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***The prevalence of multiple deprivation for children in the UK:
Analysis of the Millennium Cohort and Longitudinal Survey of Young
People in England***

Report for HMT, version 1.4

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Research focus and objectives

1. This report addresses the question: how many children in the UK live in families with multiple risk factors? Our analysis draws on two national UK datasets to set out the prevalence of different types of problems across families and the extent of co-occurrence of risk, commonly termed multiple deprivation. We calculate the proportion of families/households living with two or more risk factors, three or more, and so on.

2. There are a number of challenges in the task of calculating the prevalence of multiple deprivation. Because of the complexity of human development and of the role of the family and other contexts in human development, there are potentially a great many ways of characterising and assessing family risk. Moreover, there are not objective metrics for many aspects of deprivation and non-arbitrary cut-offs beyond which an individual or family can be definitively categorised as experiencing deprivation. The definition of multiple deprivation is a matter of judgement as well as measurement. There are also data limitations such that only certain aspects of family life could be assessed in the datasets used for the analysis.

3. In order to address these issues, HMT requested us to assess the prevalence of risk in these specific domains of family life:

- **Mental Health:** children living with parents suffering from depression, anxiety, or other psychological disturbances.
- **Substance and Alcohol Misuse:** children whose parents have addiction to tobacco, alcoholism, or use illicit drugs.
- **History of Criminality:** children whose parents have been charged or convicted with crime and also children living with parents who show anti-social behaviours (e.g. fighting, damaging public properties).
- **Domestic Violence:** This domain includes children who live subject to direct and indirect domestic violence (e.g. parents actually abusing the children or parents constantly arguing or fighting).
- **Having a Child in Care:** children living with foster or adoptive parents.
- **Financial Stress:** children living in households that are under financial pressure, not able to pay bills or credit cards.
- **Worklessness:** children whose parents are in long term unemployment.
- **Teenage parenthood:** children of teenage mothers.
- **Homelessness:** children who experience homelessness.
- **Learning disabilities in parents:** children whose parents have learning problems or learning disabilities.
- **Physical disabilities in parents:** children whose parents have a longstanding illness or disability that limits their daily activities.
- **Overcrowding:** children living in overcrowded households.

4. Some of these domains are characterised by a single indicator, for example teenage parenthood. Others are multidimensional, as is the case, for example, of mental health or domestic violence, where risk in the domain can be assessed by a number of indicators. These issues affect the estimation of

a multiple deprivation indicator and are discussed in further detail in the methods section.

5. Apart from these domains, there are also indicators of poverty, neighbourhood deprivation and household structure. These are important issues that exacerbate the impact of risk factors on children, but are not themselves treated here as features of multiple deprivation. Rather, we use these measures to test the general validation of the results. One may expect that several of the families showing these risk factors also live in poverty, or in deprived areas, or consist of single parents. For this reason, the indicator of multiple risks can be verified against indicators of poverty, neighbourhood deprivation or household structure. This is also discussed in the methods section.

Methods and data resources

6. We have applied two different methods to the challenge of assessing the prevalence of multiple deprivation. We conduct a number of sensitivity analyses in order to check the validity of the findings and to ascertain the range of conditions in which they may prove accurate and meaningful.

7. All of the analysis conducted draws on two data sources: the Millennium Cohort Study and the National Longitudinal Survey of Young People in England.

Data sources

8. The Millennium Cohort Study (MCS) is a large-scale survey of the new century's babies, and the families who are bringing them up, for the four countries of the United Kingdom. Its first sweep was carried out during 2001-2002 and contains information about 18,819 babies in 18,553 families, collected from parents when the babies were aged nine months. The sample design allowed for disproportionate representation of families living in areas of child poverty in Northern Ireland, Scotland and Wales and in areas with high ethnic minority populations in England¹.

9. The National Longitudinal Survey of Young People in England (LSYPE) is a major new longitudinal study of young people in Britain. The purpose of LSYPE is to chart the progress of a cohort of young people who had been exposed to new government policies directed at young people such as the new ConneXions Service and Educational Maintenance Allowances (EMAs). The study follows a large cohort of young people (up to 20,000), initially contacted at age 13/14 and to be followed-up every year into their mid-twenties. The sample has been boosted to ensure adequate representation of ethnic minorities (up to 5,000) young people living in disadvantaged areas. The first sweep of information was collected in 2004.

¹ Dex, S. and Joshi, H. (2004). "Millennium Cohort Study First Survey: A User's Guide to Initial Findings", Centre for Longitudinal Studies, Institute of Education

Method 1

10. Objective: The aim is to estimate an indicator of multiple risks using only one measure of risk available in the datasets for each of the 12 domains proposed above. Selected indicators or risk are combined into an indicator of multiple deprivation. The indicator calculates the proportion of families/households living with two or more risk factors, three or more, and so on.

11. In order to obtain the number of households living with multiple risks we multiply the estimated proportion by the size of the population. For the MCS, we use the total number of children under the age of 1 year old in 2000 in the UK and then by each of the four countries (Office of National Statistics, Quarterly Population Trends). For the UK, there were 681,000 children under the age of 1 in 2000; for England 574,000; for Wales 32,000; for Scotland 53,000; and for Northern Ireland 22,000. This provides a rough approximation of the total number of children born in 2000 living in families with multiple deprivation.

12. We use the estimated proportion of children born in 2000 and some strong assumptions to estimate the number of families in the UK living in multiple deprivation. The first assumption is that the proportion of children living in families with multiple risks is constant across all age groups and indicated by the proportion of 0-1 year olds in the MCS living in such circumstances. This means that the total number of 0 to 15 year old children living in families with multiple risks is obtained by multiplying the number of 0 to 1 year olds by 15. To obtain an estimate of the number of families, this figure for the number of children has to be adjusted by household size. In order to do this, we obtain the average number of 0 to 15 year olds living in households at each level of multiple risk, using the MCS data.

13. For the LSYPE, we use the total number of pupils in Year 9 in schools (both maintained and independent and including special schools and Pupil Referral Units) in England in spring 2004. We exclude boarders, those in the UK solely for educational reasons, and pupils in small schools (defined as less than 10 year 9 pupils in maintained schools, or less than 6 year 9 pupils in independent schools). The total number of pupils is 645,840.

14. For the LSYPE exclusively, we estimate the proportion of children and the relationship between prevalence of multiple risks and young people's outcomes. Outcomes selected are educational attainment, mental health disorders, being in care, persistent truancy or exclusion, substance and alcohol abuse, anti-social behaviour, and crime.

15. Measures used: For the MCS, individual risk indicators selected are depression, physical disabilities, substance misuse, alcohol consumption, domestic violence, financial stress, worklessness, teenage parenthood, lack of basic skills, and overcrowding.

16. For the LSYPE, individual risk indicators selected are physical disability, health status, domestic violence, financial stress, teenage parenthood, household size, contact with services, and parental education.

17. Summary statistics: Table 1 shows descriptive statistics for indicators of risk in the MCS. For depression, 19.4% of the children live in families where either the mother or the partner often feels depressed; for physical disability, 15% of the children live with at least one of the parents with a longstanding illness or disability. Nearly 12% of the children were born to mothers who smoked during pregnancy and 12% live with parents at risk of alcoholism. 4% of the children live with parents who get into violent rage, 7.7% in families that finds it quite difficult and very difficult to manage financially, and 5.5% where neither of the parents is on work or leave. Of the Millennium cohort children, 11% were born of a mother who is a teenage mother or was a teenager for her first born child. Finally, 3.6% of the children live with parents whose lack of basic skills limits their daily activities and 9.4% in an overcrowded household.

Table 1: Indicators of risk – summary statistics (MCS)

Type of risk	Variable from the MCS	Proportion
Depression	Either the mother or partner often feels depressed	19.4%
Physical Disability	Either the mother or partner has a longstanding illness that limits daily activities	15.0%
Substance Misuse	Mother smoked during pregnancy	11.7%
Alcohol	At least one of the parents is at risk of alcoholism (risk of alcoholism is defined as consumption of over 14 units (21 units) of alcohol per week for women (men))	12.3%
Domestic Violence	Either mother or partner often gets in violent rage	4.0%
Financial Stress	The family finds it quite difficult or very difficult to manage financially	7.7%
Worklessness	Neither mother or father on work or leave	5.5%
Teenage Parenthood	The mother is (was) a teenage mother (under 20 years old) for their first born child.	11.1%
Basic Skills	Either the mother or partner lack of basic skills limits their daily activities	3.6%
Overcrowding	Ratio of persons per room to number of rooms in the house (excluding toilets, halls, kitchen, living room, and garages).	9.4%

18. An indication of the relationships between these risk indicators is given in Table 2. The numbers represent the bivariate correlations between risks; the specific statistic reported being the odds ratio of having each risk given

the second risk. Odds greater than one indicate in these terms a positive correlation between risks.

19. For depression, individuals with longstanding illnesses have 2.7 times higher probability of reporting depression than those without longstanding illnesses. The higher odds ratio for depression is domestic violence, where families who often get in violent rage have 4.3 times higher probability of reporting depression. The highest odds ratio for having a longstanding illness is long term unemployment, as families not in work or leave have 4.4 times greater probability of having a longstanding illness. For smoking during pregnancy, being a teenage mother is associated with 2.7 times higher odds of smoking during pregnancy. High odds ratio are also shown for worklessness and overcrowding, where those living in an overcrowded housing are 4 times more likely not to be on employment or maternity leave.

Table 2: Odds by risk factors (MCS)

	Depr	Illne	Smk	Alcoh	Viol	Fin Strss	Work	Teen	Bsc Skill
Depression									
Illness	2.73								
Smoke in pregnancy	1.32	1.28							
Alcohol	1.69	0.74	1.23						
Violence	4.32	2.78	1.51	1.18					
Financial stress	1.81	2.35	1.63	0.78	2.73				
Worklessness	3.55	4.44	1.80	0.95	2.51	2.78			
Teenage parent	1.06	2.04	2.79	0.70	2.69	1.85	3.20		
Basic skills	3.01	2.78	1.30	1.16	2.37	1.88	3.99	1.17	
Overcrowding	1.40	2.52	1.01	0.57	2.20	1.98	4.02	2.46	1.40

20. In summary, we find that the vast majority of odds are higher than one with the exception of five cases, all of them related to the risk of alcoholism. This provides an indication that risk factors do not exist in isolation and that children living in families with one of these risk factors are likely be under the impact of other risk factors as well.

21. Variables in Table 3 were selected as indicators of risk for the LSYPE. Not all the indicators are the same as for the MCS, as the datasets are different. In as much as possible we aimed to obtain a similar indicator. For physical disability, 21% of 13 and 14 years olds live with at least one of the parents with a longstanding illness or disability, and 5.5% live with parents who reported very poor general health status. For domestic violence, 9% of young people quarrel most days with their parents. Additionally, 7.8% of young people live in families that are getting into financial difficulties and 8.4% with parents who have never worked or are in long-term unemployment. Of the LSYPE children, 11% were born of a mother who is a teenage mother or was a teenager for her first born child. Finally, 8.2% live in large households, 4.4% of their parents have been in contact with social services and 17.3% live in households where both parents lack of qualifications (or the main parent in case of one parent household).

Table 3: Indicators of risk – summary statistics (LSYPE)

Type of risk	Variable from the LSYPE	Proportion
Physical Disability	Either the mother or partner has a longstanding illness that limits daily activities	21.0%
Health Status	Either the mother or the father reported “not very good” health status	5.5%
Domestic Violence	Either the mother or the father quarrel most days with the YP	9.0%
Financial Stress	The family is getting into difficulties financially	7.8%
Worklessness	Family SEC: never worked / long term unemployed	8.4%
Teenage Parenthood	The mother is (was) a teenage mother (under 20 years old) for their first born child.	11.6%
Household Size	Household size over 6 members	8.2%
Contact with Services	Main parent has been in contact with social services	4.4%
Parental Education	Both parents lack of qualifications and in the case of one parent household if the parent lacks of qualifications.	17.3%

22. For the LSYPE, we find that all odds ratios are higher than one (Table 4). We find some particularly high odds between risk factors. Among them, self-reported health status and having a disability that limits activities have an odds ratio of 27 (i.e. 27 times higher odds for a family with disabilities to report very poor health status); lack of qualifications and long-term unemployment have odds of 11; and long-term unemployment and financial stress have an odds ratio of 4.5.

Table 4: Odds by risks factors (LSYPE)

	Dis	SRH	DV	FS	Wrk	Teen	HSize	Serv
Physical Disability								
Health Status	26.97							
Domestic Violence	1.21	1.46						
Financial Stress	2.34	2.97	1.49					
Worklessness	2.39	2.54	1.16	4.48				
Teenage Parenthood	1.18	1.40	1.45	1.55	2.88			
Household Size	1.71	2.21	1.11	1.88	3.90	3.32		
Contact w.Services	1.80	1.76	3.04	2.95	2.01	1.89	1.32	
Parental Education	2.38	3.02	1.06	3.18	11.05	2.17	3.36	2.06

23. *Validity analysis:* We propose two validity analyses for our indicator of multiple risks. Firstly, we use indicators of risk with very low prevalence and estimate whether the families with these risks have also multiple risks. This is only performed for the MCS, as we do not have comparable indicators in the LSYPE. For the MCS, we use families with history of criminality (0.2% of the sample), having a child in care (0.4% of the sample) or who have experienced over 1 month homelessness since the child was born (0.4% of the sample).

24. Secondly we use indicators of poverty, neighbourhood deprivation and household structure, which are important issues that exacerbate the impact of risk factors on children. We would expect that several of the families showing multiple risk factors also live in poverty, or in deprived areas, any may also be headed by single parents. For this reason, these indicators are used to verify how many of the families living in multiple deprivation also live in poverty, single parent households, or deprived neighbourhoods.

Method 2

25. **Objective:** To estimate an indicator of multiple risks using all available information on risk factors in each domain. Each indicator is in itself an important signal of a possible problem within each domain, and one that may have direct and indirect impacts on children's life.

26. This method is only applied using data from the MCS, as that dataset provides several indicators of risk for several of the domains. This is not the case for the LSYPE, which is a focused study on young people's life at home and school.

27. *Technical process to meet objective:* This method uses all available information rather than single specific measures, for domains in which more than one measure is available. We generate a score variable for the likelihood of being in risk for each domain. As all our risk variables are binary, we first obtain the tetrachoric correlations and utilise them in factor analysis. The tetrachoric correlations assume a latent bivariate normal distribution for each pair of dichotomous variables, with a threshold model for the manifest variables. The means and variances of the latent variables are not identified, but the correlation of the bivariate normal distribution can be estimated from the joint distribution of the dichotomous variables, which are called the tetrachoric correlation coefficients.

28. We perform factor analysis on the correlation matrix. We include the average and standard deviation of the risk factors in order to avoid the assumption that the variables are centred at zero with a unitary standard deviation. This information is useful to obtain the predicted score variable for each of the domains.

29. The scores are utilised to select a certain proportion of the population, for example the 10% with the worst mental health score. Each of these scores is combined to obtain a Venn diagram of the overlapping domains. These are also combined with the risk indicators for domains where only one indicator exists, for example teenage parenthood.

30. The selected proportion of the sample can serve as weight for the importance of the likelihood of risk in the domain in the estimation of multiple risks by domain. For the moment, risk in each domain carries the same weight.

31. *Measures used:* For each of the domains, we extract all existing indicators of risk available in the MCS. Not all domains of risk have multiple indicators. We have multiple indicators of risk in mental health, substance misuse, alcohol, domestic violence, and educational background (such as lack of basic skills or lack of formal qualifications).

32. *Summary statistics:*

Table 5 shows descriptive statistics for all indicators of risk by domains. This includes only those domains where there are multiple indicators. In the domain of substance misuse, for example, tobacco use during pregnancy identifies a risk, as smoking impacts upon the mother-baby relationship and it has consequences for the child (e.g. birthweight, development of asthma and other respiratory problems). But smoking during pregnancy for the mother is not the only available information. We have also measures as to whether the mother or partner smokes in the same room as the baby, and the use of recreational drugs by either of the parents.

Table 5: Several indicators of risk by domain – summary statistics (MCS)

Domain	Variables from the MCS	%
Mental health	Doctor diagnosed depression in mother (include post natal depression)	22.7
	Doctor diagnosed depression in partner	8.6
	Mother often feels depressed	11.2
	Partner often feels depressed	10.3
Substance Use	Mother smoked during pregnancy	11.7
	Partner smoked during pregnancy	8.6
	Mother or partner smoke in same room as baby	9.4
	Either mother or partner use recreational drugs regularly ⁽¹⁾	2.1
Alcohol	Mother at risk of alcoholism (14+ units per week)	3.6
	Partner at risk of alcoholism (21+ units per week)	10.2
	Mother drinks alcohol 5+ days a week	6.5
	Partner drinks alcohol 5+ days a week	16.0
	Mother drank alcohol during pregnancy (4 units per week daily or more than once a week)	3.6
Domestic Violence	Mother often gets in violent rage	1.5
	Partner often gets in violent rage	2.7
	Mother ever used force	3.1
	Partner ever used force	9.9
Educational	Mother lacks of basic skills limiting activities	1.4
	Partner lacks of basic skills limiting activities	2.4
	Both mother and partner lack of formal qualifications (or the main parent in case of single household)	7.3

Source: Millennium Cohort Study, Wave 1, except for information on use of recreational drugs, which comes from MCS, Wave 2.

Notes: The following domains have only a single indicator of risk: physical disability, financial stress, worklessness, teenage parenthood and overcrowding. Summary statistics for these variables are shown in Table 1.

Post estimation analysis

33. We use results from the MCS and from the LSYPE data on the prevalence of multiple risks (method 1) to investigate whether there are particular patterns or configurations of risks that are more important for the population. This analysis aims at responding to the question, how likely is that a particular combination of risk accounts for most of the prevalence of risk?

34. For this analysis we considered only those families with 3 risk factors and described the frequency, percent and cumulative distribution for the different combinations of risks. We then provide the same information for children living in families with 4, 5, 6, and 7 or more risk factors.

Results

35. We present results by the source of data and by the method applied. We also differentiate between results on prevalence of multiple risks and validity analyses of the measure of multiple risks.

MCS Results on Prevalence of Multiple Risks: Method 1

36. We estimate the cumulative proportion of children born in 2000 living with in families with these risk factors (Table 6). For the UK, approximately 403 thousand children born in 2000 live in families that have at least one or more of these risk factors. Of the cumulative risks, we estimate that 192 thousand children born in 2000 live in families with two or more risk factors, 83 thousand with 3 or more risk factors, 33 thousand with 4 or more risk factors, nearly 12 thousand with 5 or more risk factors, 4 thousand with 6 or more risk factors and finally one thousand families with 7 or more risk factors. The maximum number of risk factors by any family is 9.

Table 6: Total number of children in UK living in families with multiple risks

Number of risks	Average	Linearised S.E.	Number of Children (UK)	Lower bound	Upper bound
1 risk or more	0.593	0.007	403,893	394,278	413,507
2 or more	0.282	0.006	192,302	184,121	200,484
3 or more	0.122	0.004	83,115	77,655	88,574
4 or more	0.049	0.002	33,443	30,338	36,547
5 or more	0.018	0.001	11,995	10,284	13,707
6 or more	0.006	0.001	4,047	3,148	4,947
7 or more	0.002	0.000	1,039	630	1,448

Source: Millennium Cohort Study, Wave 1.

37. We estimate the total number of children living with families of multiple risks by each of the four countries in the UK (Table 7). The average proportion for children living with 1 or more risks and with 2 or more risks is the lowest in Northern Ireland, significantly different than for England at 1% level. For the rest of the proportions, we do not find significant differences of Wales, Scotland and Northern Ireland versus England.

Table 7: Children in England, Wales, Scotland and Northern Ireland living in families with multiple risks (proportion and total)

	MEAN				TOTAL # Children			
	England	Wales	Scotland	NI	England	Wales	Scotland	NI
1 risk or more	0.595	0.620	0.583	0.535*	341,321	19,852	30,901	11,779
2 or more	0.283	0.303	0.275	0.241*	162,648	9,699	14,556	5,308
3 or more	0.123	0.127	0.119	0.103	70,418	4,079	6,293	2,272
4 or more	0.049	0.053	0.049	0.038	28,281	1,695	2,606	830
5 or more	0.017	0.021	0.023	0.013	9,743	666	1,222	280
6 or more	0.006	0.008	0.009	0.004	3,194	257	461	91
7 or more	0.001	0.002	0.002	0.001	795	69	127	31

Source: Millennium Cohort Study, Wave 1. Asterisk (*) indicates significant difference at a 1% level between averages in Wales, Scotland and Northern Ireland versus England.

38. As it can be seen in Table 8 , the number of children living in the household has a positive association with the multiple risks indicator. This gives us a denominator by which to estimate the number of families from the information about the number of children, at each level of multiple risk.

Table 8: Estimated number of families in the UK living in multiple deprivation

Number of risks	Number of 0 to 1 year old children	Number of 0-15 year old children	Average number of 0-15 children	Estimated number of families
risk1plus	403,893	6,058,390	2.091	2,896,885
risk2plus	192,302	2,884,535	2.273	1,269,245
risk3plus	83,115	1,246,722	2.519	495,013
risk4plus	33,443	501,641	2.645	189,662
risk5plus	11,995	179,931	2.816	63,898
risk6plus	4,047	60,706	3.058	19,854
risk7plus	1,039	15,579	2.934	5,310

Source: Millennium Cohort Study, Wave 1.

LSYPE Results on Prevalence of Multiple Risks: Method 1

39. We estimate the cumulative proportion of young people, represented by 13 and 14 year olds members of the LSYPE sample, living with in families with multiple risk factors (Table 9). 45% of young people live in families with one or more risk factors, 18% in families with 2 or more risk factors, 7% in families with 3 or more risk factors, and 2.4% in families with 4 or more risk factors. The proportion living in households with 5 or more risk factors is relatively small, less than 1%. The maximum number of risk factors by any family was 7.

Table 9: Proportion of 13 & 14 year olds in England living in families with multiple risks

Number of risks	Average	S.E.	Estimated population number(*)	Lower bound	Upper bound
1 risk or more	0.450	0.004	290,562	285,445	295,679
2 or more	0.183	0.003	118,391	114,411	122,371
3 or more	0.069	0.002	44,716	42,105	47,327
4 or more	0.024	0.001	15,461	13,889	17,034
5 or more	0.006	0.001	4,005	3,197	4,812
6 or more	0.002	0.000	1,114	687	1,541

Source: Longitudinal Survey of Young People in England.

Notes: (*) The estimated population number is based on the total number of pupils in Year 9 in schools in England in spring 2004. It excludes exclude boarders, those in the UK solely for educational reasons, and pupils in small schools.

40. An interesting use of the LSYPE is the link between risk factors in families and the prevalence of high cost, high harm outcomes for young people. Table 10 show a list of different outcomes selected. There are two

educational outcomes, one is a measure of educational expectations and the other is registration as special education needs. For persistent truancy and exclusion we have three different indicators, one is frequency of truancy (5.2% of young people play truant frequently), another being suspended from school more than once (3.9%) and finally being expelled from school (0.7%). For anti-social behaviour we have five different measures.

Table 10: Young people's outcomes – summary statistics

Type of Outcome	Description from the LSYPE	Proportion
Educational	YP does not want to stay in schooling post 16	12.0%
	YP is identified as special education needs	19.0%
Care	YP has ever been in care	2.2%
Persistent truancy / exclusion	YP plays truant frequently	5.2%
	YP has been suspended from school more than once in the last 3 years	3.9%
	YP has been expelled or permanently excluded from school	0.7%
Substance and alcohol abuse	YP smokes cigarettes frequently	6.1%
	YP drinks alcohol more than 3 x a month	2.9%
Anti-social behaviour	YP has ever tried cannabis	8.8%
	YP has written on walls with spray	6.6%
	YP has smashed public property	10.0%
	YP has stolen goods from shops	11.8%
	YP has taken part in fights	18.7%
Involved in crime	YP frequently misbehave in class	7.8%
	Main parent has been contacted by police due to YP actions	7.8%

41. We find a clear, increasing risk gradient for some, but not all, of the outcomes. In particular, the likelihood of young people to have been in care doubles for those who live in families with one risk compared to young people who live in families without risk. The odds ratio continues to increase and reaches nearly six for those who live in families with five or more risks compared to those without any risk factor. Similar results are found for the likelihood of playing truancy frequently, being suspended from school, being excluded from school, and being in contact with the police.

42. A less marked gradient is found for the anti-social behaviour measures, for smoking cigarettes, and to a lesser extent for educational outcomes. For example, compared to young people living in families without risk, the odds of smashing public property increases by 45% for young people living in families with 1 risk, by 71% for 2 risks, decreases to 55% for 3 risks, 39% for 4 risks and increases to over twofold for five or more risks.

43. Finally, we do not find a risk gradient for alcohol or cannabis consumption.

Table 11: Odds ratio for likelihood of outcomes by multiple risks

	One risk	Two risks	Three risks	Four risks	Five+ risks
YP not stay on post 16	1.49	1.53	1.61	1.60	1.30
YP is SEN	1.19	1.32	1.36	1.35	1.23
YP ever in care	1.98	3.49	2.91	2.66	6.55
YP truant frequently	2.05	3.24	3.60	4.66	6.83
YP suspended school	2.31	4.08	6.33	5.28	11.88
YP excluded school	4.63	8.49	7.93	15.41	36.23
YP cigarettes frequently	1.70	2.06	2.30	2.17	2.73
YP drinks alcohol 3xmonth	1.35	1.27	1.66	0.79	0.26
YP has ever tried cannabis	1.30	1.17	1.19	1.14	1.05
YP written on walls with spray	1.45	2.00	2.03	1.62	2.69
YP smashed public property	1.34	1.71	1.55	1.39	2.11
YP stolen goods from shops	1.33	1.55	1.44	1.37	2.28
YP fights	1.58	1.83	1.93	1.89	1.98
Police contact	1.92	2.48	3.97	3.73	6.00

Source: Longitudinal Survey of Young People in England. Odds ratios are compared against young people living in families without any of these risks. Shaded area indicates that the variable is not significantly different at 5% level from the comparison group.

MCS Validity Analysis Method 1

44. For the MCS we use one parent household as an indicator of household structure, income poverty with a threshold of a combined income of £10,400 annually as an indicator of poverty and finally self reported prevalence of vandalism in the area as indicator of neighbourhood deprivation.

45. For low income, the probability of multiple risks is higher for children in the UK living in low income households than for those not in poverty. Of those children whose family income is higher than £10,400 pounds, 59% live in families with 1 or more of these risks and 27% with 2 or more risks. 80% of the children living in income poverty also live in families with 1 or more risks and nearly half with 2 or more risks. For each cumulative risk, a greater proportion of children living in poverty are also considered income poor, and these are all significantly different at a 1% level expect for the likelihood of having 7 or more risks, which is significantly different at 5% level.

46. A similar result is found for children living in deprived areas. Our proxy measure for neighbourhood deprivation is self-reported frequency of vandalism in the area. Children living in households who reported that vandalism was quite frequent or very frequent are more likely to be living with

multiple risks. At all levels of multiple risks, children living in deprived areas have higher likelihood of multiple risks than those not living in deprived areas.

47. This is not so the case for household structure. Although we find a difference by household structure in the proportion of children living with one, two and three or more risks, the difference becomes statistically insignificant where there are 4 or more risks and changes direction for children living with more than 4 risk factors.

Table 12: Proportion of children in UK living in families with multiple risks by household structure, poverty and neighbourhood deprivation

Number of risks	Household Structure		Poverty		Neighbourhood Deprivation	
	Two parents	One parent	Not income poor	Income poor	Low vandalism	High vandalism
	mean	mean	mean	mean	mean	Mean
1 risk or more	0.556	0.782*	0.527	0.824*	0.574	0.841*
2 or more	0.259	0.400*	0.223	0.492*	0.261	0.562*
3 or more	0.116	0.155*	0.086	0.245*	0.108	0.299*
4 or more	0.050	0.045	0.034	0.104*	0.041	0.150*
5 or more	0.019	0.012*	0.010	0.045*	0.014	0.065*
6 or more	0.007	0.002*	0.004	0.015*	0.004	0.024*
7 or more	0.002	0.000*	0.001	0.003	0.001	0.012*

Source: Millennium Cohort Study, Wave 1. Asterisk (*) indicates significant difference between the means at a 1% level.

48. We use the low prevalence indicator of risk to determine the proportion of children living in the UK by number of risk factors in addition to a low prevalence risk (

Table 13). We find that no more than 15% of the children living in families with a low prevalence risk face only this risk. For children whose parents lived in a Young Offenders Institution before the age of 17, 15%, 24%, and 10% live in families with two, three, and four additional risk factors, respectively. For children whose parents have given another child to care or adoption, 31% live in families with one additional risk factor and 25% with two additional risk factors. Finally, for children whose mothers have experienced over 1 month of homelessness since they were born, 30% live in families with an additional risk and a further 30% in families with 2 additional risks.

Table 13: Proportion of children in UK by the number of risk factors in addition to a low prevalence risk

Number of risks	Criminality	Care or adoption	Homelessness
	Proportion	Proportion	Proportion
Only low prevalence risk	0.12	0.13	0.15
Plus 1 risk	0.05	0.31	0.30
Plus 2 risks	0.15	0.25	0.30
Plus 3 risks	0.24	0.18	0.18
Plus 4 risks	0.10	0.04	0.05
Plus 5 risks	0.16	0.05	0.02
Plus 6 risks	0.11	0.02	n.a.
Plus 7 risks	0.02	0.03	n.a.
Plus 8 risks	0.06	n.a.	n.a.

Source: Millennium Cohort Study, Wave 1.

49. In summary, results from

Table 13 suggest that risk factors do not occur in isolation, even for the ones that have low prevalence we find that the vast majority of the children face at least one additional risk factor.

LSYPE Validity Analysis Method 1

50. For the LSYPE we use single parent as indicator of household structure; whether the main parent's occupation is elementary as indication of poverty and the ONS index of multiple deprivation as an indicator of neighbourhood deprivation.

We find that one parent families are more likely to have multiple risks than are two parent families (

51. Table 14). A similar result is found for families whose main parent occupation is classified as elementary and those living in deprived areas. Most of the differences are statistically significant at 1% level. We find some cases where the significance level does not hold. This may be due to the low number of observations for families with more than 5 risks.

Table 14: Proportion of 13/14 year old in England living in families with multiple risks by household structure, poverty and neighbourhood deprivation

Number of risks	Household Structure		Poverty		Neighbourhood Deprivation	
	Two parents	One parent	Not elementary occup.	Elementary occup.	Lowest 25% IMD	Highest 25% IMD
	mean	mean	mean	Mean	mean	Mean
1 risk or more	0.414	0.565*	0.376	0.581*	0.297	0.672*
2 or more	0.150	0.289*	0.114	0.258*	0.071	0.376*
3 or more	0.052	0.124*	0.032	0.092*	0.014	0.177*
4 or more	0.018	0.043*	0.008	0.029*	0.003	0.068*
5 or more	0.005	0.011*	0.001	0.006*	0.001	0.020*
6 or more	0.002	0.002	0.000	0.002*	0.000	0.006*
7 or more	0.000	0.000	0.000	0.001*	0.000	0.001

Source: Longitudinal Study of Young People in England. Asterisk (*) indicates significant difference between the means at a 1% level.

MCS Results on Prevalence of Multiple Risks: Method 2

52. So far we have used one measure of risk by domain. However, some domains have multiple measures of risk. We combine all the information available in the MCS and re-estimate our measure of multiple deprivation. We use an arbitrary 10% cut off point for the score variables to define risk in the domain.

53.

Table 15 shows the proportion of children in the UK living in families at risk across multiple domains of life. We find that 60% of children are at risk in one or more domains, which represents 408 thousand children. There are 28% of children living in families with two or more domains at risk, 12% with three or more domains of risk, 5% with four or more domains.

54. These results are very similar to the one obtain using a single measure. This happens for two reasons. First, the estimation of the multiple indicator of risk contains five of the single measures, so there is only variation for the domains where there are several indicators. Secondly, the 10% cut off for domains with multiple indicators can either incorporate additional families not previously selected by the individual indicator or drop some previously selected families. For example, we previously selected only 4% of families with domestic problems (which is the proportion of mothers and partners who often get in violent rage). The 10% cut off point in domestic violence incorporates additional families. The opposite result happens for mental health, where previously we selected 19% of families and the cut-off point reduced this selection to 10%.

Table 15: Total number of children in UK living in families with multiple risks

Cumulative risk in domain	Average	Linearised S.E.	Number of Children (UK)	Lower bound	Upper bound
At least 1 domain in risk	0.600	0.006	408,336	400,124	416,548
2+ domains	0.282	0.006	191,852	183,989	199,715
3+ domains	0.121	0.004	82,511	77,363	87,660
4+ domains	0.047	0.002	32,294	29,172	35,417
5+ domains	0.016	0.001	10,786	9,235	12,338
6+ domains	0.005	0.001	3,631	2,875	4,386
7+ domains	0.002	0.000	1,314	848	1,780

Source: Millennium Cohort Study, Wave 1. Cut off point for score is 10%.

Post estimation using MCS & LSYPE

55. The interpretation from these tables is as follows. Take Table 16 as an example. There are 89 children living in families with risk of smoking, financial stress and teenage motherhood. This corresponds to 6.02% of all children living in families with 3 risks. The next most common patterns are smoking, teen motherhood and overcrowding and smoking, teenage motherhood and basic skills. There are 62 children with each of these 3 risk factors and each account for 4.2% of all children in families with 3 risk factors. These 3 patterns make up 14.4% of all patterns for 3 risk factors. Table 17 provides the same information for children living in families with 4 risks; Table 18 for children living in families with 5 risks; Table 19 for 6 risks and finally Table 20 for 7 or more risks. Table 21 to Table 24 have similar information from the LSYPE.

56. Information from these tables confirms the hypothesis that there is not one pattern of risk factors that accounts for most of the information. As we can see the patterns are diverse, as no single combination of risk applies to more than 12% of cases. For the single pattern of risk that represents 12% of the cases, its frequency is relatively small, accounting for only 4 young people from the LSYPE living in families with 6 or more risk factors.

Table 16: Combinations of risks for children living in families with 3 risk factors.

Freq.	Percent	Cum.	Depr	Illne	Smk	Alcoh	Viol	Fin Strss	Work	Teen	Bsc Skill	OverCrow
89	6.02	6.02	.	.	X	.	.	X	.	X	.	.
62	4.19	10.21	.	.	X	.	.	.	.	X	.	X
62	4.19	14.40	.	.	X	.	.	.	.	X	X	.
44	2.97	17.38	.	.	X	.	.	.	X	X	.	.
42	2.84	20.22	.	.	.	.	.	.	X	.	X	X
42	2.84	23.06	X	.	X	.	.	.	.	X	.	.
39	2.64	25.69	.	.	.	.	.	.	X	X	.	X
37	2.50	28.19	X	.	X	.	.	.	.	.	X	.
35	2.37	30.56	X	.	.	.	.	.	X	.	X	.
35	2.37	32.93	X	.	.	X	.	.	.	.	X	.
34	2.30	35.23	X	.	.	.	.	X	.	.	X	.
33	2.23	37.46	X	.	.	.	X	.	.	.	X	.
29	1.96	39.42	.	.	.	.	.	X	.	X	.	X
29	1.96	41.38	.	.	.	.	.	X	X	.	.	X
27	1.83	43.20	.	.	.	.	.	.	X	X	X	.
27	1.83	45.03	X	.	.	.	.	.	.	X	X	.
26	1.76	46.79	.	.	X	X	.	.	.	X	.	.
23	1.56	48.34	.	.	.	.	.	.	.	X	X	X
23	1.56	49.90	.	.	X	.	.	X	.	.	X	.
22	1.49	51.39	.	.	.	.	.	X	.	.	X	X
719	48.61	100	Other patterns									

Source: Millennium Cohort Study, Wave 1. Notes: The sample contains 1,479 children living in families with 3 risk factors.

Table 17: Combinations of risks for children living in families with 4 risk factors.

Freq.	Percent	Cum.	Depr	Illne	Smk	Alcoh	Viol	Fin Strss	Work	Teen	Bsc Skill	OverCrow
19	3.02	3.02	X	.	.	.	.	.	X	X	X	.
18	2.86	5.88	X	.	.	.	.	.	X	.	X	X
14	2.23	8.11	X	.	.	.	.	X	X	.	X	.
14	2.23	10.33	X	.	.	.	X	X	.	.	X	.
14	2.23	12.56	X	.	X	.	.	.	.	X	.	X
14	2.23	14.79	X	.	X	.	.	X	.	.	X	.
13	2.07	16.85	X	.	X	.	.	.	X	X	.	.
12	1.91	18.76	.	.	X	.	.	.	X	X	X	.
12	1.91	20.67	.	.	X	.	.	X	.	X	X	.
12	1.91	22.58	X	.	.	.	.	.	.	X	X	X
12	1.91	24.48	X	.	X	.	.	.	X	.	X	.
12	1.91	26.39	X	X	.	.	.	.	X	.	X	.
11	1.75	28.14	.	.	.	.	.	X	X	X	.	X
11	1.75	29.89	.	.	X	.	.	.	X	X	.	X
11	1.75	31.64	X	.	.	.	.	.	X	X	.	X
10	1.59	33.23	X	.	X	.	.	.	.	X	X	.
10	1.59	34.82	X	.	X	X	.	.	.	X	.	.
9	1.43	36.25	.	.	.	.	.	.	X	X	X	X
9	1.43	37.68	.	.	.	.	.	X	X	X	X	.
9	1.43	39.11	.	.	X	.	.	.	.	X	X	X
383	60.89	100	Other patterns.									

Source: Millennium Cohort Study, Wave 1. Notes: The sample contains 629 children living in families with 4 risk factors.

Table 18: Combinations of risks for children living in families with 5 risk factors.

Freq.	Percent	Cum.	Depr	Illne	Smk	Alcoh	Viol	Fin Strss	Work	Teen	Bsc Skill	OverCrow
11	4.49	4.49	X	.	.	.	.	.	X	X	X	X
10	4.08	8.57	.	X	.	.	.	X	X	.	X	X
9	3.67	12.24	X	.	X	.	.	.	X	X	.	X
8	3.27	15.51	.	.	X	.	.	.	X	X	X	X
8	3.27	18.78	X	.	X	.	.	.	X	X	X	.
7	2.86	21.63	X	.	X	.	.	X	X	X	.	.
6	2.45	24.08	X	.	X	.	.	X	X	.	X	.
6	2.45	26.53	X	X	.	.	.	.	X	X	X	.
5	2.04	28.57	X	.	.	.	.	X	X	.	X	X
5	2.04	30.61	X	.	.	.	.	X	X	X	X	.
5	2.04	32.65	X	.	.	.	X	.	X	X	X	.
5	2.04	34.69	X	.	X	.	.	X	.	X	X	.
5	2.04	36.73	X	.	X	.	X	.	.	X	X	.
5	2.04	38.78	X	.	X	X	.	.	.	X	X	.
4	1.63	40.41	.	X	.	.	.	X	X	X	X	.
4	1.63	42.04	X	.	X	.	.	.	X	.	X	X
4	1.63	43.67	X	.	X	X	.	.	.	.	X	X
3	1.22	44.90	.	.	.	.	.	X	X	X	X	X
3	1.22	46.12	.	.	X	.	.	X	.	X	X	X
3	1.22	47.35	.	.	X	.	.	X	X	X	.	X
129	52.65	100	Other patterns									

Source: Millennium Cohort Study, Wave 1. Notes: The sample contains 245 children living in families with 5 risk factors.

Table 19: Combinations of risks for children living in families with 6 risk factors.

Freq.	Percent	Cum.	Depr	Illne	Smk	Alcoh	Viol	Fin Strss	Work	Teen	Bsc Skill	OverCrow
7	7.78	7.78	X	.	X	.	.	.	X	X	X	X
5	5.56	13.33	X	X	.	.	.	X	X	X	X	.
4	4.44	17.78	X	.	.	.	.	X	X	X	X	X
4	4.44	22.22	X	.	X	.	.	X	X	X	X	.
3	3.33	25.56	X	.	.	.	X	X	X	X	X	.
3	3.33	28.89	X	.	X	.	X	X	X	.	X	.
3	3.33	32.22	X	X	.	.	.	X	X	.	X	X
3	3.33	35.56	X	X	X	.	.	.	X	X	X	.
2	2.22	37.78	.	X	.	.	.	X	X	X	X	X
2	2.22	40.00	X	.	.	.	X	.	X	X	X	X
2	2.22	42.22	X	.	.	.	X	X	X	.	X	X
2	2.22	44.44	X	.	.	X	.	.	X	X	X	X
2	2.22	46.67	X	.	.	X	X	.	X	X	.	X
2	2.22	48.89	X	.	.	X	X	.	X	X	X	.
2	2.22	51.11	X	.	X	.	.	X	.	X	X	X
2	2.22	53.33	X	.	X	.	X	.	X	X	X	.
2	2.22	55.56	X	.	X	X	.	.	X	X	X	.
2	2.22	57.78	X	X	.	.	.	X	.	X	X	X
1	1.11	58.89	.	.	X	.	X	X	.	X	X	X
1	1.11	60.00	.	.	X	X	.	X	.	X	X	X
36	40.00	100	Other patterns.									

Source: Millennium Cohort Study, Wave 1. Notes: The sample contains 90 children living in families with 6 risk factors.

Table 20: Combinations of risks for children living in families with 7 or more risk factors.

Freq.	Percent	Cum.	Depr	Illne	Smk	Alcoh	Viol	Fin Strss	Work	Teen	Bsc Skill	OverCrow
3	9.09	9.09	X	X	.	.	X	X	X	X	X	X
2	6.06	15.15	X	.	X	.	X	.	X	X	X	X
2	6.06	21.21	X	.	X	.	X	X	X	X	X	.
2	6.06	27.27	X	X	.	.	X	X	X	X	X	.
2	6.06	33.33	X	X	.	X	X	X	X	.	X	.
2	6.06	39.39	X	X	X	.	X	.	X	X	X	.
2	6.06	45.45	X	X	X	X	X	.	X	X	X	.
1	3.03	48.48	.	.	.	X	X	X	X	X	X	X
1	3.03	51.52	X	.	.	X	X	.	X	X	X	X
1	3.03	54.55	X	.	X	.	X	X	X	X	.	X
1	3.03	57.58	X	.	X	X	.	.	X	X	X	X
1	3.03	60.61	X	.	X	X	.	X	.	X	X	X
1	3.03	63.64	X	.	X	X	.	X	X	X	X	.
1	3.03	66.67	X	.	X	X	X	.	X	.	X	X
1	3.03	69.70	X	.	X	X	X	.	X	X	X	.
1	3.03	72.73	X	.	X	X	X	X	X	X	.	.
1	3.03	75.76	X	X	.	.	.	X	X	X	X	X
1	3.03	78.79	X	X	.	.	X	X	X	.	X	X
1	3.03	81.82	X	X	.	X	.	X	X	X	X	X
1	3.03	84.85	X	X	.	X	X	X	X	X	.	X
5	15.15	100	Other patterns									

Source: Millennium Cohort Study, Wave 1. Notes: The sample contains 33 children living in families with 7 or more risk factors.

Table 21: Combinations of risks for children living in families with 3 risk factors.

Freq.	Percent	Cum.	Disab	SRH	Dom. Viol	Fin Stress	Wrk	Teen	HH Size	Contact Soc. Serv.	Par Ed
89	8.91	8.91	X	X	.	.	.	.	.	.	X
79	7.91	16.82	X	.	.	.	X	.	.	.	X
54	5.41	22.22	.	.	.	X	X	.	.	.	X
52	5.21	27.43	.	.	.	.	X	X	.	.	X
52	5.21	32.63	X	.	.	.	.	.	X	.	X
49	4.90	37.54	X	.	.	X	.	.	.	.	X
47	4.70	42.24	.	.	.	.	.	X	X	.	X
36	3.60	45.85	.	.	.	.	X	.	X	.	X
34	3.40	49.25	X	.	.	.	.	X	.	.	X
33	3.30	52.55	X	X	.	X	.	.	.	.	.
29	2.90	55.46	X	X	.	.	.	X	.	.	.
22	2.20	57.66	X	X	X	.	.	.	.	.	.
20	2.00	59.66	X	.	.	.	.	X	X	.	.
19	1.90	61.56	X	.	X	.	.	.	.	.	X
18	1.80	63.36	X	X	.	.	.	.	X	.	.
15	1.50	64.86	X	.	.	X	.	X	.	.	.
14	1.40	66.27	.	.	.	X	.	.	.	X	X
14	1.40	67.67	.	.	.	X	.	X	.	.	X
13	1.30	68.97	.	.	.	X	.	.	X	.	X
13	1.30	70.27	.	.	.	X	.	X	X	.	.
297	29.73	100	Other patterns								

Source: Longitudinal Survey of Young People in England. Notes: The sample contains 999 children living in families with 3 risk factors.

Table 22: Combinations of risks for children living in families with 4 risk factors.

Freq.	Percent	Cum.	Disab	SRH	Dom. Viol	Fin Stress	Wrk	Teen	HH Size	Contact Soc. Serv.	Par Ed
31	7.35	7.35	X	X	.	X	.	.	.	.	X
27	6.40	13.74	X	.	.	X	X	.	.	.	X
27	6.40	20.14	X	X	.	.	.	.	X	.	X
27	6.40	26.54	X	X	.	.	X	.	.	.	X
22	5.21	31.75	X	.	.	.	.	X	X	.	X
21	4.98	36.73	.	.	.	.	X	X	X	.	X
15	3.55	40.28	X	.	.	.	X	.	X	.	X
12	2.84	43.13	.	.	.	X	X	.	X	.	X
12	2.84	45.97	.	.	.	X	X	X	.	.	X
12	2.84	48.82	X	X	X	.	.	.	.	.	X
11	2.61	51.42	X	.	.	.	X	X	.	.	X
10	2.37	53.79	X	X	.	.	.	X	.	.	X
9	2.13	55.92	X	X	.	.	.	X	X	.	.
8	1.90	57.82	X	.	.	X	.	X	.	.	X
8	1.90	59.72	X	X	.	X	.	.	.	X	.
8	1.90	61.61	X	X	.	X	.	.	X	.	.
7	1.66	63.27	.	.	X	X	X	.	.	.	X
7	1.66	64.93	X	.	X	X	.	.	.	.	X
7	1.66	66.59	X	X	X	.	.	.	.	X	.
6	1.42	68.01	X	.	.	.	X	X	X	.	.
135	31.99	100	Other patterns								

Source: Longitudinal Survey of Young People in England. Notes: The sample contains 422 children living in families with 4 risk factors.

Table 23: Combinations of risks for children living in families with 5 risk factors.

Freq.	Percent	Cum.	Disab	SRH	Dom. Viol	Fin Stress	Wrk	Teen	HH Size	Contact Soc. Serv.	Par Ed
13	11.21	11.21	X	X	.	X	X	.	.	.	X
10	8.62	19.83	X	X	.	.	X	.	X	.	X
8	6.90	26.72	X	.	.	.	X	X	X	.	X
8	6.90	33.62	X	X	.	X	.	.	X	.	X
6	5.17	38.79	.	.	.	X	X	X	X	.	X
5	4.31	43.10	X	.	.	X	X	.	X	.	X
4	3.45	46.55	X	.	.	X	X	X	.	.	X
4	3.45	50.00	X	X	.	.	.	X	X	.	X
3	2.59	52.59	.	.	X	.	X	X	X	.	X
3	2.59	55.17	X	X	.	.	X	X	.	.	X
3	2.59	57.76	X	X	X	.	X	.	.	.	X
2	1.72	59.48	.	.	X	X	.	X	X	.	X
2	1.72	61.21	X	.	.	.	X	X	X	X	.
2	1.72	62.93	X	.	.	X	X	.	.	X	X
2	1.72	64.66	X	.	X	.	X	.	X	.	X
2	1.72	66.38	X	.	X	.	X	X	.	.	X
2	1.72	68.10	X	X	.	X	X	.	X	.	.
2	1.72	69.83	X	X	.	X	X	X	.	.	.
2	1.72	71.55	X	X	X	.	.	X	.	.	X
2	1.72	73.28	X	X	X	.	.	X	.	X	.
31	26.72	100	Other patterns								

Source: Longitudinal Survey of Young People in England. Notes: The sample contains 116 children living in families with 5 risk factors.

Table 24: Combinations of risks for children living in families with 6 or more risk factors.

Freq.	Percent	Cum.	Disab	SRH	Dom. Viol	Fin Stress	Wrk	Teen	HH Size	Contact Soc. Serv.	Par Ed
4	11.76	11.76	X	X	.	.	X	X	X	.	X
4	11.76	23.53	X	X	X	X	.	.	X	.	X
3	8.82	32.35	X	X	X	X	X	.	.	.	X
2	5.88	38.24	X	.	.	X	X	X	X	.	X
2	5.88	44.12	X	X	.	X	X	.	X	.	X
2	5.88	50.00	X	X	.	X	X	X	X	.	X
2	5.88	55.88	X	X	X	.	.	X	X	.	X
1	2.94	58.82	.	.	X	.	X	X	X	X	X
1	2.94	61.76	X	.	.	X	.	X	X	X	X
1	2.94	64.71	X	.	.	X	X	X	.	X	X
1	2.94	67.65	X	.	X	.	.	X	X	X	X
1	2.94	70.59	X	.	X	.	X	X	X	.	X
1	2.94	73.53	X	.	X	X	X	.	X	.	X
1	2.94	76.47	X	X	.	.	X	X	X	X	X
1	2.94	79.41	X	X	.	X	.	.	X	X	X
1	2.94	82.35	X	X	.	X	.	X	X	.	X
1	2.94	85.29	X	X	.	X	X	X	.	X	X
1	2.94	88.24	X	X	X	.	X	.	X	.	X
1	2.94	91.18	X	X	X	.	X	X	.	X	X
1	2.94	94.12	X	X	X	X	.	.	.	X	X
2	5.88	100	Other patterns								

Source: Longitudinal Survey of Young People in England. Notes: The sample contains 34 children living in families with 6 or more risk factors.