged 10 years and under, using dietary data in the National Diet and Nutrition Survey (NDNS) in relation to UK dietary guidelines. Two stages of the process of developing this score are described. The final score was employed as an outcome measure in secondary analysis of the NDNS and as a means of sampling 48 case study children from the NDNS. This DQI, like all composite measures, produces a summary of overall dietary quality. This may mask individual components important for understanding the health impacts of children's diets. However, DQIs are methodologically advantageous over 'data driven' dietary pattern approaches because they are based on existing knowledge of optimal dietary patterns and provide clear nutritional benchmarks for comparing dietary quality for population sub-groups. Our innovative scoring system enables children's diets to be compared for different age groups relative to UK dietary guidelines and is appropriate for use in quantitative analysis and for assessing diet quality more qualitatively for small groups of children.

Keywords: Diet Quality; NDNS; Diet Index; Nutrition; Nutritional score; Children's diets; Dietary Guidelines;

Developing tools

Introduction

Diet Quality Indexes (DQIs) may be used to examine the quality of dietary intake in population sub-groups in relation to nutrient guidelines. In 1991, the Department of Health published Dietary Reference Values (DRVs) which cover a range of intakes for most nutrients. These are based on advice from the Committee on Medical Aspects of Food and Nutrition Policy (COMA) (Department of Health 1991). However, in the UK there is no DQI that enables estimates of the quality of the diet to be made for children of different age groups. This is problematic for researchers who want to examine the relative quality of children's overall diets in a systematic way. This paper outlines how this gap was addressed in a research project examining 'Food Practices and employed families with younger children' in England, undertaken by the two lead authors. It briefly reviews some of the various measures that have been used to measure diet quality in the UK and USA before presenting an innovative tool, a 'nutritional score', that was developed for measuring diet quality for younger children in England.

The following sections of this paper provide some background, outlining why measuring children's diets matters, and describing some approaches. The next section describes the research project and data upon which this paper draws, explaining the need for a new measure. Following this, the paper addresses its main aim, which is to describe some of the methodological complexities of designing a measure of children's diets, a 'nutritional score', for the purposes of that study. Two stages of this process are described. The conclusion suggests that, whilst it is an imperfect solution, this nutritional score enables comparison of the diet quality of different sub-groups of children in the UK.

Why does measuring children's diets matter?

Children are likely to maintain their dietary intake patterns from childhood into adolescence (Wang et al 2002), with relatively little change in diet quality over time (Bertheke et al 2001), suggesting dietary habits learnt in infancy can influence preferences and practices in later life (Cockcroft et al 2005). Establishing a healthy lifestyle in childhood has been shown to have both immediate and long term consequences for children's educational attainment, mental, social and economic wellbeing (Feinstein et al 2008; Golley et al 2010). Diets that are particularly rich in fruit and vegetables are now globally recognised as having protective effects against cardiovascular diseases and certain types of cancer (Block et al 1992; Cockcroft et al 2005; Ness & Powles 1997) and to have a positive impact on long-term health outcomes from heart disease and asthma for children (Forastiere et al 2000; Nicklas 1995). Since research has shown that the quality of children's diets varies, methods of measuring children's diet quality are necessary to monitor health status of different sub-groups and appropriately target and evaluate interventions.

Conceptualising and measuring diet quality

Since the beginning of the 21st century, health practitioners, nutritionists and other scientists have been working to create tools to establish and measure diet quality, so that assessments can be made about whether the population is consuming 'good/healthy' (usually characterised as diets rich in fruit and vegetable content) or 'bad/unhealthy' foods (usually defining diets containing a high proportion of high fat processed foods) and to facilitate comparisons across different groups. However, while it is considered 'relatively easy to assess diet quality in terms of consumption of particular food items, developing a single indicator for the measurement of overall diet quality is a more complex task' (Dubois et al 2000: 358).

Alongside evidence supporting the positive impact of individual food items, such as fruit and vegetables, on long-term health and well-being, it is increasingly acknowledged that 'it is the combination of foods that groups of individuals eat which comprise the overall diet, rather than the presence or absence of specific food items, that is ultimately of importance to nutritional health status' (Pryer et al 2001: 787). As such, McNaughton et al (2008) argue that analyses of children's diets should examine not only individual food items or nutrients but also the types of food that make up their whole diet. Researchers have conceptualised the measurement of overall diet quality in two broad ways. The first is concerned with which foods are eaten in combination (food patterns). The second involves considering the nutritional value of different foods relative to guidelines (Diet Quality Indexes).

In epidemiological studies, individual diets are now being characterised not only in terms of the quantity of individual dietary components consumed but also in terms of how the overall diet is made up (i.e. the pattern of the diet) (Fahey et al 2007). This is because, as North & Emmett (2000: 73) postulate, 'exploring the relationship between several socio-demographic factors and various components of diet, such as the frequency of food consumption of individual foods, can be difficult to summarise, and since many isolated foods form even the most basic of diets, this could be seen as an uneconomical method of analysis'. Analyses of individual foods and nutrients also have the inherent problem of inter-correlations in that they are often eaten together. Different types of food may together be a stronger and perhaps more accurate description of diet than consideration of individual food items in isolation. Some of the reported drawbacks of analysing individual foods or nutrients can be overcome through employing statistical techniques that identify the underlying dimensions of a set of variables based on the inter-correlations of those variables. For example, cluster analysis has been used to allocate individuals to distinct groups based on their similar dietary

characteristics (e.g., James 2009; Pryer et al 2001) or for grouping dietary information into food groups (e.g., Brunner et al 2008; Crozier et al 2006; Würfält et al 2000). In such analyses, individuals/foods within each cluster group tend to be similar but differ from individuals in another cluster.

Currently, Principal Components Analysis (PCA) is the most popular technique for examining food patterns (Northstone & Emmett 2008). PCA is a method combining data reduction (by grouping correlated variables together) and identifying the underlying dimensions of the data. PCA has been usefully employed in several studies to examine the diets of adults (e.g., Barker et al., 1990; Whichelow & Prevost 1996) and children (e.g., North & Emmett 2000; Northstone & Emmett 2008; Craig et al 2010). However, despite being widely used in nutritional epidemiology, there have been some criticisms of the use of data driven approaches, such as PCA, to derive dietary patterns. For example, some have argued the exploratory nature of this method in individual studies means that the technique lacks repeatability between studies (Hu 2002; Jacques & Tucker 2001; Martinez et al 1998) and others have suggested that PCA produces disappointing results when deriving dietary patterns that are predictors of disease (Hoffmann et al 2004).

It has been argued that Diet Quality Indexes (DQIs), have certain advantages over data-driven dietary pattern approaches, such as PCA, because they are based on existing knowledge of optimal dietary patterns and provide a clear nutritional benchmark (McNaughton et al 2008: 86). As such, DQIs can be used to assess how official dietary guidelines at the nutrient and food level are met by populations and sub-groups (Armstrong et al 2009:4; Dubois et al 2000; Huijbregts et al 1997). Two commonly used measures are the Healthy Eating Index and the Revised Diet Quality Index (Haines et al 1999; Kennedy et al 1995). Both of these are based on the U.S. dietary guidelines and include both food and nutrient-based indicators. Whilst there has been some adaptation of the range of indicators to reflect the dietary guidelines in other countries (e.g., McNaughton et al 2008), as far as we know in the UK there is currently no single measure that enables dietary intakes of children of different age groups to be compared to the Dietary Reference Values (DRVs) produced by the Department of Health (Department of Health 1991). This is problematic for researchers, such as us, aiming to compare the diet quality of different sub groups of children in a systematic way.

Aims, Data and Methods

Background

This paper draws on a study which set out to examine the relationship between maternal employment status and children's diets using a mixed methods approach (O'Connell et al 2009). This included secondary analysis of the National Diet and Nutrition Survey (NDNS Year 1, 2008/09) and qualitative methods (including interviews) with an in-depth sample of 48 households, drawn from the NDNS 2009/10. The linked qualitative study aimed to get underneath the findings from the secondary analysis and provide a fuller picture. The purposive sampling strategy for the qualitative study sought to include children from the NDNS with 'healthier' and 'less healthy' diets in higher and lower income families where the mother was in paid employment. The study specified an age range of 1.5-10 years. This was because the focus was on families with pre-school and primary school age children (see O'Connell et al 2009 for further details). For this study, we developed a Diet Quality Index (DQI) for children aged 10 years and under. This was used as an outcome measure in regression analysis and a means of selecting the in-depth sample. We have termed this DQI a 'nutritional score' to emphasise that it uses purely nutritional components in its measure.

Aim of this paper

The aim of this paper is to describe the development of the aforementioned nutritional score for assessing diet quality of children aged 10 years and under. As we go on to describe below, there were two stages to this process; the final method represented a refinement of the earlier attempt.

Data

The nutritional score was developed using diet data from the National Diet and Nutrition Survey (NDNS Year 1, 2008/09). The NDNS is regarded as a world leading resource for measuring diet intake and is the only rolling UK survey to collect nationally representative and detailed dietary information on children and adults (Bates et al, 2011). Previously, the NDNS programme consisted of a series of discrete surveys each covering a specific age group (Gregory et al 1995; 2000). A key advantage of the NDNS is that it contains linked data on food consumption, nutrient intake, physical measures such as height and weight, nutritional status and contextual information on individuals, such as socio-demographic characteristics, shopping and cooking behaviour and physical activity information. Some NDNS data have been analysed by social class (Gregory & Hinds 1995), but not by mothers' employment.

Dietary information for children taking part in the NDNS is collected through a four day estimated (unweighed) food and drink diary. For children aged 12 years and under the parent/carer is asked to complete the four-day diary, with help from the child (as appropriate). Children over 12 are asked to complete the diary themselves but details are confirmed, where necessary, with the Main Food Provider (MFP) – the person in the household who is identified at the point of the NDNS interview as being responsible for food provision (including cooking). In the diary, respondents are asked to describe their food and drink consumed, giving as much detail as possible. They are asked to include extras like sugar and milk in tea or on cereal, butter or other spreads on bread and sauces such as ketchup and mayonnaise. If they knew how the food was cooked (e.g., roast, baked, boiled, fried), they were asked to record this, or if unsure to ask the person who prepared the food. The dietary information collected was coded and edited by the dietary assessment team at MRC Human Nutrition Research, using their in-house dietary assessment system DINO (Data In - Nutrients Out) and incorporating the NDNS Nutrient Databank (which contains data on the nutrient content of foods). Dietary records are converted to energy and nutrients as part of DINO and checked for outliers prior to reporting. Dietary Intake data are available to other researchers on the UK Data Archive held at the University of Essex. The dietary information is provided in the archive as derived variables which show the portions of food consumed by each participant. Nutrients are provided as the average daily intake and the contribution from different food types. The NDNS therefore provides rich data not only about the types and frequency of food consumption but about the nutritional quality of food, which can be used to develop a nutritional score.

Our qualitative sample (n=48) was drawn from the NDNS (NDNS Year 2, 2009/10). Participants of the 2009/10 NDNS were asked if they were willing to be contacted to participate in follow-on research. We were the first research team to be granted permission to use the NDNS for sampling research participants (as part of our funding agreement with the Food Standards Agency (FSA) and Economic and Social Research Council (ESRC)). We were given the contact details of those who had agreed to be contacted again at the time of the dietary assessment interview. At this point, the full NDNS data release for 2009/10 was being prepared for archiving to the UK Data Archive. However, much of the coding of variables had yet to be done. This meant we were restricted in the information we could be given about the 2009/10 NDNS participants who agreed to be contacted. Ideally we had wanted full dietary data from which to select participants according to 'healthier' or 'less healthy' diet (in

addition to employment status). However, detailed information about diets could not be supplied at the point at which we drew our sample for the case studies. We were limited instead to information about diets that is provided to all NDNS participants in the 'Dietary Feedback' report, which is provided to each individual participant about his or her own intake within three months of the diet record being completed. This provides information about the individual intakes of fat, saturated fat, Non-Milk Extrinsic Sugars (NMES), dietary fibre (as non-starch polysaccharide (NSP)), Vitamin C, folate, calcium, iron and energy (Table 1) relative to average intakes for each of these items for children in the UK, these being based on the results for children of this age from the NDNS conducted in the 1990s (Gregory et al 1995; 2000). This information is what we used to calculate our nutritional score.

Table 1: Nutritional variables available in the 'Dietary Feedback' to NDNS study participants

Food/Nutrient	Measure
Fat	% energy
Saturated Fat	% energy
NMES*	% energy
Dietary Fibre (NSP)	g/d
Vit. C	mg/d
Folate	µg/d
Calcium	mg/d
Iron	mg/d
Energy	Kcal/d

*Non-milk Extrinsic Sugars

The nutritional score developed was employed in both the secondary analysis (as an outcome measure in regression analysis) and for selecting the qualitative sample cases. This was essential in order to achieve a tool that would enable the results of our mixed-methods research design to be integrated and so that we could contextualise our case studies. We were also careful to develop a nutritional score that could be specifically applied to children in the age range we were interested in (10 years and under).

Nutritional score: first calculation method

Our first nutritional score produces a score for each child based on their intake of key nutrients relative to dietary guidelines (Department of Health 1991), which varies for some nutrients according to the age of the child. It followed the methodology developed by Kranz et al (2006) for a representative sample of 2-to 5-yearolds in the US Department of Agriculture Continuing Survey of Food Intakes by Individuals 1994-96 and 1998, which was a DQI designed to rank preschool children by their diet quality. All the nutritional items included in the 'Dietary Feedback' were included in our nutritional score, with the exception of 'Total Fat' and 'Energy'. The fat terms were excluded because, unlike older children and adults, the current UK recommendation is not to limit fat in young children under five years (Department of Health 1991). In addition, energy intake was also excluded because the recommendation for energy is based on a moderate level of activity being undertaken. There were no data available for physical activity or energy expenditure in the 'Dietary Feedback' and in addition, it is known that a high proportion of the population are largely sedentary and the recommendations are therefore inappropriate (Department of Health 1991).

The same weighting (of 5) was allocated to each nutritional item but a higher weight of 10 was allocated to NMES (Table 2) to take account of UK guidance for young children to reduce their intake of foods high in fat and foods and drinks high in free sugars (Department of Health 1991). By having a higher weight for NMES, children scoring highly on this nutritional component would obtain a higher score in the overall nutritional score. The allocation of points was proportional to the deviation from the ideal (defined as the recommended intakes).

Table 2: First method of calculating our nutrition score for children 10 years and under

Food/Nutrient	Unit of measurement	Guide or RNI ¹		Mean intake males 4-18 NDNS	Mean intake females 4-18 NDNS	Weight given to score for this nutritional item
		Child aged 4-6	Child aged 7-10			
NMES	% energy	10	10	16.7	16.4	10
Fibre	g/d	12	12	11.2	9.7	5
Vit. C	mg/d	30	30	75.2	71.2	5
Folate	µg /d	100	150	240	194	5
Calcium	mg/d	450	550	819	710	5
Iron	mg/d	6.1	8.7	9	7.9	5
Maximum total score (%)						35

¹Some UK RNI's do not differ by child age.

For the first nutritional scoring method, two formulas were developed. The first calculated an over consumption of NMES, whereby, if a child met the level at or below the guideline for NMES (11% energy), he or she would get the maximum score for NMES. Another formula was calculated for under consumption of calcium, iron, vitamin C, folate and fibre, whereby if a child met or exceeded the reference nutrient intake (RNI) for calcium, iron, C, folate or fibre, they would get a maximum score for that component. NMES and Saturated fats need to be expressed as '%/Kcal'. These variables were converted into '%/kcal' for the nutritional score as follows:

saturated fat: raw score*9/Energy*100

NMES: raw score*3.75/Energy*100.

The total nutritional score was calculated as a sum of the scores obtained for each of the nutritional items (for NMES, calcium, iron, vitamin C, folate and fibre) and expressed as a percentage. Hence, for example, if a child aged 5 years had an average intake of 16.7 per cent energy for NMES, 11.2 g/d for fibre, 25 mg/d for vitamin C, 75 µg/d for folate, 300 mg/d for calcium and 5 mg/d for Iron as an average of the four days of recording in the diary, their total nutritional score using this scoring method would be 76 per cent (see figure 1).

Figure 1: Example of first calculation method

$$76\% = 5.9 (\text{NMES}) + 5.3(\text{fibre}) + 4.2(\text{vitamin C}) + 3.75(\text{folate}) + 3.3(\text{calcium}) + 4.09(\text{Iron}) / 35 * 100$$

Where:

$\text{NMES} = 10 (\text{weight for NMES for child aged 4-6}) * 10 (\text{RNI for NMES for a child aged 4-6}) / 16.7 (\text{their average intake of NMES over the 4 day diet diary})$

$\text{Fibre} = 5 (\text{weight for fibre for child aged 4-6}) * 12 (\text{RNI for fibre for a child aged 4-6}) / 11.2 (\text{their average intake of fibre over the 4 day diet diary})$

$\text{Vit. C} = 5 (\text{weight for vit C for child aged 4-6}) * 25 (\text{their average intake of vit c over the 4 day diet diary}) / 30 (\text{RNI for vit c for a child aged 4-6})$

$\text{Folate} = 5 (\text{weight for folate for child aged 4-6}) * 75 (\text{their average intake of folate over the 4 day diet diary}) / 100 (\text{RNI for fibre for a child aged 4-6})$

$\text{Calcium} = 5 (\text{weight for calcium for child aged 4-6}) * 300 (\text{their average intake of calcium over the 4 day diet diary}) / 450 (\text{RNI for fibre for a child aged 4-6})$

$\text{Iron} = 5 (\text{weight for Iron for child aged 4-6}) * 5 (\text{their average intake of Iron over the 4 day diet diary}) / 6.1 (\text{RNI for fibre for a child aged 4-6})$

This first calculation method for our nutritional score as described above was compared for three different samples: the entire NDNS (for Year 1 (2008/09) as used in the secondary analysis), the total 'pool' of participants from the NDNS 2009/10 who agreed to be contacted again for further research, and the sampled cases from this pool that were included in our qualitative analysis (48 cases but only 47 had dietary information). The three samples were compared because we wanted to ascertain a) how well the calculation method represented the qualitative cases selected for the in-depth study relative to the 'whole NDNS sample' and b) how the selected qualitative cases compared (in terms of diet quality) with the larger pool of potential participants for our in-depth study. This was in order to rule out (or adjust) for any potential bias.

Analysis comparing the three samples showed this first calculation methodology for our nutritional score did not differentiate the qualitative sample particularly well. This is because most children's scores were skewed towards the upper end of the distribution, with the mean score being 89 per cent for the 'pool' and for the 47 qualitative cases (see Table 3: columns marked 'method 1'). This result is perhaps unsurprising as this calculation method converts the intakes of each nutritional component into fractions rather than covering the entire range of intakes, which would give a wider range of possible scores.

Table 3: Diet score distributions (in percentages) using both methods of calculating our nutrition score

	'Pool' of participants to NDNS in 2009/10 who agreed to take part in further research (n=131)		Selected qualitative cases drawn from 'Pool' (n=47)		Whole NDNS sample for 2008/9 for children aged 0-10 (n=359)	
	Method1	Method2	Method1	Method2	Method1	Method2
Highest	100	91	100	89	73	94
Lowest	76	23	76	23	11	14
Mean	89	61	89	59	43	55

In addition, as some of the nutritional components are not static, it could be argued to be inaccurate to give a single score to everyone over or below a set level (as in the first calculation method). Current recommendations for Vitamin C for example are that higher intakes are better because of antioxidant properties (Department of Health 1991). Therefore, scoring for this nutritional component should ideally increase in line with higher intakes of Vitamin C – but only up to a threshold because there is evidence to support the body can only store a certain level of Vitamin C so that intakes above this level are of no further benefit (see for example Levine et al 1995). Perhaps allocating scores above and below a threshold does not therefore reflect the complexity of the physiological role of the nutrient in the body and its impact on health.

Nutritional score: refined method of calculation

To address some of our concerns with the first nutritional method, we developed a modified calculation method for our nutritional score, which aimed to capture better the complexity of the nutrients and take into account the normal ranges observed. In this revised nutritional score, the same nutritional components were included as our earlier method. However, with this method, points were awarded in relation to different ranges of intake of each nutritional component, with each range informed by current UK guidelines for young children (Department of Health 1991), the age of the child and published expert opinion (FSA 2002). For example, for vitamin C, RNI is 30mg daily (Department of Health 1991). Evidence also shows median intakes of vitamin C from food and supplements in young people and in adults range from 50 to 68.5 mg/day (FSA 2002). Therefore, 30mg and 70mg were used as the upper and lower ranges of our scoring system for vitamin C. Table 4 shows the ranges and scoring allocated to each range for each of the nutritional components, for each age group of children, in the revised nutritional score. As with the first scoring method, NMES and saturated fats were initially converted into '%/kcal'.

Table 4: Second method of calculating our nutrition score for children aged 18 months-10 years

Nutritional component	Age of child	Range	Score
NMES	1.5-10 years	<8 8-10 10-14 14-18 18-22 >22	5 4 3 2 1 0
Fibre	1.5-3 years	<4 4-6 6-8 8-10 10-12 >12	0 1 2 3 4 5
Fibre	4-6 years; 7-10 years	<6 6-8 8-10 10-12 12-14 >14	0 1 2 3 4 5

Vit C	1.5-10 years	<30 30-50 50-70 >70	0 2 4 5
Folate	1.5-3 years	<70 70-120 120-170 >170	0 2 4 5
Folate	4-6 years	<100 100-150 150-200 >200	0 2 4 5
Folate	7-10 years	<150 150-200 200-250 >250	0 2 4 5
Calcium	1.5-3 years	<350 350-600 600-800 800-1000 >1000	0 1 2 4 5
Calcium	4-6 years	<450 450-600 600-800 800-1000 >1000	0 1 2 4 5
Calcium	7-10 years	<550 550-700 700-900 900-1100 >1100	0 1 2 4 5
Iron	1.5-3 years	<5 5-6 6-7 7-8 >8	0 1 2 4 5
Iron	4-6 years	<5 5-6 6-7 7-9 >9	0 1 2 4 5
Iron	7-10 years	<6 6-7 7-8 8-9 9-11 >11	0 1 2 3 4 5

Using the revised nutritional scoring method, the distribution of scores was less skewed towards the upper end of the distribution compared with the first method (for the 'pool': a mean score of 61 per

cent was derived using the revised calculation method compared with 89 per cent mean score for the first calculation method:

Table 3). In addition the scores for the 'pool' and qualitative cases were closer to the mean scores derived for the whole NDNS sample using the 2008/9 wave one data using the revised method (Table 3: a derived mean score of 61 for the 'pool' is only 6 percentage points higher than the mean score of 55, derived for the whole NDNS sample for 2008/9 using the Year 1 data). In addition to differentiating the 47 qualitative cases in terms of their diet, we employed the revised nutritional score in our study in our secondary analysis. We found no statistical relationship between the nutritional score (as calculated using the revised method) and maternal employment.

Discussion

This paper reports on the development of a nutritional score which was needed to assess diet quality of children in a mixed methods research study. This study utilised the National Diet and Nutrition Survey (NDNS), which is the most comprehensive UK survey to collect nationally representative and detailed dietary information on children and adults. This made it an ideal resource from which to construct a Diet Quality Index. Our nutritional score enables the nutrient intakes of population sub-groups (in this case, younger children with and without mothers in paid employment) to be compared relative to each other and to national recommendations. Since these data are calculated using four day diet diaries, which are good measures of diet at the aggregate and individual level (Stephen 2007), this scoring method is appropriate for use in secondary analysis and for assessing diet quality more qualitatively for small groups of children.

Our nutritional score has been designed for specific use with NDNS data for children aged 10 years and under. Therefore, it may not be suitable for use with other datasets and would require modification, such as including terms for fat and/or saturated fat to be used for examining diet quality of other population sub-groups including older children and adults. It is also limited to the information supplied in the NDNS 'Dietary Feedback' to NDNS respondents. However, our revised nutritional score does have certain important methodological advantages over alternative methods. For example, PCA and food cluster analysis are data driven methods which derive subjective patterns from underlying data. In contrast, DQIs, such as our nutritional scoring method, are derived in relation to actual guidelines for the groups under investigation.

We suggest our revised nutritional score offers a more accurate method than the first nutritional score because it better captures the complexity of nutrients and takes into account the normal ranges observed. However, we do not claim that either of our nutritional scores is perfect. The purpose of this paper is to suggest first steps into developing a scoring method based on nutritional information for use for assessing diet quality for young children (aged 10 years and under), which did not exist in the UK prior to our study. We would welcome other researchers further developing this tool and also assessing its applicability and use in other large studies and surveys.

Acknowledgment

The study which is the focus of this paper was funded as a collaborative grant between the Economic and Social Research Council (ESRC) and Food Standards Agency (FSA) in 2009 (RES-190-25-0010). On 1 October 2010, responsibility for nutrition policy transferred from FSA to the Department of Health (DH). As a result, the research project also transferred to DH. The authors would like to thank their co-researchers (Julia Brannen, Ann Mooney, Charlie Owen and Abigail Knight), the DH and ESRC for funding this research, colleagues at MRC HNR and NatCen Social Research for their help in drawing a sample from the National Diet and Nutrition Survey, and of course the families who generously gave

their valuable time to participate in the study. Special thanks to Carol Devine, Cornell University, for advising the team on the methodological considerations involved with developing DQIs and her input in constructing the first nutritional score reported in this paper.

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Biography

Antonia Simon is a Research Officer, at the Thomas Coram Research Unit, Institute of Education. She has over 15 years experience of undertaking and managing mixed-methods research projects, with particular expertise in analysing official statistics, administrative, cross-sectional and longitudinal data. She has conducted a wide range of research around child and family services. Her research interests include statistical research methods, the internal migration of ethnic groups within the UK, the health and well-being of families, and children and young people in care/leaving care.

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Paper 6: Changing trends in young people's food behaviour and wellbeing in England in relation to family affluence between 2005 and 2014

This is the final pre-publication version. Full Pdf can be downloaded here:

<https://doi.org/10.1080/13676261.2017.1406599>

Abstract

Research shows that healthy eating improves outcomes for children and that inequalities in diet are socially determined. However, little is known about how associations between household income and the diet intake of children and young people change over time. Descriptive analysis was carried out using the Health Behaviour in School-Aged Children survey data for England for the years 2005, 2009 and 2014 to examine how breakfast, fruit, vegetable and soft drink consumption compares for young people aged 11-15 years by family affluence (low versus medium/high), gender and wellbeing measures. The results show young people in the low FAS group generally reporting less healthy eating behaviours, and differences by gender such as more soft/sugary drink consumption and lower consumption of fruit and vegetables for boys. Young people in the low FAS group also tend to have lower self-reported ratings on other wellbeing measures examined. There is evidence of a 'closing gap' between the FAS groups over time in terms of some behaviours. The patterns reported here are complex to interpret but do highlight some potentially positive effects of policies for addressing poor diets and dietary inequalities as well as some concerns given the UK context of continuing political uncertainty.

Key words: Adolescence; Health; Fruit; Vegetables; HBSC.

Introduction

Long-standing social inequalities in health and nutrition exist in the UK (Dowler and Spencer 2007; Dowler 2008). In addition, the global economic recession, rising price of some foods (from 2007 to 2012) and so-called 'austerity' policies resulting in falling or stagnant incomes have made food less affordable for UK households in recent years (O'Connell and Hamilton 2017). However there is a lack of systematic evidence about how changing social policies and reduced affordability of food impact upon children's and young people's diet intakes. Using repeat cross sectional data from the Health Behaviour in School-aged Children (HBSC) study (Currie et al 2012), this paper adds to what is known by analysing the association between family affluence and self-reported consumption of breakfast, fruit, vegetables and soft drinks by young people aged 11-15 years in England in 2005, 2009 and 2014.

Background

Food is a source of nutrients and a medium for social relations with important health and participation dimensions, especially for young people. Social scientific approaches have demonstrated that children and teenagers seek to establish and express their identity and independence, including through the foods they consume, in an increasingly wide range of settings (Hamilton and Wills 2017; O'Connell and Brannen 2016; Wills et al 2005; Rawlins 2009). Lifecourse approaches also suggest that adolescence is a critical life stage during which many biological, physical, emotional, cognitive, behavioural and social changes take place (WHO 2006) and in which long-term health behaviours are established (Hagell, Coleman and Brooks 2013). Since growth during adolescence is faster than at any other time in an individual's life except for the first year, it is

also recognised as a period of increased nutritional requirements (WHO 2005). Whilst 'healthy eating' contributes to young people's wellbeing (Shepherd et al 2006), sub-optimal diet and food practices, such as skipping breakfast (Hoyland, Dye and Lawton 2009), are associated with poor cognition and lower academic achievement as children's ability to concentrate is damaged by insufficient food or food of poor nutritive value (Dowler 2014).

The UK government recommends that boys and girls aged 11 to 18 years should consume at least five portions of a variety of fruit and vegetables per day and no more than 11 per cent food energy consumption in the form of non-milk extrinsic sugars (NMES) for those aged five years and over (PHE 2014b). However evidence from the National Diet and Nutrition Survey (NDNS) suggests that these targets are not being met (Bates et al 2011). For example NDNS data for 2008 to 2012 shows mean consumption of fruit and vegetables for children aged 11 to 18 years was 3.0 portions per day for boys and 2.7 portions per day for girls and only 10 per cent of boys and 7 per cent of girls in this age group were found to have met the five-a-day recommendation for children aged 11 to 18 years (PHE 2014b). Sugary drinks are known to contribute to the higher than recommended intakes of NMES, with 11-18 year olds having the highest reported mean consumption of soft drinks (PHE 2015): 78 per cent of this age group consumed 'soft drinks' such as sugar-sweetened beverages (SSB) over a four-day period (PHE 2014a).

There are also known differences between adolescents by household income that appear to reflect a broader social gradient in health and diet intake. There is evidence that inequalities of food and diet in the UK are socially determined (Dowler 2008). Analysis of the NDNS by equivalised income (a measure that takes account of the differences in a household's size and composition) shows differences in diet and nutrient intake, specifically that those in lower income quintiles tend to have poorer diets, particularly with respect to fruit and vegetable consumption (PHE 2014b). Mean fruit and vegetable consumption expressed in five-a-day portions was found to be significantly lower in all age/sex groups in income quintile 1 (lowest income) compared with quintile 5 (highest income) (ibid). Reflecting household level data, the national report for the HBSC study in England for 2009 found that 'family affluence' is an important predictor of young people's health, with higher affluence associated with higher reported fruit intake and greater likelihood of daily breakfast consumption (Currie et al 2012). Diet is also reported to vary by gender, with for example boys more likely to consume breakfast than girls (ibid).

In the context of economic austerity and rising food prices there is evidence that healthier foods have become more expensive than unhealthier ones (Jones et al 2012) and, at the household level, research suggests that reduced affordability of food has impacted on the purchase of healthy foods. For example, the Department for Environment, Food and Rural Affairs' (Defra) annual analysis of the Living Costs and Food Survey (food purchase data), shows that UK household purchases of fruit and vegetables were 11.4 per cent lower in 2014 than their peak in 2006, with low income group households purchasing the least amount of fruit and veg: 3.0 portions per person/ day (Defra 2015). However less is known about how economic phenomena and policy changes, such as austerity and rising food prices, impact upon the diet or nutrition intakes of young people.

In this paper, we seek to extend and complement the analysis by Currie et al (2012) described above by examining in detail trends for England using the HBSC data for 2005, 2009, and 2014, addressing the research question: 'What is the relationship between family affluence and self-reported consumption of breakfast, fruit, vegetables and soft drinks by young people aged 11-15 years in England and how does this change over time?' We also examine the relationship between self-reported food behaviours, gender and wellbeing. Given the UK context of continuing political

uncertainty, economic austerity, higher inflation including food prices, and sustained policy interest in improving the diet intake of children and young people, the analysis is very timely.

Method

Secondary data and study participants

The analysis reported in this paper was conducted on data from the HBSC study for England in 2005, 2009 and 2014. The HBSC is a multi-national, cross sectional survey that uses a school-based self-completion questionnaire to collect data every four years from 11-, 13- and 15-year-old boys and girls about their health and well-being, social environments and health behaviours. The HBSC now includes 44 countries and regions across Europe and North America. Some core questions are asked in all of the countries (the 'mandatory questionnaire') whilst additional batteries of questions ('optional modules') are asked by groups of countries with particular shared interests. Some questions are country specific ('country-level only'). In part this reflects the funding arrangements of the study which are such that each survey is funded nationally and funders may require that particular questions are included. Further information about the HBSC can be found at: <http://www.hbsc.org/about/>.

Measures and analysis

Currie et al (2008a; 2008b) developed a Family Affluence Scale (FAS) for the HBSC. It consisted of four questionnaire items concerning family ownership of a car (scored: No 0, Yes, one 1, Yes, two or more 2), child having their own bedroom (scored No 0, Yes 1), having family holidays (scored: Not at all 0, Once 1, Twice 2) and family computers (scored: None 0, One 1, Two 2, More than two 3). The scale ranged from zero to eight. The scale was then coded into three categories: low (0-3), medium (4-6) and high (7-8). This three-point scale has been used here. For the analysis reported here, we compared 'low FAS' with 'higher FAS' (combining medium and high). Distribution of values for each of the years did not distinguish much between medium and high FAS so we felt justified in merging these two categories. The way we have categorised these variables follows analysis reported by Niclasen et al (2013) who examined the adverse health effects of experiencing food insecurity among Greenlandic school children.

HBSC England includes a number of variables related to food behaviours that may be used as indicators of healthiness of diet in relation to recommended intake. Descriptive analysis (using SPSS) was carried out for the following food behaviours in relation to FAS: Eats Breakfast 5-6 times a week or more, Eats Vegetables 5-6 times a week or more, Eats Fruit 5-6 times a week or more, and drinking soft drinks 5-6 times a week or more. Three measures of general wellbeing are provided in the HBSC dataset: self-rated health good or excellent, self-reported 'very best' quality of life and self-reported academic achievement as 'very good/good'. These are the only measures of 'wellbeing' (wellbeing in the broadest sense) provided in the HBSC and are reported in the HBSC international reports as indicators of general wellbeing for young people (Currie et al 2012). Previously, analysis of the HBSC has discussed how important, especially during adolescence, it is to include life satisfaction (which is an important cognitive aspect of well-being) and not just report the "health oriented" satisfaction with life, i.e., the child's/adolescent's current situation (Suldo et al 2006). We examined these same 'wellbeing' measures in relation to FAS. Finally, food behaviours and the wellbeing measures were examined by gender. P values for the Pearson chi-square are presented along with phi coefficients (measuring the strength of relationship: Cohen 1977, 223).

The distribution of these variables for each of the HBSC data time points analysed (2005, 2009 and 2014) are given in table one below. This table shows that the proportion of young people in the low

FAS group was lowest in 2014 (7.4% in 2005, 11.4% in 2009 and 6.3% in 2014), indicating an improvement in socio-economic circumstances for young people over time. Although the FAS has been shown to have acceptable validity and reliability (e.g., Currie et al 1997, Kehoe and Hare 2010), Schnohr et al (2008) highlighted its limitations for cross-country comparisons due to differential response on the individual items. However, that is not relevant here as we are only analysing data for one country. More recently, Schnohr et al (2013) have identified a drift in item scores over time: in particular, a big growth in computer ownership in the 2009/10 survey produced an increasing mean for the scale, potentially reducing its validity. In the current study we also found a growth in computer ownership, giving an increase in mean FAS: in 2005 36.5% of households had more than two computers, by 2014 this had increased to 71.6%.

The percentages for the health and wellbeing measures used and for FAS, for each of the three surveys, are shown in Table 1. There is a slightly higher proportion of girls in the low FAS group at each time point but the gap between boys and girls narrows over time and is smallest in 2014.

Table 1: Variables analysed in 2005, 2009 and 2014 HBSC, England: all young people

	2005 (n=4223)	2009 (n=3003)	2014 (n=4914)
Eating breakfast on all schooldays	64.7%	59.9%	66.4%
Eating fruit 5-6 times a week or more	58.8%	52.7%	52.7%
Eating vegetables 5-6 times a week or more	62.5%	57.8%	62.7%
Drinking soft drinks 5-6 times a week or more	34.1%	52.6%	22.3%
Self-rated health good or excellent	81.4%	83.8%	16.6%
Very best quality of life	11.9%	10.0%	11.2%
Good or very good academic achievement	72.4%	73.8%	75.9%
Low FAS group only	7.4%	11.4%	6.2%
Gender % in low FAS group:			
Boys	6.7%	10.4%	5.7%
Girls	8.0%	12.0%	6.8%

Results

Overall for young people aged 11-15 years the proportion eating breakfast and vegetables 5-6 times per week or more has remained stable over time (for breakfast, the proportion changes from 65% in 2005 to 61% in 2009 to 66% in 2014 and for vegetables the proportion changes from 63% in 2005 to 59% in 2009 to 63% in 2014: see Table 4). However, there has been a decline in the proportion

reporting drinking soft drinks five or more times a week over time (from 34% in 2005 to 52% in 2009 to 22% in 2014: see table one). Examining these trends comparing low FAS and higher FAS young people produces a more complex picture. These results are discussed in the sections below.

Breakfast consumption

The proportion of young people aged 11-15 years eating breakfast five to six times per week or more declined in 2009 compared with 2005, but then rose between 2009 and 2014 so that the proportion of young people consuming breakfast at least five times per week was higher in 2014 than in 2005 (from 54.7% in 2005 to 65.9% in 2014 for all young people aged 11-15 years: Table 1). Most of the rise in breakfast consumption between 2005 and 2014 was driven by the increase in the proportion of young people in the low FAS group eating breakfast (a rise from 50.2% in 2005 to 54.7% in 2014: Table 2).

Table 2: Associations of 'FAS' by per cent of young people who eat breakfast for 2005, 2009 and 2014 HBSC, England

	% of young people who eat breakfast		
	2005 (n=4223)	2009 (n=3003)	2014 (n=4914)
Low FAS	50.2%	45.6%	54.7%
Medium/High FAS	66.0%	61.9%	66.6%
All	64.9%	60.1%	65.9%
Chi-square	P<.001*	P<.001*	P<.001*
Phi	.087	.105	.060

Consumption of fruit and vegetables

The proportion of young people eating fruit five to six times per week or more declined overall in 2009 compared with 2005, and then in 2014 was at about the same level as 2009. The pattern is different when comparing the low FAS and higher FAS groups however (see Table 2). Fruit consumption five to six times per week or more declined steadily for the higher FAS group over the three time points (from 59.9% in 2005 to 54.7 in 2009 to 53.4% in 2014: Table 3). In contrast, for the low FAS group, the proportion of young people eating fruit five to six times per week or more declined between 2005 and 2009, before rising again in 2014 to a higher proportion than in 2005 (declining from 44.9% in 2005 to 40.8 in 2009 before rising to 45.8% in 2014: Table 3). Although a greater proportion of the higher FAS group reported eating fruit 5-6 times per week or more in 2014 compared with the low FAS group, the gap between the two groups had narrowed when compared to the respective proportions for these groups in 2005 (a gap of 7 percentage points in 2014 compared with 15 in 2005). For young people aged 11-15 years, almost the same proportion ate vegetables five to six times per week or more in 2005 and 2014, with a slight dip in 2009

(Table 4). This pattern was true both for the higher FAS groups and for the low FAS group (the gap between the two groups was 15.9 percentage points in 2014: Table 4).

Table 3: Associations of 'FAS' by per cent of young people who eat fruit 5-6 times a week or more for 2005, 2009 and 2014 HBSC, England

	% of young people who eat fruit 5-6 times a week or more		
	2005 (n=4223)	2009 (n=3003)	2014 (n=4914)
Low FAS	44.9%	40.8%	45.8%
Medium/High FAS	59.9%	54.7%	53.4%
All	58.8%	53.1%	52.9%
Chi-square	P<.001*	P<.001*	P=0.014*
phi	.080	.088	.037

Table 4: Associations of 'FAS' by per cent of young people who eat vegetables 5-6 times a week or more for 2005, 2009 and 2014 HBSC, England

	% of young people who eat vegetables 5-6 times a week or more		
	2005 (n=4223)	2009 (n=3003)	2014 (n=4914)
Low FAS	48.8%	44.0%	48.7%
Medium/High FAS	64.1%	60.6%	64.6%
All	63.0%	58.7%	63.6%
Chi-square	P<.001*	P<.001*	P<.001*
Phi	.082	.107	.080

Consumption of 'soft drinks'

The HBSC question examined on soft drinks is a measure of the consumption of drinks that contain sugar, such as coke, squash or other soft drink. Compared to 2005 and 2009 there was a decline overall in 2014 in the proportion of young people reporting that they consumed soft drinks five to six times per week (Table 5). However this decline in soft drink consumption followed a sharp rise in 2009 for both groups. In 2009 similar proportions of young people in the low FAS and higher FAS groups said that they drank soft drinks five to six times per week or more. The pattern observed in 2009 of higher soft drink consumption is different to that found in 2005, when a third more young people in the low FAS group reported drinking soft drinks five to six times per week or more. There was almost no difference in 2014 between the low and higher FAS groups for this variable. Whilst smaller proportions of young people from both groups reported drinking soft drinks five to six times per week in 2014, the most dramatic difference since 2005 is in the low FAS group. The observed reduction in soft drink consumption between 2009 and 2014 for all young people could be related to a change in wording about sugary drinks in the HBSC England questionnaire (Brooks et al 2015; Brooks et al 2011, the protocol can be requested from the HBSC data hub). In 2009, the wording for the HBSC question on sugary drinks was: "How many times a week do you usually drink coke, squash or other soft drinks that contain sugar?". In 2014, the question was changed to: "How many times a week do you usually drink fizzy drinks that contain sugar e.g., Coke, Pepsi, and Lemonade. NOT diet drinks?". The change in question wording between 2005/9 and 2014, especially the addition of the phrase "NOT DIET DRINKS" means the two questions are not asking exactly the same thing over time and are likely to have been interpreted differently by the young people questioned at each time point. Also, in 2014 in the HBSC survey for England, a further two questions were included: "How

many times a week do you usually drink energy drinks e.g., Red Bull and Monster?" and "How many times a week do you usually drink squash that contains sugar"? This means that not only has the question wording changed between 2005/9 to 2014 but that two components of the earlier question have been separated out in 2014. These changes to the question wording in 2009 and 2014 could mean the question was understood differently by young people at each of these time points, making it complicated to interpret whether the reduction we observed in soft drinks between 2009 and 2014 is real or an artefact of these wording changes within the HBSC. However, while the wording changed for all groups, the differences over time were not the same for the FAS groups. We observed that the low FAS group saw the largest decline in consumption of soft drinks over time. It is unlikely therefore that the wording changes alone to soft drinks in the HBSC explain all of the difference observed between the low and higher FAS groups between 2009 and 2014.

Table 5: Associations of 'FAS' by per cent of young people who drink 'soft drinks' 5-6 times a week or more for 2005, 2009 and 2014 HBSC, England

	% of young people who drink 'soft drinks' 5-6 times a week or more		
	2005 (n=4223)	2009 (n=3003)	2014 (n=4914)
Low FAS	40.3%	53.0%	24.1%
Medium/High FAS	33.3%	52.3%	22.2%
All	33.8%	52.4%	22.3%
Chi-square	P=0.012*	P=0.827	P=0.455
Phi	.039	.004	.011

Other measures of wellbeing

Three aspects of wellbeing reported by study participants: 'self-rated health as good or excellent', 'very best quality of life' and 'good or very good academic achievement' were also related to FAS. There is a clear association overall between 'healthy food behaviours' (all the healthy eating food variables except for vegetables) and all three aspects of wellbeing we examined (Tables 6 to 8). This pattern holds across time. However, there were some notable differences between the low FAS and higher FAS groups: a higher proportion of the higher

FAS groups reported having good or very good academic achievement at each time point (Table 5). This pattern was also true for self-rated health for the years 2005 and 2009. However, in 2014 a greater proportion of the low FAS group reported positive ratings of quality of life compared with the higher FAS groups.

Table 6: Associations of 'FAS' by per cent of young people who self-rate their health as 'good' or 'excellent' for 2005, 2009 and 2014 HBSC, England

	% of young people who self-rate their health as 'good' or 'excellent'		
	2005 (n=4223)	2009 (n=3003)	2014 (n=4914)
Low FAS	67.8%	78.3%	79.7%
Medium/High FAS	82.0%	84.0%	86.0%
All	81.0%	83.4%	85.6%
Chi-square	P<.001*	P=0.008*	P=0.005*
Phi	.095	.048	.043

Table 7: Associations of 'FAS' by per cent of young people who report having the 'very best quality of life' for 2005, 2009 and 2014 HBSC, England

	% of young people who report having the 'very best quality of life'		
	2005 (n=4223)	2009 (n=3003)	2014 (n=4914)
Low FAS	9.7%	7.4%	12.2%
Medium/High FAS	12.1%	9.8%	10.8%
All	11.9%	9.6%	10.8%
Chi-square	P=0.213	P=0.159	P=0.461
Phi	.019	.026	.011

Table 8: Associations of 'FAS' by per cent of young people who report 'good' or 'very good' academic achievement for 2005, 2009 and 2014 HBSC, England

	% of young people who report 'good' or 'very good' academic achievement		
	2005 (n=4223)	2009 (n=3003)	2014 (n=4914)
Low FAS	64.5%	72.6%	70.6%
Medium/High FAS	73.0%	73.6%	76.7%
All	72.4%	73.5%	76.3%
Chi-square	P<.001*	P=0.710	P=0.022*
Phi	.050	.007	.035

Gender

Eating behaviours also varied by gender. In particular, a higher proportion of boys aged 11-15 years reported consuming breakfast 5-6 times per week or more (71% in 2005, 66% in 2009 and 74% in 2014) compared with girls (59% in 2005, 55% in 2009 and 59% in 2014). This difference is much bigger than any of the other difference between boys and girls. However, a higher proportion of girls consumed fruit (e.g., 55% compared with 50% of boys in 2014). A lower proportion of both boys and girls consumed fruit than vegetables over time (comparing 2005 with 2014). Boys were also more likely to drink soft drinks (38% in 2005, 56% in 2009 and 25% in 2014) as compared with girls (30% in 2005, 50% in 2009 and 20% in 2014) at each time point. There was a reduction in 2014 for both boys and girls, but, as noted above, there was a change in the wording for the question which may have influenced the responses.

Gender differences were also observed for the three aspects of wellbeing examined. A higher proportion of boys than girls aged 11-15 reported having good or excellent self-rated health at each time point (e.g., 88% compared with 83% in 2014). Conversely a greater proportion of girls than boys reported having self-rated good or very good academic achievement at each time point, and the gap between the two groups increases over time (70% of boys and 74% of girls in 2005, 71% of boys and 76% of girls in 2009, and 71% of boys and 81% of girls in 2014). The pattern for self-rated quality of life changes over time, being the same proportion for both groups in 2005, and higher for boys in 2009 (12% compared with 9% girls) and in 2014 (12% compared with 10% of girls), which supports findings reported elsewhere of perceived quality of life being higher for boys than girls (Jiménez-Iglesias et al 2015).

Discussion

Descriptive analysis was carried out on variables related to young people's self-reported food and eating behaviours in the Health Behaviour in School-Aged Children (HBSC) survey data for England for the years 2005, 2009 and 2014. The analysis finds a small rise over time in the proportion of young people aged 11-15 years consuming breakfast, vegetables and fruit five to six times per week and a reduction in the proportion drinking soft drinks every day. Reflecting analysis by Currie et al (2012) the patterns also vary by FAS for example, daily breakfast consumption is less common in families with lower affluence. The largest changes over time reported here appear to be for the low FAS group in their increased reported consumption of breakfast and reduction in sugary drinks. Overall we find there's no pattern in the strength of relationship over time with each of our food and wellbeing measures. These results are discussed in more detail below, in relation to changing UK economic and policy contexts.

The analysis finds a big gender difference in the consumption of breakfast, with boys much more likely to report eating breakfast than girls. This difference was consistent across the three surveys. Overall there was an increase over time in the consumption of breakfast by young people aged 11-15 years, and that was higher at each time point for the higher FAS groups compared to the low FAS group. However, what is particularly interesting is that it is the low FAS group that has seen the largest improvement over time. This could be because of changes made to the provision of school breakfasts. The School Food Plan launched in 2013 (Dimbleby and Vincent 2013) includes an Action that sets out a Department for Education commitment to set up financially self-sufficient breakfast clubs to increase healthy breakfast provision for children who are arriving at school hungry. Whilst there is a lack of research on breakfast club provision in the UK, a report by cereal manufacturer Kellogg's suggests the use of breakfast clubs has increased by 45 per cent since 2008 (Kellogg's 2014) and a proportion of these offer free breakfast to all pupils or those eligible for free school meals (FSM). Charitable support (e.g., from Kellogg's or social enterprise Magic Breakfast) may be accessed by schools with a high proportion of children eligible for free school meals. Given that many of the young people in the low FAS group are likely to be entitled to receive FSMs, this could be a possible explanation for why a greater proportion of the low FAS group consume breakfast over time and why the gap between the low FAS and higher FAS groups narrows over time.

It is also possible that the reduction observed in the proportion of young people reporting that they drink sugary drinks five to six times per week, and in particular the steep fall in the proportion of young people in the low FAS groups reporting this, perhaps reflects the success of 'behaviour change' public policy intervention. The Change4Life social marketing programme (Department of Health 2011) that was developed as part of the childhood obesity prevention strategy, launched in 2009 and originally targeted parents of children aged five to 11, 'particularly those from segments of the population where parental attitudes, beliefs and behaviours indicated that their children were most likely to gain excess weight' (*ibid*: 3). Whilst we cannot be confident that the reduction observed in the proportion of young people drinking soft drinks over time was not due to changes to the question wording between 2005/9 and 2014, it is unlikely that the soft drink question was interpreted differently by young people in the low and higher FAS groups. This means the reduction in soft drink consumption for the low FAS group is likely to be true. However, other data suggests that sugary drinks consumption for all groups remains high and has led to the UK government adopting NICE recommendations to introduce a sugar a tax or levy that will come into effect in April 2018 (HM Treasury 2016), suggesting that behaviour change strategies have not been very successful in reducing sugar intake. Boys were slightly more likely to drink sugary drinks than girls in all three surveys.

The findings also indicate differences between the consumption of vegetables and fruits between the low FAS and higher FAS groups. The findings show that whilst eating fruit five to six per week declined steadily for the higher FAS group over the three time points, for the low FAS group, the proportion of young people eating fruit five to six times per week declined between 2005 and 2009, before rising again in 2014 to a higher proportion than for 2005. Although a greater proportion of the higher FAS group reported eating fruit five to six times per week in 2014 compared with the low FAS group, then, the gap between the two groups had narrowed compared to 2005.

It is not straightforward to interpret these patterns. Rising food prices may explain some of the decline in reported fruit consumption between 2005 and 2009: UK food prices increased by 11.5 per cent in real terms between 2007 and 2012 (when prices peaked), and more for fresh fruit (23%) and vegetables (24%) (Defra 2015). Research suggests that at the household level purchase of fruits and vegetables declined over 'the great recession' (Griffith et al 2014). Analysis by Defra suggests that the effects of rising prices are greatest in households that spend a larger proportion of their budget on food and in 2012: those in the lowest income decile spent 22 per cent more on food in 2012 than in 2007 but purchased 5.7 per cent less, buying significantly fewer portions of fruit and vegetables than previously (Defra 2015). Since gradual price reductions since 2013 have reduced the real terms increase in food prices to 8 per cent compared to 2007, this may explain the levelling off observed for higher FAS groups. However, it does not explain why reported fruit consumption has risen for the lower FAS group since 2009. Some evidence (e.g., Nicklas et al 1998; Sahota et al 2001, 2001b) supports the interpretation that nutrient-based standards (now supplanted by food-based standards), which were introduced in most secondary schools in England in 2009, increase young people's consumption of fruit. However this does not account for the difference between low and higher FAS groups.

The analysis also found a positive relationship overall between healthy food behaviours (except for vegetables) and all three aspects of wellbeing examined. However, those in the low FAS group, generally rated their health and academic achievement worse than the higher FAS groups.

Furthermore, girls rated all aspects of wellbeing, apart from academic achievement, worse than boys, despite that they generally reported healthier food behaviours, with the exception of eating breakfast regularly. These results reflect that the relationship between food, health and wellbeing for teenagers is complex and that it is gendered as well as classed. It is likely that body image plays an important role and may explain the lower proportion of girls eating breakfast (Austin and Gortmaker 2001).

There are some data limitations with using the FAS that need to be acknowledged. FAS was developed by the HBSC team as a means of differentiating poor and affluent families in national and cross-national samples. However, a number of challenges in the using this measure are cited in the HBSC protocol. The (original) FAS measures were based on absolute affluence (i.e., quantity of material assets in the family) so the FAS scores might not equally correspond to relative differences in affluence across different socioeconomic conditions (i.e. between countries or between survey years). They therefore suggest it is problematic to equate the average or distribution of FAS data or the associations between FAS and health over time or between countries (Currie et al 2008b). This could explain why we find differences in the proportion of young people in the low FAS group for each survey year examined.

Conclusions

In the UK a longstanding social gradient in health and diet intake is related to inequitable economic access to sufficient healthy food (Dowler, 2008). The analysis reported here confirms that this

pattern is found among teenagers and that it persists over time. The results show marked inequalities by FAS, with young people in the low FAS group generally reporting less healthy eating behaviours than the medium/high FAS group, and differences by gender, for example, more soft/sugary drink consumption and lower consumption of fruit and vegetables for the boys. Young people in the low FAS group also tend to have lower self-reported ratings on some of the other wellbeing measures examined – health and academic achievement. However, as discussed, the patterns are more complex than this at first suggests. There is evidence of a ‘closing gap’ between the low FAS and higher FAS groups in terms of some behaviours, namely eating breakfast regularly, eating more fruit and consuming less sugary drinks over time. However, as noted above, the meaning of FAS over time may have changed due to differential change on the items of the scale (Currie et al 2012).

Whilst some of the trends appear encouraging, they are difficult to interpret and not necessarily cause for celebration. For example the closing gap between higher and low FAS groups regarding fruit consumption is explained not only by a rise in fruit consumption by the low FAS group but a fall and levelling off among the higher FAS group that occurs in the context of high food – especially fruit - prices. Some of the changes, particularly the increase in the proportion of the low FAS group eating breakfast regularly over time, are more hopeful and could be related to public policy interventions that are setting out to improve children’s diets and tackle socioeconomic inequalities in health. However, although more than half of girls ate breakfast, they were much less likely to do so than the boys. Whilst the relationships for patterns of diet by FAS reported here are statistically significant, the Phi coefficients reported in the tables show these relationships are weak. Nevertheless, the findings reported in this paper highlight some potentially positive effects of policies addressing poor diets and dietary inequalities as well as some cause for concern given the UK context of continuing political uncertainty, economic austerity and higher inflation including food prices that are making it more difficult for families to access diets that meet their needs for health and social participation.

Funding acknowledgements

The research leading to these results have received funding from the European Research Council under the European Union’s Seventh Framework Programme (FP7/2007-2013) /ERC grant agreement n° 337977.

Acknowledgements

We would like to thank the Health Behaviour in School-aged Children study for England for granting us access to the 2005, 2009 and 2014 data for the analysis reported in this paper. The HBSC web site (<http://www.hbsc.org/>) includes a link for downloading the open access survey data for 2005/6. We would also like to acknowledge the rest of the UK research project team, Julia Brannen, Abigail Knight, Laura Hamilton and Penny Mellor.

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Paper 7: Which types of family are at risk of food poverty in the UK? A relative deprivation approach

Social Policy & Society (2019) 18:1, 1–18 Cambridge University Press 2018
doi:10.1017/S1474746418000015

Which Types of Family are at Risk of Food Poverty in the UK? A Relative Deprivation Approach

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Abstract

Not enough is known in the UK about how economic phenomena and policy changes have impacted families' ability to feed themselves. This article employs a novel way of identifying the types of UK families at risk of food poverty over time. Applying a relative deprivation approach, it asks what counts in the UK as a socially acceptable diet that meets needs for health and social participation and how much this costs. Comparing this to actual food expenditure by different family types, between 2005 and 2013, it identifies which are spending less than expected and may be at risk of food poverty. The analysis finds the proportion has increased over time for most family types and for lone parents and large families in particular. The discussion considers findings in light of changing economic and policy contexts and the implications for policy responses of how food poverty is defined and measured.

Introduction

The connections between poverty and food insecurity are long established (Rowntree, 1901; Dowler, 2002). In the UK, stagnating incomes, rising costs of living and, from 2007–2012, the rising price of many foods, have made food less affordable, especially for lower income households (Defra, 2015). Whilst there is evidence that the impacts of the global financial crisis and changing social policy, including welfare reform, have hit UK households with children harder than those without (De Agostini et al., 2014; Stewart, 2015), not enough is known about how these economic phenomena and policy changes have impacted families' ability to feed themselves.

This article contributes to a growing literature concerned with food poverty and insecurity in the global North by identifying the types of families (households with children) at risk of food poverty in the UK. A second purpose is to consider the relative merits of this novel approach to defining and operationalising food poverty. Both of these have important implications for policies that seek to address poverty and food poverty.

The first section addresses issues of definition and measurement and introduces budget standards approaches to constructing and costing diets. This is followed by an overview of the methodology for the Joseph Rowntree Foundation's (JRF's) Minimum Income Standard food budget standard (FBS), and the analysis undertaken, that compares the FBS to actual expenditure for different families in

order to answer our research questions which were: 'which types of families/households appear not to be meeting the lower spending threshold for a socially acceptable healthy diet that allows for social participation?' and 'how has this changed over time?' Results are followed by a consideration of key findings in relation to broader societal and policy contexts and reflection upon the implications of methods of measurement of food poverty and insecurity for monitoring and intervention.

Food poverty and food insecurity: concepts, definitions and measures

The definition and measurement of food poverty and insecurity are complex and vary across time and place (Maxwell, 1996; Dowler et al., 2011; Kneafsey et al., 2012; O'Connor et al., 2016). In the last few decades, particularly since the publication of Sen's ground-breaking study of Poverty and Famines (1981)¹, there has been a shift in focus from food availability towards food access (Maxwell, 1996; Hadley and Crooks, 2012; Borch and Kjaernes, 2016) that is reflected in the Food and Agriculture Organisation (FAO) (2001) definition of food security as 'a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life'.

In the UK, in contrast to other developed economies with entrenched systems of emergency food provision such as the US and Canada, there is no accepted definition of household food poverty or insecurity and little systematic collection of 'direct' data. Whilst many definitions of household food insecurity, such as that adopted in 2006 by the UK's Department for Environment, Food and Rural Affairs (Defra, 2006), draw on the FAO definition, methodologies for measurement may use different approaches. For example, in the US and Canada the measurement of food insecurity at the household level uses a questionnaire, originally developed from qualitative research with food insecure households (Radimer et al., 1990), that asks direct questions about experiences. Food insecurity is primarily defined, in this survey, in terms of compromised quality and quantity of food (the most severe manifestation) and worry about running out of food (the least severe) (e.g., Bickel et al., 2000). Many other countries and surveys have adopted or drawn on this US Department of Agriculture (USDA) measure, including the Food Standards Agency survey, Food & You, that in 2016 included (for the first time) a module on food insecurity (FSA, 2017). Whilst these new data are welcome they suffer from a number of limitations including that there is only one wave (2016) so it is not possible to study change over time and the sample size is too small to analyse by household characteristics.

In the absence of extensive 'direct' information about food insecurity, researchers have carried out secondary analyses of routinely collected data on food bank usage and material deprivation. Food bank data have proved invaluable in highlighting the struggle families face in feeding themselves and in raising the profile of (food) poverty in the UK press (Wells and Caraher, 2014). Analyses find associations between rising emergency food aid usage and particular social policies, including benefit delays and sanctions (Loopstra et al., 2015), as well as increasing provision of food parcels to children (Lambie-Mumford and Green, 2015). However, since not all food insecure households access emergency food provision and not all emergency food providers collect information about their 'clients' in a systematic way, food bank data underestimate the extent of food poverty (Lambie-Mumford et al., 2014). Complementing this research, some studies examine an indicator of material deprivation, ability to 'afford meat, chicken, fish (or vegetarian equivalent) every second day', that is included in two European datasets, the EU-Survey on Income and Living Conditions (Pfeiffer et al., 2015; Loopstra et al., 2016) and the European Quality of Life Survey (Davis and Baumberg Geiger, 2017). A consistent finding is that household food insecurity has risen over time in the UK, particularly since 2010. However, using a single indicator of material deprivation as a proxy for 'food

insecurity' is problematic, not least because food poverty is a multidimensional phenomenon (see Loopstra et al., 2016: 47–8).

The next section introduces a novel strategy that we have adopted, as part of a mixed methods study of families and food poverty, to identify the types of family at risk of food poverty over time in the UK. It begins by situating this within a relative deprivation approach to poverty.

A relative deprivation approach to food poverty

Food poverty and insecurity have long been understood as dimensions and indicators of poverty (Dowler, 2002). For example, Seebohm Rowntree's (1901) definition of poverty, based on minimalist expectations of the time to establish a 'scientific' minimum income line beneath which no one could be expected to fall, included at its heart adequate food for 'physical efficiency'. As Dowler and O'Connor (2012: 45) note, '[w]ithin work on 'poverty' [...] the ability to buy or otherwise obtain enough food is an important component, however the condition is defined'. Central to the concepts of food insecurity and food poverty, then, are 'the notion of food scarcity or deprivation in the basic need for food' (Tarusuk, 2001: 7). However, as Peter Townsend later (1954, 1962, 1979) pointed out, no one could really be expected to live on Rowntree's 'primary poverty income' in real life: '[s]ocial pressures, to drink in the local pub, to buy presents for the children, to be a normal social being especially in adversity, required a higher budget' (Glennerster et al., 2004: 25).

Townsend argued that people had social as well as physical needs and that these could not usefully be divided, since the ways in which seemingly 'basic' needs (for example for nutrition) were met served social functions (Hick, 2014: 301). Whilst a cup of tea, for example, was nutritionally worthless, offering tea to visitors made 'a small contribution [...] towards maintaining the threads of social relationships' (1979: 50 in Hick, 2014: 301). Townsend's relative deprivation approach to conceptualising poverty thus covered a wide range of aspects of material and social living standards. In *Poverty in the United Kingdom* Townsend (1979) identified the levels of income below which consumption and participation fell well below what might be regarded as ordinary or acceptable in an increasingly affluent society. This group was seen to be in poverty (Lansley and Mack, 2015).

Food poverty, as we understand it, is about more than hunger or malnutrition, since, '[f]or men [sic], food acquires a series of values other those than which hunger provides' (Richards (2004[1932]: 9). At one level, food provides the nutrients needed for growth and development. It plays a critical role in health and thus inequitable access to healthy food plays a role in health inequalities (Najman and Davey Smith, 2000). But food is also fundamentally meaningful, a source of pleasure, a way of expressing care, a medium of control (O'Connell and Brannen, 2014) and a means of social inclusion and exclusion. Food is intimately linked to identity: we are what we eat (Fischler, 1988). Furthermore, exercising choice in the marketplace, including what food to buy and eat, is one means of enacting agency in a consumer society. Research has shown that these 'social' dimensions of food and eating are widely included as part of consensually determined minimum socially acceptable standards of living (Davis et al., 2012; Padley et al., 2015), despite evidence of adapted preferences (reduced expectations) in the context of austerity (Davis et al., 2012, 2014). The next section describes how we have operationalised this conceptualisation to identify which UK families may be at risk of food poverty.

Identifying families at risk of food poverty in the UK

The European Research Council funded study on which this article draws, *Families and Food in Hard Times*, is concerned with food and poverty in families in three European countries. It is a mixed methods study that uses qualitative methods with 135 young people and their parents in low

income households as well as secondary analysis of national and international quantitative data. One objective of the study is to identify which types of family in each country are at risk of food poverty.

In the UK the relative deprivation approach we have taken begins by asking what counts as a socially acceptable diet that meets needs for health and social participation and how much this costs. The analysis then compares this to actual spending on food by different family types between 2005 and 2013 to identify which families are not spending this amount and may be at risk of food poverty, and whether the types of families at risk have changed over time.

Constructing and costing a socially acceptable diet that meets needs for health and social participation

There are a number of approaches to costing a diet that is both healthy and realistic (Dowler, 2002). Reference budget – or budget standards – approaches may be based on the views of experts, make use of consensual methods (Davis and Padley, 2017) or be some combination of both. Budget standards are used widely internationally both to determine levels of income support and monitor its adequacy (Storms et al., 2014). Budget standard calculations are therefore political and consequential because they can, and do, play a role in shaping policy, including responses to food insecurity and poverty. In the US, for example, the rate of food stamps is determined by statistical packages that calculate the cost of a healthy, socially acceptable diet (Carlson et al., 2007), though the degree to which the menus reflect ordinary shopping and eating habits is contested (Maillot et al., 2010)2. Within the UK, the Minimum Income Standard (MIS), based principally on consensual methods but with consultation with experts where required, includes a food budget standard (FBS) setting out a minimum socially acceptable diet that meets social as well as nutritional needs.

The MIS, which is funded by the Joseph Rowntree Foundation and has been updated annually since 2008, calculates the income needed by a range of different household types to achieve a minimum, socially acceptable standard of living. It is based on detailed research with groups of members of the public specifying what items are needed for a minimum socially acceptable standard of living and consequently what needs to be included in a minimum household budget. The groups are augmented by expert knowledge in relation to energy use, such as electricity consumption, and food and diet. The results of the research indicate how much households require in a weekly budget and how much they need to earn in order to achieve this level of disposable income. The definition of a minimum socially acceptable standard of living at the heart of all MIS groups is that 'it includes, but is more than just, food, clothes and shelter. It is about having what you need in order to have the opportunities and choices necessary to participate in society' (Padley and Hirsch, 2016: 5). Consequently, the FBS takes account not only of the cost of spending that is essential for health but also describes what is needed for social inclusion (Oldfield and Burr, 2008). It is the amount deemed necessary for a realistic, nutritious, socially acceptable diet that allows for participation in customary activities, including additional amounts for seasonal events such as Christmas and birthdays, and modestly eating out occasionally (Davis et al. 2014; Padley et al., 2017a). The standard is, then, in line with a multidimensional understanding of poverty and more realistic than that calculated by Seeböhm Rowntree and some other more recent approaches to determining the cost of a diet (e.g., Nelson et al., 2002: 575). Because it includes spending on social participation, the FBS is about more than physical survival and is consistent with the broader definition of food poverty adopted in this article.

The FBS is constructed during the MIS research that is based on a deliberative focus group methodology. It is put together by groups of individuals looking in detail at the needs of different household types (see Davis et al., 2012, 2014). As a part of this process groups discuss and agree

menus, for all individuals covered by the MIS research, which are reasonably healthy, practical in terms of lifestyle, and realistic in terms of preferences and 'treats'³. Minor adjustments to the menus by a nutritional expert are made to ensure that they are nutritionally adequate for that particular group of the population (Oldfield and Burr, 2008) and the basket is costed at a national retailer, Tesco. An advantage of costing food baskets at Tesco is that as the largest supermarket chain in the UK, with a national pricing policy, there is no need to account for regional variation in urban and accessible rural locations. However, there are also limitations in using this approach, as noted in the discussion, including that some low income households are unable or do not choose to shop at mainstream supermarkets. MIS is calculated for eleven different core household compositions, seven of which are families with children.

Methodology

The key questions considered here were 'which types of families/households appear not to be meeting the lower spending threshold for a socially acceptable healthy diet that allows for social participation, and how has this changed over time'. To answer these, the Living Costs and Food Survey (LCFS⁴) was analysed in order to calculate the actual food expenditure of selected household types which was then compared to the FBS from MIS research. The LCFS, which is used in Defra's annual Family Food report (e.g., Defra, 2015), collects information on spending patterns and the cost of living that reflects household budgets across the UK, the results of which are primarily used to provide information about spending patterns for the Consumer Price Indices, and about food consumption and nutrition. It aims to achieve a sample size of approximately 6,000 households per year (ONS, 2017). We created a variable that combined data from the LCFS asking respondents about the amount spent on food and non-alcoholic drinks inside the home each week with other variables in the LCFS quantifying expenditure on food outside of the home⁵.

The FBS calculates minimum costs including food (and some alcoholic beverages) consumed inside and outside of the home, for a range of different household compositions reflecting variation in food needs according to the ages of children: the minimum food needs of a secondary school age child are, for example, very different to those of a toddler. For this analysis, and in line with MIS, a family was defined as adults with their children (not necessarily their biological children), adults being people of working age (eighteen to sixty-four). A lone parent family was defined as a family with one adult while a couple family was two adults who are either married, cohabiting or in a civil partnership. Families with two adults who were not married, cohabiting or in a civil partnership or with more than two adults were excluded from the analysis. Children were defined as individuals aged between zero and seventeen years. On this basis, families were identified as either a lone parent with one child or a lone parent with two or three children, and as couple parents with one child, two children, three children or with four children. Lone parents with more than three children and couple parents with more than four children were excluded from the analysis, as these are not currently included in the MIS research. The analysis was based on data for a series of nine years beginning before the financial crisis, in 2005, and ending with the most recent complete data currently available: that is, in 2013. All data reported here have been weighted using the 'annual weight' variable in the LCFS for each data year (2005-13)⁶. Food expenditure over time (2005-13) was inflated using the Retail Price Index – which has also been used to provide updates to MIS budgets – to 2013 prices.

Results: exploring the food budget standard data

How has the cost of a minimum socially acceptable diet changed over time?

Figure 1 sets out the FBS for six different family types – all working age households with children – over the nine-year period examined in this analysis (2005 to 2013), as determined through the MIS research. This is the amount that members of the public agree each family type needs to spend each week in order to achieve a minimum nutritious, socially acceptable diet that allows for social participation. The FBS sets out what is needed by children in four age groups, covering from birth to seventeen, recognising that children of different ages have different requirements in terms of diet and nutrition. The analysis presented here has averaged the needs of children set out by the FBS in order to enable comparisons with expenditure data⁷.

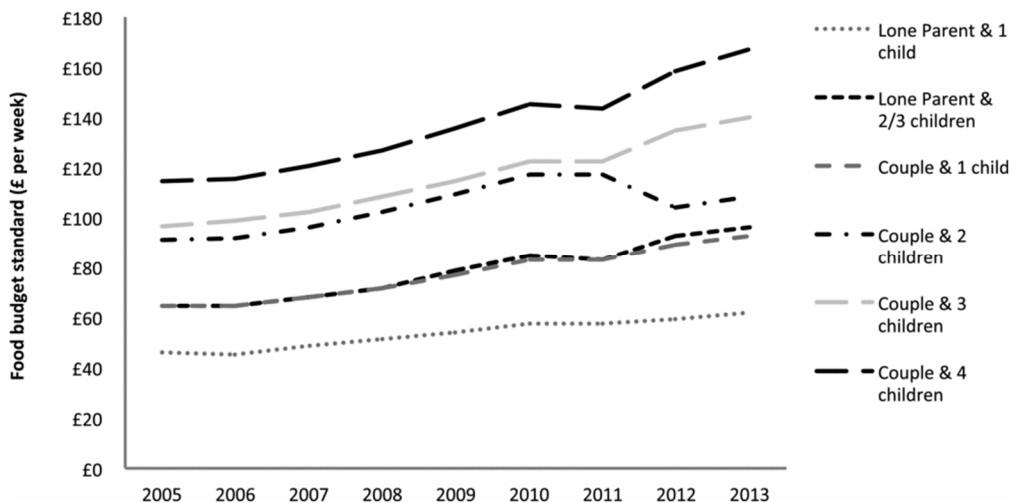


Figure 1. Weekly Food Budget Standards for families 2005–2013

The cost of meeting households' food needs for health and social participation has increased over time for each type of family shown here (Figure 1). But the cost of meeting the FBS has not increased in the same way for all households with children: couple parents with two children have seen the cost of meeting the FBS increase by just less than a fifth (19.1 per cent) between 2005–13 while couple parents with either three or four children have seen an increase of around 45 per cent. To put this in some context, over the same period the average increase in food prices, as measured by the Retail Prices Index, was 39 per cent.

Comparing actual expenditure with the FBS for different households

The central interest here is in looking at how actual expenditure on food compares with the FBS for households with children: that is, what proportion of the different family types are spending less on food than is needed for a diet that meets needs for health and social participation? Figure 3 shows the results of the comparison of actual expenditure on food with the FBS, as a proportion of each household type not meeting the FBS between 2005 and 2013. The proportion spending below the FBS has increased over time for all of the different family types examined here. For all families, the proportion spending below the FBS increased from 41 per cent in 2005 to 52 per cent in 2013. In other words, more than half of all families in 2013 were spending less on food than needed for a minimum nutritious socially acceptable diet that allows for social participation.



Figure 3. Proportion of families spending below the FBS, 2005 to 2013

Lone parents with either two or three children and couples with four children are most likely to be spending less on food than that needed to provide the FBS; 71 per cent of lone parents with two or three children and 82 per cent of couples with four children have food expenditure below the level of the FBS in 2013. The proportion of lone parents with one child spending less than the FBS on food each week has increased by more than half (54.1 per cent) between 2005 and 2013, rising from 40 to 62 per cent, while the proportion of couples with one child and couples with four children spending less than the FBS has increased by a similar order of magnitude over the same period. Although there are fluctuations in the proportion of families spending below the FBS between 2005 and 2013, it is clear that the overall pattern is one of an increasing proportion not spending what is needed for a diet that meets needs for health and social participation, defined through MIS.

That such a large proportion of all household types is spending less than the FBS — between 30 and 82 per cent of households with children between 2005 and 2013 — is of concern, but is to be expected. In the first place 'actual expenditure is constrained by income, whereas the MIS budgets have been derived without an income constraint' (Bradshaw et al. 2008: 31), that is, MIS is about establishing a publicly determined, socially acceptable threshold of need which reflects individuals' lived realities, but is not dictated by available resources. Second, previous research has shown that food expenditure is an 'elastic' part of household budgets (Dowler et al., 2001; Dowler, 2002) and in a period when the cost of other key essentials, such as fuel and housing, has also risen, it is often the food budget that is dipped into in order to pay for these other things (Tait, 2015).

Looking at the proportion of households spending below the FBS provides an indication of the substantial number of households spending below what is needed to meet the minimum described within MIS. However, there is likely to be a qualitative difference between spending just below and well below the FBS on a weekly basis (Hill et al., 2016). Exploring the link between incomes, relative to MIS, and material and financial deprivation, Hirsch and Valadez Martinez (2017) conclude that households with incomes below 75 per cent of that needed to reach MIS are around four times as likely to experience material or income deprivation as those with incomes above MIS. To put this another way, people with incomes below 75 per cent of MIS are falling well short of the minimum income standard, do not have the incomes needed day-to-day to cover all essentials, and may well be faced with difficult decisions regarding spending priorities. Figure 4 shows the proportions of households spending below 75 per cent of the FBS, who can be thought of as those having to make

serious compromises in terms of food quality and quantity on a daily and weekly basis. The overall trend is one of an increasing proportion of households with children spending less than 75 per cent of the FBS between 2005 and 2013. Nearly a third of all households with children (31.2 per cent) were spending below this level on food in 2013, compared to just more than a fifth (21.9 per cent) in 2005. This means that around 2.2 million families were spending substantially less than the FBS on food in 2013, on a weekly basis, compared to 1.4 million in 2009. In 2013, 620,000 of these were lone parent households, compared to 470,000 in 2009.

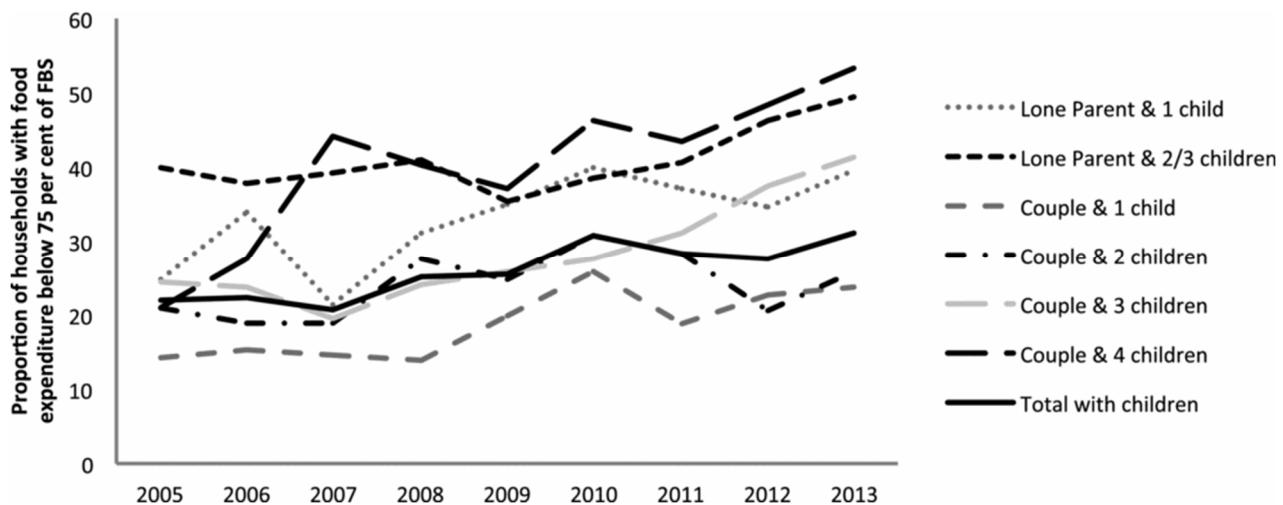


Figure 4. Proportion of families spending below 75 per cent of FBS, 2005 to 2013

The risk of spending below 75 per cent of the FBS is not evenly distributed: lone parents with two or three children and couples with four children are most likely to be spending below this level, with around half of these households spending less than 75 per cent of the FBS. Couples with either one or two children are least likely to be spending below the FBS level: around a quarter have food expenditure below 75 per cent of the FBS.

As income is the principal resource within the UK through which households meet their essential needs, looking at what happened to median household income between 2005 and 2013 may help to make sense of the growing proportions of households with children that are spending below, and below 75 per cent of, the FBS on food. Figure 5 sets out the median household weekly income, inflated (using the Retail Price Index, RPI) to 2013 prices for different types of families. It shows that, with the exception of lone parents with two or three children, median weekly income has fallen in real terms since 2005. For a couple with two children, for example, median weekly income (adjusted for inflation) has fallen from £1,005.25 in 2005 to £885.15 in 2013. It is evident from Figure 5 that the income of lone parent households is consistently much lower than that of couple parent households and has remained at a relatively constant level, in real terms, between 2005 and 2013. Overall, this period of falling real terms incomes coincides with the growing proportion of households whose food expenditure is below the FBS, and more broadly with the growing number of lone parents with incomes below MIS (Padley et al., 2017b). As the income available to provide for all household needs is constrained, it is to be anticipated that growing proportions of households will struggle to spend what is 'needed' on food, prioritising other areas of essential spending and/or adjusting the composition of a weekly food basket around the available resources.

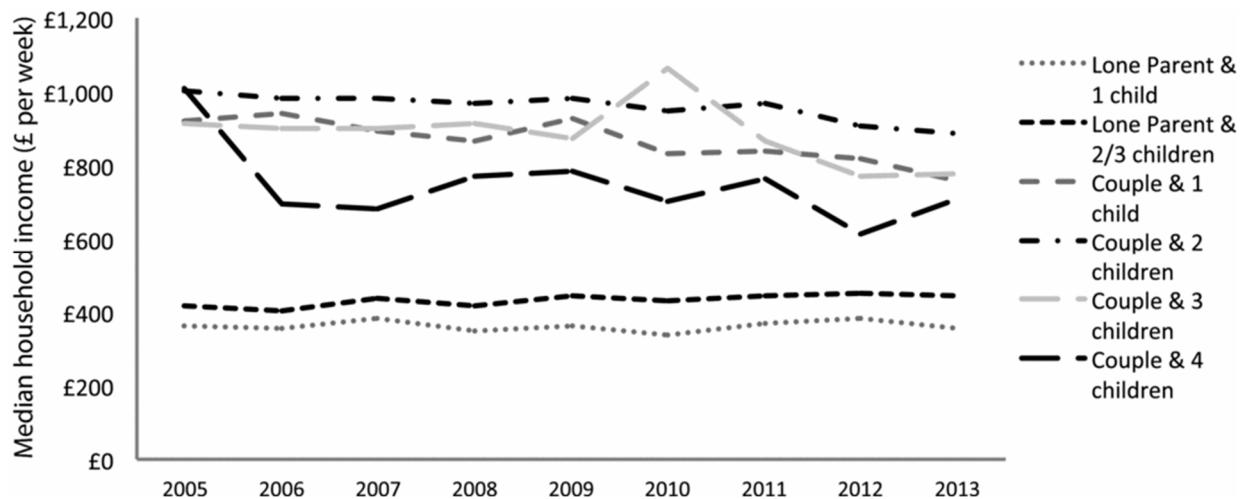


Figure 5. Median household income over time (£ per week) for families, 2005 to 2013

Further explanation, as to why large proportions of some households are not spending 'enough' on food to meet these norms, may come from looking at the FBS as a proportion of household income. Setting out the FBS as a proportion of median income, Figure 6 shows that for all households with children, the proportion of their income they would need to spend on food to achieve the FBS has increased between 2005 and 2013. However, in 2013 there are large differences between household types in terms of the proportion of income that would need to be spent to reach this level. For example, in 2013 couples with one child needed to spend 12 per cent of their weekly income in order to provide a minimum nutritious, socially acceptable diet that allows for social participation. Larger households, such as couples with four children and lone parents with two or more children, however, would need to spend nearly double this, between 22 and 24 per cent of their income, in order to meet the same standard.

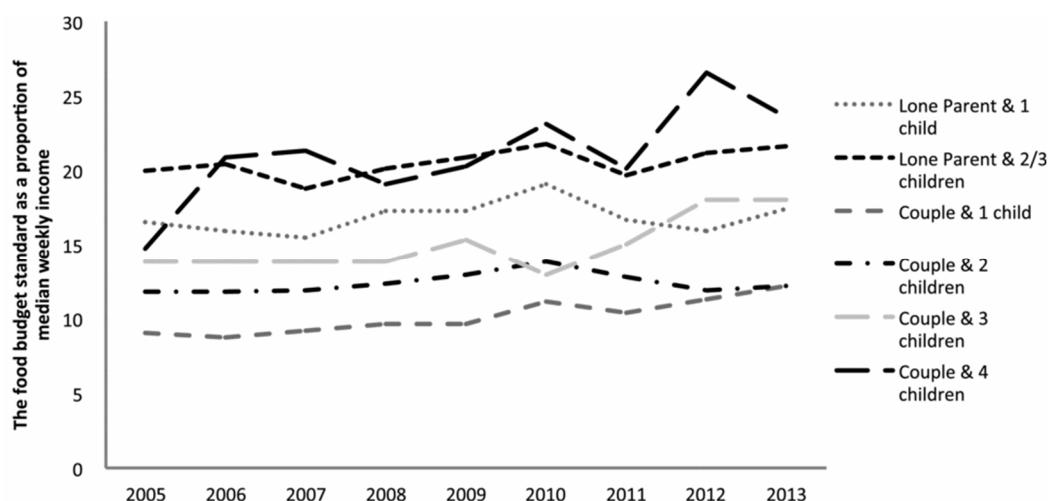


Figure 6. The FBS as a proportion of median weekly income for families, 2005 to 2013

In a period of falling household incomes (in real terms), with a FBS that has steadily increased over the same time frame, it is not surprising that meeting minimum food needs requires a growing share

of income. The analysis presented here draws attention to the growing proportion of families who are not spending as much as is considered necessary to achieve a socially acceptable, nutritious diet that allows for social participation. While all family types (52 per cent of households with children) are less likely to be spending what is 'needed' on food, there are some critical differences, with lone parents and larger families facing a greater risk of not meeting the FBS. In 2013, for example, 62 per cent and 71 per cent of lone parents with one or two/three children respectively, and 62 per cent and 82 per cent of couples with three or with four children respectively were spending less than the FBS; whereas, for couples with one child, fewer than half (46 per cent) were falling short of this standard. A particularly sharp rise between 2005 and 2007 in the proportion of families with four children spending below 75 per cent of the FBS (figure 4) reflects the sharp rise, particularly for this family type, in the FBS as a proportion of income (Figure 6). It is likely that significant inflation in cost of food (that reached 13 per cent in 2008 well above real increases in earnings) has a bigger impact on larger families.

Discussion

The analysis above shows that whilst incomes have remained stagnant or fallen, the amount households need to spend to achieve a minimum diet for health and social participation has increased both in real terms and as a proportion of household income. The result is that the proportion not meeting the FBS has increased over time for most household types and is consistently highest for lone parent and large families. Where families are spending below the FBS it is likely that compromises are made in terms of food quality and quantity, social participation and socially acceptable procurement. Previous research suggests that food budgets are 'elastic' (that is, squeezed by competing, inelastic, household expenses) and that households achieve savings through food 'coping strategies' including 'trading down' (Dowler et al., 2001; Griffith et al., 2013) involving compromised quality and variety. It has been shown that there is a growing price gap between more and less healthy foods (Jones et al., 2014) and, when income goes down or the cost of food goes up, people switch to cheaper calories, whilst families with children purchase fewer fruit and vegetables (Griffith et al., 2013). For those at the very bottom of the income distribution, further reductions in the quality of food are difficult and in these households food quantity is likely to be reduced, with parents generally sacrificing their own food intake to protect their children and/or turning to emergency food provision such as food banks, that are socially stigmatising (Garthwaite, 2016). The MIS research and results of PSE UK also confirm an 'austerity effect' on social participation, so that whilst families still see the value in social activities such as eating out or entertaining family, friends and children's friends, they are unable to allocate as much resource to them (Davis et al., 2012; Gordon et al., 2013). Increased pressures on the household budgets of all family types over time, and lone parents and large families in particular, then, may therefore impact on families' dietary intake and health and may result in exclusion from social participation and social norms.

A novel contribution of this analysis is in identifying which types of UK families are at risk of food poverty and how this has changed over time. Given what is known about the links between family structures and poverty in the UK (e.g., Culliney et al., 2014) it is unsurprising that it is large and lone parent families who struggle to meet the budget standard for a socially acceptable, healthy diet that allows for social participation. According to the Households Below Average Income figures for 2013/14 (DWP, 2015), families particularly at risk of income poverty in Britain include lone parent families, workless households (plus those with only one adult in paid work) and those with three or more children. However, this situation is not inevitable and whilst many factors have been shown to mediate the connection between family structure and poverty, 'the nature and extent of these links is continually changing as a result of broader demographic, socio-economic and policy

developments' (Culliney et al., 2014: 7; Falkingham et al., 2014). International analyses show that investment in welfare can successfully remove families from poverty and that the composition of social transfers is important. In the UK, for example, one child families 'do better' compared to large families when the total package of taxes and benefits is taken into account, because child benefit is paid at a higher rate for the first child (Bradshaw and Finch, 2002: 152; Culliney et al., 2014: 30). This difference is set to be exacerbated by policies that penalise large families further, for example limiting state support through child tax credits and other benefits to the first two children in a household.

Whilst these findings offer a valuable insight into the family types most likely to be at risk of food poverty, it is important to note that the ways in which people meet their food needs vary widely and there may be reasons other than economic ones that explain why households spend less on food than is publicly determined as socially acceptable. These might include individual, family and cultural preferences for cheaper or less healthy foods, customary cooking practices involving low cost, healthy, foods, or supplementing bought foods with home grown produce. Whilst the MIS Food Budget Standard is calculated using Tesco's pricing, there has been a growth in discount food retailers in the UK (Thompson et al., 2012) where families may be able to buy equivalent foods more cheaply. On the other hand, there is evidence that some low income households are unable or do not choose to shop at mainstream supermarkets and that food prices for many foods are higher in small local shops, which is sometimes all that is found in deprived areas (Ginn et al., 2016). This is likely to make the gap between the amount of money needed to meet food needs and income even wider. Importantly, families may not be spending below the standard because they lack resources. In addition, the diets of those families spending below this amount (whether or not they lack the resources to do otherwise) may not be nutritionally inadequate or socially unacceptable. A limitation of the approach taken in this article compared to direct measures of food insecurity and other research about material deprivation (e.g., see Mack and Lansley, 2015), then, is that it does not tell us whether households are spending below the amount because of a lack of resources or for other reasons. Furthermore, these data cannot tell us about resource distribution within families and how different household members are affected. Qualitative research examining intra-household variation would usefully augment these analyses (O'Connell et al. (forthcoming) provides detailed qualitative case studies of how three families manage food when they are spending different levels below the food budget standard for their family type). However, an advantage is that the approach operationalises a multidimensional conceptualisation of food poverty that captures food's role in social participation as well as health.

Conclusion

How poverty is conceived and defined has implications for how it is measured (Lister, 2004). Since the latter is highly relevant to the measures taken to address it, definitions of (food) poverty are a highly political issue (Saunders, 2013). The article has suggested that in order to learn about which types of family are at risk of food poverty, it is first necessary to establish what counts as a socially acceptable diet in the society of interest, and then to look at who is unable to meet this standard. The comparison of families' actual expenditure with the FBS element of MIS allows us to do that. Because it includes social acceptability and social participation, special occasions and eating out, the FBS captures a multidimensional understanding of food poverty beyond mere 'quality' or 'quantity' that is captured by some widely used measures of food insecurity. A further advantage is that because the data have been collected annually it is possible to examine change over time and make interpretations about observed differences in relation to the historical context. Whilst many in the field agree the government needs to measure and monitor food insecurity systematically (not least

to fulfil its obligations regarding the Human Right to Food (e.g., Lambie-Mumford and Dowler, 2014), any new measure will not permit retrospective analysis of the effects of austerity measures or other social policies and historical events on the food families buy and eat.

Whilst there are challenges to operationalising a broad conceptualisation of food poverty, more stringent measures that fail to acknowledge the social nature of food effectively reduce food to nutrients. A risk is that these feed into public policies that seek to 'solve' food insecurity through 'food solutions', including giving 'wasted food to surplus people' (Riches and Silvasti, 2014). This approach is inconsistent with a multidimensional understanding of poverty and contrary to the UNESCR, which gives people the right to food, not the right to be fed (Lambie-Mumford, 2013; Riches and Silvasti, 2014). Instead of further stigmatising and excluding families from 'ordinary living patterns' (Townsend, 1979: 31), and discriminating against large and lone parent families, government should use budget standards research to ensure that wages and social security benefits, in combination, are adequate for a socially acceptable standard of living and eating that recognises the fundamental role of food in health and social inclusion (Hirsch and Valadez-Martinez, 2017; Padley and Hirsch, 2017).

Acknowledgements

The research leading to these results has received funding from the European Research Council under the European Union's Seventh Framework Programme (FP7/2007-2013) /ERC grant agreement n° 337977. The authors wish to thank colleagues at the Centre for Research in Social Policy, Loughborough University, for permission to use their data and making it accessible to us.

Notes

1 Maxwell (1996: 156–7) notes that whilst Amartya Sen (1981) has been credited with initiating the paradigm shift that moved the 'issue of access to food to centre-stage' the idea was already commonplace in nutrition planning. Citing (Devereux, 1993) he argues that Sen's main contribution 'was to codify and theorize the access question, give it a new name, "food entitlement", and demonstrate its relevance even in famine situations'.

2 Certainly Maillott et al. (2010) have shown that it is easier to meet both social and health norms if the budget is higher, suggesting that at least one of these is compromised when money available for food is reduced.

3 In some MIS groups there has been discussion of variations in diet by health requirements and ethnicity. Creating specific food baskets for specific ethnic groups goes against a core principle of MIS (i.e. that it is about establishing a threshold below which people do not have all that is needed for a minimum socially acceptable standard of living). The conclusion that groups have reached is that while some individuals will have additional requirements (e.g., gluten-free, lactose-free) that may bring with them additional costs, the food baskets within MIS would allow for a wide range of different diets and shopping habits to be met.

4 For Living Costs and Food Survey the Principal Investigators and The Sponsors are the Office for National Statistics and Department for Environment, Food and Rural Affairs. The data are distributed by the UK Data Archive, University of Essex, Colchester. The data are Crown Copyright and used with the permission of the Controller of HMSO and the Queen's Printer for Scotland. The original data creators, depositors, copyright holders, and the UK Data Archive bear no responsibility for the analysis or interpretation of these data.

LCFS data were analysed for 2005 to 2013:

Office for National Statistics and Department for Environment, Food and Rural Affairs, Expenditure and Food Survey, 2005–2006 [computer file], 2nd edn, Colchester, Essex: UK Data Archive [distributor], October 2007. SN: 5688.

Office for National Statistics and Department for Environment, Food and Rural Affairs, Expenditure and Food Survey, 2006 [computer file], 3rd edn, Colchester, Essex: UK Data Archive [distributor], July 2009. SN: 5986.

Office for National Statistics and Department for Environment, Food and Rural Affairs, Expenditure and Food Survey, 2007 [computer file], 2nd edn, Colchester, Essex: UK Data Archive [distributor], July 2009. SN: 6118.

Office for National Statistics and Department for Environment, Food and Rural Affairs, Living Costs and Food Survey, 2008 [computer file], 3rd edn, Colchester, Essex: UK Data Archive [distributor], June 2011. SN: 6385.

Office for National Statistics and Department for Environment, Food and Rural Affairs, Living Costs and Food Survey, 2009 [computer file], 4th edn, Colchester, Essex: UK Data Archive [distributor], July 2011. SN: 6655.

Office for National Statistics and Department for Environment, Food and Rural Affairs, Living Costs and Food Survey, 2010 [computer file], 2nd edn, Colchester, Essex: UK Data Archive [distributor], July 2012. SN: 6945, <https://doi.org/10.5255/UKDA-SN-6945-2>.

Office for National Statistics and Department for Environment, Food and Rural Affairs, Living Costs and Food Survey, 2011 [computer file], 2nd edn, Colchester, Essex: UK Data Archive [distributor], August 2013. SN: 7272, <https://doi.org/10.5255/UKDA-SN-7272-2>.

Office for National Statistics and Department for Environment, Food and Rural Affairs, Living Costs and Food Survey, 2012 [computer file], Colchester, Essex: UK Data Archive [distributor], March 2014. SN: 7472, <https://doi.org/10.5255/UKDA-SN-7472-1>.

Office for National Statistics and Department for Environment, Food and Rural Affairs, Living Costs and Food Survey, 2013 [computer file], Colchester, Essex: UK Data Archive [distributor], May 2015. SN: 7702, <https://doi.org/10.5255/UKDA-SN-7702-1>.

5 The following variables were used to capture food eaten outside of the home: Catered food non-alcoholic drink eaten / drunk on premises, Hot take away meal eaten at home, Cold take away meal eaten at home, School meals-total amt paid last week, Confectionery eaten off premises, Ice cream eaten off premises, Soft drinks eaten off premises, Hot food eaten off premises, Cold food eaten off premises, Food / non-alcoholic drinks eaten / drunk on premises, Confectionery, Ice cream, Soft drinks, Hot food, Cold food, Contract catering (food) and Meals bought and eaten at workplace.

6 Additionally, we compared (as a separate analysis) actual food expenditure with key socio-economic characteristics of the household.

7 We applied a more fine-grained version of the published FBS, taking account of the ages of the children: the age bands used were 0–1, 2–4, 5–10 and 11–18. This was to take into account the different costs of feeding children of different ages.

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Appendix 3: Complete list of the candidate's publications

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Appendix 4: Exemplar evidence of media impact (ECEC work)

- Interview in Nursery World 18 March 2019:
<https://www.nurseryworld.co.uk/nursery-world/other/1167132/interview-antonia-simon>
- The Telegraph - [Children at risk as nurseries face funding squeeze, report says](#)
- The Mirror - [Tory 30 hours' childcare pledge 'could put children at risk' as nurseries are starved of cash](#)
- Nursery World - [Danger of childcare workforce shortage without wage increase](#)
- Children & Young People Now - [Meagre pay could spark nursery staff shortage](#)
- daynurseries.co.uk - [Low pay and rising costs threaten staffing levels](#)
- Voice The Union – [Voice welcomes Institute of Education report on childcare](#)
- Early Years Educator - [Improving economy may lead to staff shortages in nurseries](#)
- Teach Early Years: Wages inadequate, P10, quotes ANTONIA SIMON
- Election 2017: Six alternative ways to fix the childcare problem, quotes Antonia Simon: <https://www.bbc.co.uk/news/election-2017-39998261>
- Tory 30 hours' childcare pledge 'could put children at risk' as nurseries are starved of cash, quotes Antonia Simon:
<https://www.childcarecanada.org/documents/child-care-news/15/07/tory-30-hours-childcare-pledge-could-put-children-risk-nurseries-are>

Appendix 5: Regression Analysis

The table below shows regression coefficients (standardized) showing associations between Nutritional Score (n=356), maternal employment status and other socio-economic characteristics (for children aged 18 months to 10 years⁵⁵). Reference categories: Maternal employment (not working), Siblings (none), Child gender (girl), Maternal ethnic group (non-white), Maternal age (31 years and over), Social class (I), Family income (£500+ per week), Partner present (no). The model fit was:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.323 ^a	.105	.051	16.04027

The R square value shows the correlation between observed and predicted values of dependent variable. In this case, the model r square value of 0.51 denotes approximately half of the observed variation can be explained by the model's inputs (variables).

According to the NDNS, sixty-five per cent of mothers with children aged 18 months to 10 years were in paid employment in 2009/10. The 'nutritional score' was not statistically related to maternal employment (-.005, p=0.933). Children of mothers who were not employed had a very similar average nutritional score (mean=54.24; std. deviation=17.41) to children of mothers who were in employment (mean=55.84; std. deviation=15.86). The only significant coefficient in the model was maternal social class IV (-0.265; p=0.001).

⁵⁵ R square =0.41. Dummy variables were computed for the socio-economic variables entered in the regression analyses. All the socio-economic variables were entered into the regression model simultaneously, so that the impact of maternal employment on children's diets was assessed after controlling for these other socio-economic variables. All data were analysed using the Statistical Package for the Social Sciences (SPSS). Separate analysis by child age was not possible because of small cell sizes.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error				Lower Bound	Upper Bound
		56.171	3.573				49.138	63.203
1	(Constant)							
	Mother: paid employment	-.191	2.270	-.005	-.084	.933	-4.659	4.277
	Child sex	3.471	1.924	.106	1.804	.072	-.316	7.257
	Child ethnicity	-1.390	2.602	-.032	-.534	.594	-6.512	3.732
	Has sibling	-.784	1.962	-.024	-.400	.690	-4.645	3.077
	Maternal age: 26-30	1.171	2.327	.032	.503	.615	-3.408	5.751
	Maternal age: 21-25	-3.043	2.735	-.075	-1.113	.267	-8.426	2.339
	Maternal age: 20 or under	-3.291	3.652	-.059	-.901	.368	-10.479	3.897
	Mother: Class II	.862	3.143	.023	.274	.784	-5.324	7.049
	Mother: Class IIINM	-2.734	3.241	-.069	-.844	.400	-9.115	3.646
	Mother: Class IIIM	-2.514	3.707	-.052	-.678	.498	-9.811	4.783
	Mother: Class IV	-12.017	3.603	-.265	-3.335	.001	-19.109	-4.924
	Mother: Class V	-7.228	4.226	-.123	-1.710	.088	-15.545	1.090
	Income quartile: Q4	2.767	3.315	.057	.835	.405	-3.758	9.292
	Income quartile: Q3	.497	2.998	.012	.166	.868	-5.405	6.399
	Income quartile: Q2	4.296	3.052	.115	1.408	.160	-1.711	10.302
	Income quartile: Q1	3.309	3.638	.076	.910	.364	-3.851	10.470
	Partner present	-.863	2.836	-.020	-.304	.761	-6.445	4.718

a. Dependent Variable: scorepct

Source: Unpublished table which is partially reported in O'Connell, R and Brannen, J. (2016) Food, families and work. Page 27.