

Appendix A.

We imputed missing data using the multivariate imputation by chained equations method implemented in STATA 12. This uses a missing at random (MAR) assumption. Supplementary variables were used in the imputation models. These included the same variables collected at other waves and variables measuring other constructs that were highly correlated with the main study variables. Table A1 gives the proportion of missingness for all variables used in either the propensity score model or the substantive mobility models.

Table A1. Missing data in the two cohorts

1958 cohort	N	% missing	1970 cohort	N	% missing
Breastfed	14625	16.01	Breastfed	12610	24.80
Region	17413	0.00	Region	16768	0.00
Mother's age	17398	0.09	Mother's age	16668	0.60
Marital status	17402	0.06	Father's age	11938	28.80
Mother's education	17350	0.36	Marital status	16768	0.00
Father's social class at birth	16455	5.50	Mother's education	16628	0.83
Overcrowding	16917	2.85	Father's education	11946	28.76
Number of maternal siblings	17232	1.04	Father's social class at birth	15396	8.18
Mother's age at first birth	16909	2.89	Mother's social class at birth	10308	38.53
Parity	17409	0.02	Mother's age at first birth	16569	1.19
Number of premature births	17285	0.74	Smoking in pregnancy	16685	0.49
Smoking prior to pregnancy	17346	0.38	Drinking in pregnancy	16768	0.00
Smoking after pregnancy	17187	1.30	Date of first antenatal visit	16486	1.68
Date of first antenatal visit	16961	2.60	Number of antenatal visits	16089	4.05
Number of antenatal visits	17137	1.59	Attended mothercraft classes	16648	0.72
Gestation	15569	10.59	Attended labour preparation classes	16632	0.81
Mother's height	16703	4.08	Mother ill during pregnancy	16767	0.01
Haemoglobin count	16867	3.14	Gestation	13320	20.56
Hours worked during pregnancy	5479	68.54	Mother's height	16602	0.99
Number cooks for in family	17134	1.60	Haemoglobin count	12092	27.89
Mode of delivery	17407	0.03	Fetal distress	16173	3.55
Fetal distress	17406	0.04	Duration of labour	16622	0.87
Duration of labour	16994	2.41	Baby's weight	16751	0.10
Baby's weight	16780	3.64	Multiple birth	16768	0.00
Birth abnormalities	17401	0.07	Father's social class age 10	11386	32.10
Father's social class age 11	12889	25.98	Cognitive test score	11511	31.35
Cognitive test score	14132	18.84	One hand catches	12002	28.42
Left hand catches	12647	27.37	Left hand matches sorted	11978	28.57
Left hand matches sorted	12753	26.76	Left foot stand	11972	28.60
Left hand squares ticked	12778	26.62	Both hand catches	11852	29.32
Right hand catches	12643	27.39	Right hand matches sorted	11982	28.54
Right hand matches sorted	12757	26.74	Right foot stand	11955	28.70

Right hand squares ticked	12778	26.62	Mother reported emotional stress	12592	24.90
Mother reported emotional stress	13787	20.82	Teacher reported emotional stress	11728	30.06
Teacher reported emotional stress	14157	18.70	Nightmares	14875	11.29
Nightmares	13643	21.65	Sleep walks	14875	11.29
Sleep walks	13731	21.15	Wet by day	12036	28.22
Wet by day	13715	21.24	Wet at night	12551	25.15
Wet at night	13792	20.79	Soils	12058	28.09
Soils	13764	20.96	Own social class at 34 years	7352	56.15
Own social class at 33 years	10582	39.23			

Appendix B. Propensity score matching

Baseline covariates include indicators of socio-demographics (region, parents' ages, marital status, parental education, parental social class, overcrowding, maternal siblings) maternal fertility history (age at first birth, parity, previous premature children), pregnancy characteristics (smoking prior to/ during/ after pregnancy, drinking in pregnancy, first antenatal visit, number of antenatal visits, mothercraft and labour classes, gestation, maternal height, mother's haemoglobin, maternal illness, hours worked, number cooks for) and birth outcomes (multiple birth, type of delivery, distress, duration of labour, birth weight, any abnormalities). Not all variables were available for both cohorts and so the matching procedure was carried out separately for each cohort. Baseline covariates in common were region, mother's age, marital status, mother's education, parental social class, age at first birth, parity, mother's haemoglobin, gestation, illness in pregnancy, first antenatal visit, number of antenatal visits, type of delivery, signs of fetal distress, birth weight, labour and any abnormalities.

The propensity score was used as the basis for matching the breastfed and formula fed cohort members. We carried out a 1:3 propensity score matching procedure with a nearest neighbour matching algorithm within callipers (width of propensity score intervals) of width 0.0002 standard deviations of the propensity score, dropping 2% of the treatment observations where the pscore density of the control observations is the lowest.

All the variables in the propensity score models had a bivariate association with breastfeeding. In multivariate models on the 1958 cohort, mothers were more likely to breastfeed if they were older, taller, more educated, in a more advantaged social class, did not smoke before the pregnancy, and had a full-term baby. They were less likely to breastfeed if they were ill in pregnancy, attended the first antenatal clinic earlier, had a low haemoglobin count, previous premature babies, lived in overcrowded accommodation, and gave birth to a low birth weight baby with health problems. In the 1970 cohort, taller older more educated and more socially advantaged mothers of full-term singleton children were more likely to breastfeed. Mothers who smoked, were ill in pregnancy, who did not attend mothercraft or labour preparation classes were less likely to breastfeed.

Standardised differences are used to examine the balance of the matched groups of breastfed and formula fed groups. Table B1 gives matching diagnostics for each of the 20 filled-in datasets averaged over all variables. It shows evidence of significant differences in the distribution of the propensity score matching variables for breastfed and formula-fed children before matching which disappeared after matching. Figure B1 complements Table B1 by giving diagnostics for each

variable averaged over the 20 filled-in datasets. This perspective also confirmed that differences in the matching variables were eliminated after matching.

Table B1 Propensity score matching diagnostics averaged over all variables

Sample	Before matching					After matching				
	Mean absolute standardised bias ^	Median absolute standardised bias	Pseudo R ² *	LRT χ^2 +	LRT p-value	Mean absolute standardised bias^	Median absolute standardised bias	Pseudo R ² *	LRT χ^2 +	LRT p-value
1958 cohort										
1	7.64	6.50	0.051	1204	<0.0005	0.78	0.62	0.001	22	1.00
2	7.30	6.21	0.049	1160	<0.0005	0.79	0.73	0.001	19	1.00
3	7.38	5.96	0.048	1139	<0.0005	0.65	0.64	0.001	21	1.00
4	7.23	6.15	0.048	1132	<0.0005	0.69	0.61	0.001	19	1.00
5	7.30	6.17	0.048	1148	<0.0005	0.88	0.70	0.002	32	1.00
6	7.49	6.45	0.050	1190	<0.0005	0.81	0.69	0.001	27	1.00
7	7.48	5.88	0.050	1182	<0.0005	0.80	0.78	0.001	24	1.00
8	7.13	5.86	0.045	1067	<0.0005	0.70	0.63	0.001	24	1.00
9	7.69	6.55	0.050	1191	<0.0005	0.67	0.62	0.001	20	1.00
10	7.48	5.79	0.049	1154	<0.0005	0.89	0.74	0.001	29	1.00
11	7.36	5.27	0.047	1123	<0.0005	0.78	0.69	0.001	23	1.00
12	7.43	5.82	0.049	1173	<0.0005	0.65	0.43	0.001	18	1.00
13	7.28	6.10	0.049	1176	<0.0005	0.71	0.58	0.001	23	1.00
14	7.37	6.15	0.047	1122	<0.0005	0.79	0.61	0.001	27	1.00
15	7.41	5.74	0.051	1213	<0.0005	0.75	0.67	0.001	20	1.00
16	7.33	6.35	0.017	1119	<0.0005	0.70	0.61	0.001	23	1.00
17	7.50	6.03	0.050	1187	<0.0005	0.78	0.68	0.001	22	1.00
18	7.12	5.86	0.046	1087	<0.0005	0.63	0.60	0.001	15	1.00
19	7.38	5.88	0.047	1106	<0.0005	0.77	0.68	0.001	24	1.00
20	7.26	5.23	0.048	1136	<0.0005	0.73	0.59	0.001	23	1.00
1970 cohort										
1	14.22	11.90	0.095	1624	<0.0005	0.95	0.76	0.001	9	1.00
2	14.43	11.65	0.099	1680	<0.0005	0.95	0.69	0.001	13	1.00
3	14.39	12.63	0.100	1706	<0.0005	0.98	0.82	0.001	11	1.00
4	14.15	11.92	0.097	1655	<0.0005	0.94	0.70	0.001	12	1.00
5	13.71	11.74	0.091	1557	<0.0005	1.01	0.94	0.001	13	1.00

6	14.11	11.80	0.096	1631	<0.0005	0.96	0.92	0.001	11	1.00
7	14.41	12.80	0.099	1686	<0.0005	0.94	0.79	0.001	13	1.00
8	14.12	11.200	0.099	1686	<0.0005	1.11	1.05	0.001	14	1.00
9	14.05	11.91	0.095	1623	<0.0005	1.03	0.85	0.001	13	1.00
10	13.99	11.32	0.097	1663	<0.0005	1.08	1.02	0.001	10	1.00
11	14.01	11.14	0.097	1632	<0.0005	0.88	0.64	0.001	9	1.00
12	14.41	11.70	0.100	1711	<0.0005	1.12	1.07	0.002	14	1.00
13	14.00	12.22	0.093	1583	<0.0005	0.94	0.81	0.001	11	1.00
14	14.07	7.38	0.095	1627	<0.0005	0.96	0.70	0.001	12	1.00
15	14.38	12.49	0.099	1674	<0.0005	0.86	0.65	0.001	9	1.00
16	13.94	11.07	0.095	1619	<0.0005	0.82	0.61	0.001	10	1.00
17	14.28	11.60	0.097	1651	<0.0005	0.98	0.85	0.001	13	1.00
18	14.31	12.75	0.097	1643	<0.0005	1.20	1.08	0.002	15	1.00
19	14.59	11.43	0.101	1720	<0.0005	0.71	0.57	0.001	8	1.00
20	14.12	11.99	0.099	1694	<0.0005	1.16	0.98	0.002	15	1.00

* Pseudo R2 is from a probit of treatment status on all the variables in the propensity score model before matching and on the matched samples

+ Likelihood-ratio test of the joint insignificance of all the independent variables in the propensity score model before and after matching

^ Standardised bias is the difference of the sample means in the breastfed and non-breastfed (before or after matching) sub-samples as a percentage of the square root of the average of the sample variances in the breastfed and non-breastfed groups

Figure B1. Percentage standardized differences for baseline covariates comparing breastfed with formula fed children in the original and the matched samples from the 1958 and 1970 cohorts.

