

Child Health and Lone Motherhood: Evidence from the UK Millennium Cohort Study

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Introduction

The Marmot Review, published in 2010, highlighted the social gradient of health inequalities of children within England. It also demonstrated that this social gradient arose from a complex interaction between many factors including: local area characteristics, child characteristics and mother characteristics. This chapter seeks to explore, using the Millennium Cohort Study, a social gradient of health inequalities between children living in lone-parent families and those living in two-parent families, net of other local area, child and mother characteristics. It is anticipated that the results will confirm those of the Marmot Review and provide evidence as to the importance of family composition.

Previous related work on the child health aspects of the Millennium Cohort Study data has largely focused on exploring the link between child health, ethnicity and local area characteristics at each sweep. Dezateux et al (2004) use the first sweep data, when the cohort members were nine months old, to consider the differences in health with regard to: ethnicity, social class, country in the UK and local area characteristics. They find that there are significant differences in various health measures especially by ethnicity and local area characteristics. This work is further developed in considering the first sweep data to exploring further the link between poor child health and poor maternal health, breastfeeding and early family experience (Dezateux et al, 2005). Whilst this work does not focus on the health gap between lone-parents and those in two-parent families, it does demonstrate the usefulness of this survey for understanding these issues.

Dezateux et al (2007) using the second sweep data when the cohort members were three years old, consider differences in various health outcomes with regard to ethnicity, local area characteristics, gender and family poverty. Differences by ethnicity and local area characteristics are found to be important, as are the effects of family poverty. They also compare, where possible, with health measures at nine months, but find there is limited scope to do this due to a lack of comparable health questions.

Sullivan and Joshi (2008) using the third sweep of the Millennium Cohort Study when the cohort members were five consider the differences in various health measures by ethnicity, poverty, gender, country within the UK, parents employment and maternal education. They find important differences in the various child health measures within these dimensions but once again find limited scope for longitudinal analysis and intergenerational analysis due to the lack of comparable questions. This is the first of the child health chapters using the Millennium Cohort Study data to consider difference in child health by family composition and they find little difference for those with working parents but significant lower health outcomes for those within non-working lone-parent households.

Kelly and Bartley (2010) consider the intergenerational aspects of child health and parental health, whilst they find evidence of links between poor health of parents and children as well as strong links between parental obesity and child obesity. This work demonstrates the ability of comparing across the first three sweeps the child health data using the Millennium Cohort Data. In a similar paper, Griffiths et al (2010) exploit the child height and weight data for the first three sweeps and find evidence of a longitudinal link to childhood obesity.

Kneale (2010) considers the fourth sweep of the Millennium Cohort Study when the cohort members were seven to consider the differences in various health measures by parental education, family composition, family employment, country in the UK, mothers' age at birth, poverty and social class. This paper finds more scope for longitudinal analysis between ages five and seven data, due to the larger conformity between the questionnaires for these two sweeps. Significant differences in health are found in all these dimensions and there is evidence presented of an improvement in health reported on the previous survey.

Beyond these papers, there has been little use of the Millennium Cohort Study to explore health gaps and nothing focusing on the health gap between children raised in lone-parent and two-parent households. The previous literature does however demonstrate the potential usefulness of the Millennium Cohort Study in considering the health gap by family composition.

Millennium Cohort Study

The Millennium Cohort Study (MCS) is a multidisciplinary child cohort study and the fourth of the UK national child cohort studies. It covers a wide range of topics including: parenting, childcare, school choice, child behaviour and cognitive development, child and parental health, parents' employment and education, income and poverty, housing, neighbourhood and residential mobility, and social capital and ethnicity. It draws on information gathered from surveys with the children, their families and schools/nurseries and is supplemented by data linkage to government administrative data sources. This chapter will use the child health data collected during the family interviews when the children were nine months, three years, five years and seven years old. All surveys were completed before the Marmot Review in 2010.ⁱ

The MCS survey design is rather different from the previous UK national child cohort studies. Rather than selecting all children born in a week in the UK and contacting them on the maternity ward as previous cohorts had, the MCS survey design used Child Benefit Records to locate children living within particular electoral wards within the UK and born between September 2000 and January 2002. All children born in the selected wards were eligible for the study (some 19,517 children in 19,244 families). These electoral wards were selected in a stratified random sample designed to over sample those children living in disadvantaged circumstances, from minority ethnic backgrounds and from the smaller countries of the UK (Scotland, Wales and Northern Ireland).ⁱⁱ For this chapter we shall use

data from England only, as the Marmot Review was for England only. All of the analysis presented has been corrected for this survey design and appropriately weighted.

Of the 18,818 children in 18,552 families in 398 UK electoral wards surveyed in the first MCS survey, 11,695 children in 11,533 families in 200 electoral wards were in England. Of these, 7,387 families in England replied to all four surveys used in this chapter which is almost 40% of the initial UK sample and 64% of the initial English sample.ⁱⁱⁱ To be included the cohort member needed to be: living in England at the first survey, living with their natural mother at nine months, in households that have one cohort member only (excluding twins, triplets and families with two children born in the sampling year) and have complete data on the variables of interest. The results presented below are based on 6,629 children (89% of those responding to all four surveys) who meet these criteria and have complete information on the variables of interest.

Health Variables

The Millennium Cohort Study collects a range of child health data during the parent interviews at each sweep. In this chapter we use information on four different measures of child health:

Number of Health Problems

In the first survey, completed at nine months, much of the child health data collected is around their birth rather than general health data. It is therefore difficult to identify a comparable health measure at all four data points. However, as a baseline, a measure of the number of health problems the cohort child has, reported by the mother is used. This is the closest to a general health measure we could identify. Following this question the mother is prompted to provide details of the health issue; those details are not used here.

Has a Longstanding Illness

From the second survey, more general health questions are asked. At age three, age five and age seven the mothers of the cohort members were asked to report if their child suffered from any longstanding illnesses. This is the nearest in comparison to the number of health problems identified at the first survey. After this question the mother was prompted to give details of these longstanding illnesses; again those details are not used here.

Overweight/Obese based on Body Mass Index

At the second, third and fourth surveys, weight and height of the children were recorded based on actual measurements taken by the interviewers. The weight and height details taken at nine months were based on records in the cohort members' medical records (red book) and are not as reliable as the subsequent measures taken on the day due to the timing of the measurements and accuracy of recording by interviewer. Therefore the first sweep Body Mass Index (BMI) measures are excluded from this chapter. The height and weight measures

taken from sweep 2 are converted into a BMI measure, which is used to generate an indicator for the cohort member being overweight or obese. Overweight and obese have been merged as there are relatively few cases in the obese category, as might be expected. This measure is being used as a general measure of the child’s health, given that being overweight or obese is associated with various health issues.

General Health based on Mothers’ Rating

For the third and fourth surveys, the cohort members’ mothers are asked to report their opinion of the cohort members’ general health. This rating has been rescaled from the original data so that a higher score is associated with better health (poor 0 to excellent 4). This is an additional measure of general health but, unlike the overweight variable, is based on their mother’s view rather than an actual measurement.

Each of these measures gives a different insight into the general health of the cohort members. As a set they provide a wealth of information to consider the scale and importance of health inequality between the children of lone-parents and those with two-parents in the first seven years of life.

Results

Health Inequality by Family Composition

Table 1 considers each health measure and presents the weighted mean, standard error (in brackets) and unweighted observations. Of all the measures, only those for general health reported by the parents is significantly different between lone-parent and two-parent families. For all other measures, children in lone-parent families have worse health outcomes (more health problems at nine months, higher proportion with longstanding illnesses and overweight/obese at three, five and seven years old), however these differences are insignificant. An interesting observation is that as time progresses more children find themselves living in lone-parent households at the time of interview.

Table 1: Weighted Means and Standard Errors of Health Measures by Family Composition

Health Measures	Lone Parents	Two Parents
Number of Health Problems (sweep 1/age 9 months)	1.87 (0.13) 761	1.76 (0.06) 5868
Has a longstanding illness (sweep 2/age 3 years)	0.18 (0.02) 927	0.15 (0.01) 5696
Has a longstanding illness (sweep 3/age 5 years)	0.22 (0.02) 1101	0.18 (0.01) 5527
Has a longstanding illness (sweep 4/age 7 years)	0.21 (0.01) 1206	0.17 (0.01) 5375

Overweight/Obese based on BMI (sweep 2/age 3 years)	0.24 (0.02) 927	0.22 (0.01) 5696
Overweight/Obese based on BMI (sweep 3/age 5 years)	0.21 (0.01) 1101	0.20 (0.01) 5527
Overweight/Obese based on BMI (sweep 4/age 7 years)	0.22 (0.01) 1206	0.18 (0.01) 5375
General Health (poor-excellent 0-4) (sweep 3/age 5)	3.19 (0.04) 1101	3.35 (0.01) 5527
General Health (poor-excellent, 0-4) (sweep 4/age 7)	3.42 (0.03) 1206	3.51 (0.01) 5375

Looking at general health rating in more detail, we can see that children of lone parents have significantly lower general health as reported by the cohort members' mother, although this gap is less at age seven ($3.51 - 3.42 = 0.09$) than at age five ($3.35 - 3.19 = 0.16$). Within groups there is a significant improvement in the scores reported by both lone parents and mothers in two-parent families increasing their average score by 0.23 ($3.42 - 3.19$) and 0.16 ($3.51 - 3.35$), respectively. This shows that the lone-parents closing the gap on mother reported general health as the general health gap reported reduces. This could be due to a selective movement into and out of lone-parent status or a genuine closing of the gap up to age seven.

Given that the general health rating is the only one health variable that has any significant difference between the cohort members of lone-parents and two-parent families in Table 2 this relationship is explored further. We consider the difference between, boys and girls, those who are black and minority ethnic (BME), those with a mother who is a graduate, those with a mother under 30 years old at the time of childbirth and finally differences in terms of the type of electoral ward they live in (advantaged, disadvantaged and high proportion of BME residents).

Table 2: Means and Standard Errors of Health Measures by Family Composition and Cohort Member Characteristics

Health Measures	Lone Parents	Two Parents
<i>General Health (poor-excellent 0-4)</i> (sweep 3/age 5)		
Boys	3.17 (0.04)	3.32 (0.02)
Girls	3.21 (0.05)	3.38 (0.02)
BME	3.12 (0.06)	3.09 (0.04)
White British/Irish	3.20 (0.04)	3.38 (0.02)
Mother is a Graduate	3.35 (0.07)	3.47 (0.02)
Mother is not a Graduate	3.15 (0.04)	3.28 (0.2)
Mother under 30 at birth	3.18 (0.05)	3.28 (0.02)

Mother 30 and over at birth	3.21 (0.05)	3.41 (0.02)
Living in an Advantaged Area	3.24 (0.06)	3.41 (0.02)
Living in a Disadvantaged Area	3.14 (0.04)	3.26 (0.02)
Living in an Area with a High Proportion of BME residents	3.10 (0.04)	3.01 (0.05)
<i>General Health (poor-excellent, 0-4)</i> <i>(sweep 4/age 7)</i>		
Boys	3.42 (0.03)	3.48 (0.02)
Girls	3.41 (0.04)	3.54 (0.02)
BME	3.27 (0.07)	3.26 (0.04)
White British/Irish	3.44 (0.03)	3.55 (0.01)
Mother is a Graduate	3.57 (0.05)	3.61 (0.02)
Mother is not a Graduate	3.37 (0.03)	3.45 (0.02)
Mother under 30 at birth	3.39 (0.03)	3.47 (0.02)
Mother 30 and over at birth	3.45 (0.04)	3.55 (0.02)
Living in an Advantaged Area	3.50 (0.04)	3.56 (0.01)
Living in a Disadvantaged Area	3.32 (0.02)	3.43 (0.02)
Living in an Area with a High Proportion of BME	3.26 (0.07)	3.13 (0.05)

High Inequality by Family Composition and Cohort Member's Sex

Differences in health measures for boys and girls are considered as there are different risk factors for various health conditions by gender. At age five, boys' general health rating is significantly less for those with lone parents than with two parents (0.15 less) although this difference is not significant. By age seven this difference has reduced to 0.04 and is no longer significant. This suggests that for boys the health gap reduced to nothing between age five and age seven.

For girls, those with lone parents have a general health rating 0.17 less than those with two parents at age five and this is a significant difference. Whilst this difference reduces to 0.13 by age seven, this difference is still significant. This suggests that whilst for boys the health gap is eliminated by age seven, for girls the difference in general health moderates very slightly but is maintained up to age seven.

Finally, at age five no significant differences between boys and girls in either lone-parent families or in two-parent families are found. By age seven there is still no significant difference between boys and girls in lone-parent families, however for girls in two-parent

families there is a significant health gain of 0.6 over boys in two-parent families. Therefore the health benefits of a two-parent family are greater for girls at seven than for boys at seven.

Overall these results suggest that the health advantage from being from a two-parent family is larger for girls than boys and is also maintained longer for girls than boys. This would suggest Sports England's campaign (This Girl Can) to get more girls into sport could have even greater health returns if focused on those within lone-parent families.

High Inequality by Family Composition and Cohort Member's Ethnicity

Differences in health measures for cohort members by ethnicity are considered as there are different risk factors for various health conditions by ethnicity. For those cohort members who are BME there is no significant difference between those from lone-parent families and those from two-parent families. It is worth noting that the survey design led to the over sampling of a non-representative sample of BME children, largely those of South East Asian heritage. Whilst these results have been weighted and survey design taken into account, this is worth bearing in mind when reading these results.

There is a significant difference, regardless of the family composition, between children of BME heritage and those who are White British/Irish children. BME children are significantly likely to report lower general health. At age five there is a gap of 0.08 for BME children in lone-parent families and 0.29 for those in two-parent families. This increases at age seven to 0.17 for BME children in lone-parent families and remains at 0.29 in two-parent families. Overall for all groups the averages improve in general health reported. For those BME children with lone parents, this improvement is less than for other groups leading to a widening of the general health gap between them and other children. This suggests that health initiatives aimed at BME children in lone-parent families in infant schools could help to reduce health inequalities. For example, healthy eating campaigns with BME children in school could be tailored to the diets of the children at home, with resources sent home available in a range of languages. This could potentially have a large effect in reducing the health gap for BME children.

For cohort members who are white British/Irish there is a significant difference between the reported general health of those from lone-parent families and those from two-parent families, with those in lone-parent families having lower scores on average consistently. At age five, the health gap reported between cohort members in lone-parent families and two-parent families was 0.18, which was reduced to a gap of 0.11 by age seven.

Both groups saw an improvement in the measure between age five and age seven, with children in lone-parent families gaining more (0.24) than their two-parent family counterparts (0.17) but not closing the gap sufficiently to eliminate this health gap. Whilst it is not possible to show the magnitude of the effect, it is likely that schools are part of the explanation for this reduction in health gap. Children from lone-parent families are much more likely to be eligible for free school meals and other incentives to take part in wider school life activities

than those from two-parent families. It is possible that the school engagement with those from more disadvantaged backgrounds is part of the explanation of the closing of the health gap between age five and age seven.

High Inequality by Family Composition and Mother's Education

The first two sets of results in Table 2 consider the characteristics of the cohort members which may explain the significant differences observed between the reported general health of those from lone-parent families and those from two-parent families. The next two measures consider two key characteristics of the cohort members' mothers, which are often used as measures of the family social capital, those of mother's education and maternal age at birth.

There is a lot of information in the first survey of mother's education. For this chapter we have used a derived variable drawn on information on academic and vocational qualifications which identifies whether the mother of the cohort child is a university graduate or not. This measure is used rather than no qualifications as it is expected that holding university qualifications is likely to lead to better jobs and higher wages on average, hence distinguish better between those cohort members in better off families than possible measures of education.

At age five, for both children of graduates and non-graduates there is a health gain to being from a two-parent family compared to a lone-parent family, with lone-parent children having lower reported general health than their two-parent counterparts. This gap is 0.12 for those with mothers who hold a university degree and 0.13 for those with mothers who do not hold a university degree, although this difference is only significant for the children of non-graduates. This health gain is reduced at age seven. For those with graduate mothers a health gap between lone-parent and two-parent families is 0.04 compared to the gap for those with non-graduate mothers of 0.08. Both of these differences are insignificant. These results suggest that whilst being a child in a lone-parent family with a non-graduate mother leads to significantly lower health at five, by age seven the two-parent family premium is eroded.

Comparing by family structure there is clear evidence that having a graduate mother has a significant impact on health gain at both age five and age seven. For those in lone-parent families, at age five the significant health gain of having a graduate mother is 0.2 and this significant health gain is maintained at age seven. Therefore, although both the children of graduates and non-graduates in lone-parent families experience improvements in health between five and seven, the gap remains the same, representing a consistent health penalty for children in non-graduate lone-parent homes.

For those in two-parent families, at age five the significant health gain of having a graduate mother is 0.19 and this significant health gap is reduced a little to 0.16 at age seven. Therefore, whilst both the children of graduates and non-graduates in two-parent families experience improvements in health between five and seven, for those in two-parent families

the gap reduces but remains significant, representing a stubborn health penalty for children in non-graduate two-parent homes.

These results by family structure and mother's education suggest a significant interaction between these two characteristics and the health gap experienced by the cohort members at age five and age seven. The children of non-graduates and especially those in lone-parent families experience a consistent and persistent health gap with their peers with graduate mothers. This result, as expected, highlights another important intergenerational benefit of university education for women.

High Inequality by Family Composition and Mother's Age at Birth

The second key characteristic of the mothers of the cohort member considered is maternal age at birth of the cohort member. It is possible to consider the maternal age at the birth of the cohort member or the maternal age at the birth of their first child, which may or may not be the cohort member. The age at birth is split into 30 and over and under 30 as this roughly splits the sample into two equal size groups.

At age five, the health gain for a cohort member within a two-parent household compared to a lone-parent household is 0.1 and insignificant for those whose mother was under 30 when they were born compared to 0.2 and significant for those whose mother was 30 and over. Once again at age seven, health gains have been experienced by all groups but neither for those in with older or young mothers have a significant difference. Those with young mothers have an insignificant health gain from being in a two-parent family of 0.08 and for those with older mothers 0.10. Therefore, whilst there was a significant gain within family structure of having an older mother at age five this is eroded by age seven.

For those with lone-parent families, there is no significant difference at age five or age seven between general health scores, although those with older mothers report an insignificantly greater value than those with younger mothers, and the difference increases from 0.03 at age five to 0.06 at age seven. For those in two-parent families, there is a significant difference in health gap of 0.13 between those with young mothers and those with older mothers at age five. This gap is reduced to 0.08 and insignificant by age seven.

With both maternal education and maternal age at birth, evidence is provided that partially explain the health gaps initially presented in this chapter. The characteristics of the mother (her human and social capital) in addition to the characteristics of the children themselves explain some of the health gaps but do not eliminate them. For those from the most disadvantaged backgrounds, it is likely most have many of these characteristics as well as lone-parent status. This will amplify the health gap found when comparing just those from lone-parent families and those from two-parent families.

High Inequality by Family Composition and Local Area Deprivation

The final set of results to consider looks at the local area effects on health gap between children in lone-parent families and those in two-parent families. To consider this we use the type of local area as measured by the stratum in the survey design. In England, three types of areas were identified: advantaged, disadvantaged and ethnic wards. Ethnic wards are those that were selected due to having the highest proportion of BME residents and are amongst the poorest areas in England. Differences by area are considered as the Marmot report puts an emphasis of differences in health outcomes for children by local area deprivation.

Firstly, we compare the health gaps within each ward type. For those living in an advantaged area, we see that the only significant difference between children in lone-parent families and those in two-parent families is in the age five measures in the advantaged areas. At age five there is a 0.17 health premium within advantaged areas for living with two parents rather than one parent. This is reduced to an insignificant 0.06 at age seven. Whilst for those living in disadvantaged areas and ethnic areas no significant differences are found.

The larger health gaps are found within family structures comparing between area types. At both age five and age seven those living in advantaged areas within lone-parent families have significant health gains on those living in disadvantaged and ethnic areas. However, although there is a positive health gap of those living within lone-parent families within disadvantaged areas and ethnic areas this difference is not significant. Making the same comparison between areas for those from two-parent households we see a wider health gap between those living in advantaged areas compared to disadvantaged areas and a much larger health gap for those living in ethnic areas. All of these differences are significant. For those living in two-parent households, the health gap from living in an advantaged area compared to a disadvantaged or ethnic area are the largest and most significant differences found in this chapter.

Finally, health gains made between the age five survey and the age seven survey are larger in all areas for children living in lone-parent households (0.26 for those in advantaged areas, 0.18 in disadvantaged areas and 0.16 in ethnic areas) than for children living in two-parent households (0.15 for those in advantaged areas, 0.17 in disadvantaged areas and 0.12 in ethnic areas).

This interaction between area characteristics and lone-parent status in terms of health gains suggests that the differences in child health by area deprivation in the Marmot report could be explored in more detail in terms of child characteristics, mother characteristics, family characteristics and area deprivation. The Millennium Cohort Study is the ideal dataset for further work of this type to attempt to break down health gains in terms of these four sets of influences.

Conclusions

The analysis in this chapter adds to the existing literature that uses the Millennium Cohort Study to explore child health differences by moving beyond intergenerational poor health

transmission and within cohort comparisons. This analysis extends the existing literature to look across the first four sweeps of the Millennium Cohort Study to look at changes in health between and within family structure, taking account of child, mother and area characteristics. The result presented in this chapter can be summarised as follows:

- Cohort members in lone-parent families have poorer general health scores at age five and age seven
- Between age five and age seven, children in lone-parent families experience larger increases in general health than children in two-parent families, leading to the elimination of the health gap
- Girls have higher general health score on average than boys, with girls in two-parent families leading the way in health gains over their lone-parent counterparts reported between five and seven years old.
- Children with black and minority ethnic heritage (BME) have lower health scores than White British/Irish children regardless of family composition. BME children in lone-parent families have the smallest health gain between five and seven years old, leading to a widening of the health gap for these children.
- For children of White British/Irish heritage those from lone-parent backgrounds have a health deficit compared to those from two-parent families, although there is significant evidence of a narrowing of this gap between age five and age seven.
- Children of graduates and older mothers have higher scores than those of non-graduates and younger mothers (under 30) within the same family structure. Family structure only has a significant difference for those with non-graduate mothers and younger mothers at age five.
- Comparing children with the same family structure, the children of graduate mothers have a significant health advantage that is maintained at seven years old.
- There are much bigger differences in health scores by area deprivation for those living in two-parent households than in lone-parent households. In all areas the biggest health gains are made by children living in two-parent households.

As found in the Marmot Review, the results in this chapter highlight the complexity of the relationship between child health and family structure, as well as the degree to which lone-parent status could be seen as a general signal of disadvantage with regard to child health. Reassuringly, no difference is found in rates of overweight/obesity and longstanding illnesses and lone-parent status. Differences in maternal rated general health measure are found and indeed are shown to be much more complex than the initial difference by lone-parent status suggests.

One possible limitation of this analysis is whether lone parents are more likely to be more pessimistic or otherwise systematically report lower levels of health for their children than mothers in two-parent families. However, with the key period of study being the health gain from age five and age seven, when the children have started school and the lone mothers have had a regular opportunity to see their own child's health issues in relation to their peers at school, it would seem unlikely that if such a bias exists at age five it is maintained at age seven.

Finally, the results in this chapter suggest that in designing public health campaigns in the UK it is worth taking account of the lone-parent status, gender and ethnic origins of the target parents, especially when working with those without a university education, younger mothers and those living in the most disadvantaged areas in England. Campaigns such as This Girl Can and healthy eating campaigns such as “Five-a-day” (which encourages everyone to eat at least five portions of fruit and vegetables a day), need to be developed to fit the diversity in the target audience. The results in this chapter suggest that getting that right could help close the health gaps presented for children living in lone-parent families.

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ⁱ For more details on the MCS see Hansen (2012).

ⁱⁱ Further details on the survey design can be found in Plewis (2007).

ⁱⁱⁱ For more information on the response to the Millennium Cohort Study see Ketende (2010).