Childhood correlates of adult positive mental wellbeing in three British longitudinal studies

Natasha Wood*[1], Rebecca Hardy[2], David Bann[3], Catharine Gale[4] & Mai Stafford[5]

*Corresponding author

[1] Nuffield Department of Population Health, University of Oxford, Big Data Institute, Old Road Campus, Oxford, OX3 7LF

Email: natasha.wood@ndph.ox.ac.uk

[2] CLOSER, UCL Institute of Education, 55-59 Gordon Square, London, WC1H 0NU

[3] UCL Institute of Education, 55-59 Gordon Square, London, WC1H 0NU

[4] Faculty of Medicine, University of Southampton, 12 University Road, Southampton, SO17 1BJ

[5] The Health Foundation, 8 Salisbury Square, London, EC4Y 8AP

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ABSTRACT

Background

Previous evidence has shown how experiences within childhood, such as parenting and socioeconomic conditions are associated later on in life with adult mental wellbeing. However, these studies tend to focus on childhood experiences in isolation and fewer studies have investigated how multiple aspects of the childhood environment, including both socioeconomic and psychosocial aspects, are associated with adult positive mental wellbeing. Using data from three British birth cohort studies we investigated how prospective measures of the childhood environment up to aged 16 were associated with midlife adult mental wellbeing and whether similar associations were replicated across different generations.

Methods

Childhood environment comprised socioeconomic circumstances, psychosocial factors (child rearing and parenting, family instability) and parental health. The Warwick Edinburgh Mental Wellbeing Scale, a validated instrument measuring both hedonic and eudemonic aspects of wellbeing, was administered in mid-life. We modelled associations between childhood environment domains and wellbeing.

Results

Despite changes in social context in all three studies, poorer quality parent-child relationships and poor parental mental health were strongly and independently associated with poorer adult mental wellbeing. Socioeconomic circumstances were also associated with adult mental wellbeing, but the association was weaker than for the measures of parenting or parental mental health.

Conclusion

These findings confirm that parenting and parental mental health, as well as socioeconomic circumstances, are important for adult mental wellbeing. Interventions in early childhood aimed at reducing socioeconomic adversity and offering support to parents might be warranted, in order to enhance adult mental wellbeing later on in the life course.

KEYWORDS

Mental wellbeing, life course, childhood environment, parent-child relationships, childhood socioeconomic circumstances

What is already known on this subject?

- Life course models show that circumstances during childhood predict mental health later in life. Certain domains of the childhood environment, such as socioeconomic circumstances, poor parenting and poor parental health have found to be associated with lower levels of mental wellbeing in adulthood.
- Childhood environment domains are correlated with many, though not all, psychosocial adversities and poor parental health being more common in families with socioeconomic adversity. However, prior evidence has often considered each childhood environment domain separately. As a result, we have an incomplete picture of the independent contributions of psychosocial, socioeconomic and parental health factors in childhood to adult mental wellbeing.

What this study adds?

- Through carrying out a coordinated analysis, using comparable prospective measures of psychosocial, socioeconomic and parental health factors in childhood and an identical measure of wellbeing in adulthood across three studies, we found that despite social changes within the childhood environment across the birth cohorts that there were consistent associations between childhood environment and adult mental wellbeing. We found that parenting and poor parental mental health were strongly and independently associated with adult mental wellbeing across three British birth cohorts. Socioeconomic circumstances were also associated with adult mental wellbeing, but not as strongly as for parenting and parental mental health.

INTRODUCTION

Mental wellbeing is multidimensional comprising both hedonic and eudemonic aspects (1) and maintaining good mental wellbeing is an important element of healthy ageing (2). Evidence shows that determinants of positive mental wellbeing in adulthood begin early in the life course (3). Childhood socioeconomic disadvantage (4) (5) (6), suboptimal parental bonding (7) (8), experience of physical or emotional abuse in childhood (9) (10) and poor maternal mental health (11) have been associated with poorer adult mental wellbeing (12). However, these studies have looked at experiences within childhood separately and childhood socioeconomic and psychosocial adversities often co-occur, with those who experience greater material disadvantage in childhood also at higher risk of experiencing greater psychosocial adversity (13) (14). Within the psychiatric literature studies which have examined multiple domains of the childhood environment have found that poor family socioeconomic circumstances, family disruption and poor parenting (14) (15) are independently associated with adult affective disorder. For adult mental wellbeing, evidence of the role of childhood socioeconomic and psychosocial disadvantage is mixed.

Data from the MRC National Survey of Health and Development (NSHD, a British cohort of people born in 1946), found that childrearing and parental and child illness, but not childhood socioeconomic disadvantage, were associated with a composite measure of adult mental wellbeing including hedonic and eudemonic aspects (11). Whilst a study using the National Child Development Study (NCDS, born in 1958) showed that disadvantaged socioeconomic circumstances in childhood, as well as certain childhood characteristics comprising poor childhood mental health and socially withdrawn personality were associated with lower life satisfaction (16). In the British birth cohort 1970 (BCS70) poorer childhood emotional health was strongly associated with lower adult life satisfaction, with weaker associations for poorer cognitive performance and family socioeconomic disadvantage (17). A fourth study, using European data, found that socioeconomic conditions in childhood, measured through the number of people per room, as well as the family's cultural capital and whether parents were together at age 10 were associated with higher life satisfaction at age 50 years and older (18).

From these studies, it remains unclear which childhood psychosocial factors are strongly associated with adult mental wellbeing and whether psychosocial and socioeconomic factors are independently associated with wellbeing. These studies have also used different mental wellbeing outcomes, including hedonic and eudemonic elements of wellbeing, and life satisfaction and considered different measures of the childhood environment. Of the multiple domains studied, family socioeconomic disadvantage and child health have been considered in all these studies, but parenting and parental health domains have only been considered in some studies. It could also be argued that childhood mental health is an outcome of the childhood environment and on the pathway between childhood environment and adult mental wellbeing. Additionally, the studies have used different samples who have experienced different social contexts and potentially different childhood environments. Those in the 1946 cohort grew up during the immediate aftermath of the war when housing conditions were poorer (19) than for those growing up in the 1970s. In contrast the 1970s birth cohort grew up with better housing conditions, but family structures were changing with divorce becoming more prevalent and the transition from the traditional male 'breadwinner family' to the 'dual-earner family' (20). At present we don't know if the mixed results of these studies are due to the differing childhood social contexts that were experienced or whether they are due to methodological differences in the study designs.

Given the inconsistencies and gaps in the evidence there are two aims to this paper, the first of which is to identify which aspects of the childhood environment are associated with adult mental wellbeing. Specifically, we test whether indicators of childhood socioeconomic circumstances, parenting, family instability and parental health domains are associated with wellbeing and whether they are independent of one another. The second aim is to investigate whether similar associations between childhood environment and adult mental wellbeing are replicated across different birth cohorts. We used data from three British birth cohorts to carry out a coordinated analysis with comparable prospective measures of the childhood environment across multiple domains and an identical measure of wellbeing in order to assess replicability.

MATERIALS AND METHODS

The NSHD included 5,362 singleton births in Britain within one week in 1946 (21). The NCDS comprises more than 17,000 births in one week in Britain in 1958 (22) and the BCS70 comprises more than 17,000 births in one week in Britain in 1970 (23). The NSHD was granted ethical approval from the Greater Manchester Local Research Ethics Committee and the Scotland A Research Ethics Committee and all participants have provided informed consent. The NCDS and the BCS70 have been granted ethical approval for each sweep from 2000 by the National Health Service (NHS) Research Ethics Committee and all participants have given informed consent.

Wellbeing

Wellbeing was measured using the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS) administered by self-completion paper questionnaire at age 60 to 64 in NSHD, age 50 in NCDS and age 42 in BCS70. WEMWBS is a validated instrument combining hedonic and eudemonic elements with confirmatory factor analysis showing the measure to consist of a single factor (24). Cronbach's alpha test of reliability showed high levels of internal consistency (0.91 in all three studies). WEMWBS consists of 14 items measured on a 5 point Likert scale which are summed to give a total wellbeing score ranging from 14 to 70 (highest wellbeing). Those missing 3 items or less were imputed scores based on the mean score of the items for which they had data (NSHD n=83; NCDS n = 1,044; BCS70 n = 1,252). This method had been used in prior research which has utilised the WEMWBs measure (11) (25) and it has been suggested that imputing up to three missing values does not invalidate the robustness of the scale (26).

Childhood environment

Childhood environment was measured prospectively (except for parental bonding in NSHD, which was measured at age 43) up to the age of 16 years and comprised the following domains: socioeconomic circumstances; childrearing and parenting; family instability; and parental health. All variables were derived to ensure maximum comparability across the studies, however harmonisation was not always possible and instead variables which

captured similar underlying constructs were derived. The variables used, along with their descriptions and derivation, are shown in Table 1 and Supplementary Information A.

Table 1: Measures of childhood environment

Variables	Description	Age of cohort member when measured
	Family socioeconomic circumstances	
Father's social class	Collected prospectively and coded according to the Register General's classification. Father's social class categories were converted into ridit scores (27). The score ranged from 0 (highest social class) to 1 (lowest social class).	Age 10 or 11 in NSHD, NCDS and BCS70
Parental education	Age left continuous full time education for both mothers and fathers.	Age 6 NSHD, age 16 NCDS, age 5 and 16 BCS70
Lack of amenities in the accommodation	The number of occasions in childhood the property lacked three amenities (sole use of a bathroom, sole use of a kitchen, hot water).	Age 2 and 11 NSHD, age 7 and 11 NCDS and age 5 and 10 BCS70
Overcrowding	The mean number of people per room across multiple time points during childhood	Ages 2, 4, 6, 8 and 11 years in NSHD, ages 7, 11 and 16 years in NCDS and age 5 years in BCS70
Tenure	Whether rented or owned accommodation at two time points in childhood	Ages 2 and 11 years in NSHD, 7 and 11 years in NCDS and 5 and 10 years in BCS70
Teen parenting	Parents under the age of 20 at the birth of the cohort member	At birth
	Childrearing and parenting	
Breastfed	Whether the cohort member was ever breastfed or not.	Age 2 in NSHD, age 7 in NCDS and age 5 in BCS70
Parent-child relationship quality	Parent- child relationship quality was captured in NSHD and BCS70 using the parental bonding instrument (28) and parental care and overprotection subscales were derived. In NCDS a measure of the extent to which the study member related with either parent was used.	Age 43 in NSHD, age 16 in NCDS and BCS70
Parental interest in cohort member's education	Parental interest in cohort member's education was asked about both parents together in NSHD, whilst in NCDS and BCS70 it was asked about each parent separately. In NCDS and BCS70 the most interested parent was used to create the measure.	Age 11 years by the teacher and mother in NSHD and age 7 and 10 years in NCDS and BCS70 by the teachers only.
	Family instability	
Parental divorce	Whether cohort member had experienced parental divorce.	Up to age 16 NSHD, NCDS and BCS70.
Residential moves	The number of residential moves experienced in childhood.	Age 2 to 15 in NSHD, age 0 to 16 in NCDS and age 0 to 10 in BCS70.

Separation from mother	Whether the cohort member had ever been separated from their mother in childhood. In NSHD and NCDS it included short term separation such as overnight, whilst in BCS70 it referred only to longer term separation.	Age 4 NSHD, age 7 NCDS and age 10 BCS70.
	Parental health	
Parental chronic health conditions	Whether either parent had a chronic health condition. In NSHD and NCDS parents stated whether they had a condition from a list of chronic health conditions provided. In BCS70 parents reported whether they had a health condition or not.	Age 15 NSHD, age 11 NCDS and age 10 BCS70.
Maternal or family mental health	In NSHD the mother completed the Maudsley personality inventory, which measured neuroticism. In NCDS family mental health problems were reported to the health visitor. In BCS70 maternal depression was measured using the malaise inventory (29).	Age 15 NSHD, age 7 NCDS and age 10 BCS70.

Analytic method

We used linear regression to model the association between each childhood indicator and WEMWBS. First, sex-adjusted associations between each indicator and WEMWBS were estimated. In the second set of models, associations between indicators within each childhood domain and adult mental wellbeing were modelled. Third, the fully adjusted model included all indicators across all domains, to test whether the associations with each childhood domain and adult mental wellbeing were independent of one another. We analysed each study separately and all childhood environment variables (but not adult mental wellbeing), were standardised, for both continuous and categorical measures, to facilitate comparison of effect sizes across the childhood indicators. All analysis was performed in STATA 15.

Analytic sample

The sample comprised all those with a valid WEMWBS measure (n=1,978 in NSHD, n=8,745 NCDS, and n=8,589 in BCS70). A comparison of those with and without complete WEMWBS data is detailed in Supplementary Information B. For those who had a valid WEMWBS measure but were missing data on any of the childhood exposures, full information maximum likelihood estimation (FIML) was used. FIML estimation is based on the assumption that data were missing at random, it uses all available information to model estimates, and is less biased than listwise deletion under certain assumptions (30).

RESULTS

Table 2 shows the sample characteristics for each study. The socioeconomic conditions experienced in childhood have improved in later born cohorts, with the exception of teen parenthood. We note that teen parenthood could alternatively be considered in the childrearing and parenting domain. The prevalence of breastfeeding declined between NSHD and BCS70, but parental interest in education increased (60.6% of parents in BCS70 were very interested in their child's education compared to 36.5% of parents in NSHD). A higher proportion of those in BCS70 experienced parental divorce than in NSHD (15.6% compared to

6.4%), although residential moves were similar across the studies. The majority of parents in all studies had no health problems.

Table 2: Sample characteristics

	NSHD	NCDS	BCS70
	N = 1,978	*N =8,745*	*N =8,589*
	% / mean (SD)	**% / mean (SD)**	**% / mean (SD)**
WEMWBS (mean)	***Age: 60-64***	***Age: 50***	***Age: 42***
	51.57 (8.30)	49.22 (8.12)	49.11 (8.33)
Family socioeconomic circumstances			
Father's social class			
I Professional	3.9	4.9	6.0
II Managerial and technical occupations	15.8	21.7	26.9
III NM Skilled Non-Manual	10.1	11.4	10.2
III Skilled manual	45.7	40.5	39.8
IV Semi-skilled Manual	17.7	13.8	11.6
V Unskilled Manual	6.8	7.7	5.5
Father's education (mean age)	14.5 (1.1)	15.0 (1.6)	15.9 (1.8)
Mother's education (mean age)	14.5 (1.1)	15.0 (1.4)	15.7 (1.5)
Lack of amenities			
No occasions	41.0	81.5	95.74
1 occasion	38.4	12.4	4
2 occasions	20.6	6.1	0.26
Overcrowding (person per room)			
Up to 1	44.4	60.2	85.6
Over 1 to 1.5	38.2	29.0	11.7
Over 1.5 to 2	14.0	9.1	2.1
Over 2	3.4	1.7	0.6
Tenure			
Rented or other at both time points	67.0	49.4	30.5
Owned at one time point	16.7	8.1	9.9
Owned at both time points	16.3	42.5	59.6
Teen father	1.0	0.7	2.5
Teen mother	3.1	5.1	8.3
Childrearing and parenting			
Breastfed			
Not breastfed	23.4	30.5	60.6
Breastfed for under 1 month	12.2	24.0	16.1
Breastfed for 1+ months	64.5	45.5	23.4
Parents interest in child's education			
Very interested	36.5	45.9	60.6
Some interest	49.5	41.7	33.1
Little interest	14.1	12.4	6.3
Parent-child relationship quality			
Mean parental care [a]	9.4 (6.2)		2.1(1.9)
Mean parental overprotection [a]	12.2(6.0)		0.5 (0.9)
Whether gets on well with mother [b]			
Yes		87.8	
Sometimes		7.69	
No		4.53	
Whether gets on well with father [b]			
Yes		80.6	
Sometimes		12.1	
No		7.3	
Family instability			
Parental divorce	6.4	9.7	15.6
Separated from mother for over 1 week	33.7	48.1	2.8
Moved house			
None	27.6	22.0	31.4
1 -3 moves	67.5	63.5	55.5

4+ moves	4.9	14.5	13.4
	Parental health		
Father has a health problem	27.9	5.7	11.5
Mother has a health problem	38.6	5.6	12.6
Family has mental health problem [b]		2.6	
Mean Maudsley personality inventory [c]	1.6		
Mean maternal malaise [d] **(Rutter scale)**			484.4 (263.8)

a NSHD and BCS70 only; b NCDS only; c NSHD only; d BCS70 only.

NSHD descriptives are weighted to account for stratified sample design.

Model 1: adjusted for sex

Model 1 (Table 3) shows which individual elements of each childhood domain were associated with adult mental wellbeing. In all three studies, those whose fathers were in a more disadvantaged social class had lower levels of adult mental wellbeing (NSHD: β=-0.36; NCDS: β= -0.44; BCS70 β=-0.77). In NCDS and BCS70 there were stronger associations between the other socioeconomic measures and adult mental wellbeing than in NSHD.

In the child rearing and parenting domain lower parental care and higher parental overprotection, but not breastfeeding or parental interest in education, were associated with poorer adult mental wellbeing in NSHD (Table 3). In NCDS and BCS70 all the child rearing and parenting measures were strongly and independently associated with wellbeing. No measures of family instability were associated with adult mental wellbeing in NSHD or in NCDS, but in BCS70 having experienced parental divorce was associated with poorer adult mental wellbeing compared to those whose parents stayed together (β=-0.49). Poor parental health was associated with poorer adult mental wellbeing in all studies.

Table 3: Childhood factors and adult mental wellbeing, adjusted for sex (Model 1)

	NSHD			NCDS			BCS70		
	Coef	**95% CI**	***p* value**	**Coef**	**95% CI**	***p* value**	**Coef**	**95% CI**	***p* value**
Family socioeconomic circumstances									
Father's social class	-0.36	(-0.75, 0.03)	0.07	-0.44	(-0.62, -0.25)	0.00	-0.77	(-0.96, -0.58)	0.00
Lower father's education	-0.30	(-0.08, 0.67)	0.12	-0.45	(0.26, 0.65)	0.00	-0.71	(0.53, 0.89)	0.00
Lower mother's education	-0.21	(-0.16, 0.58)	0.27	-0.38	(0.19, 0.57)	0.00	-0.74	(0.57, 0.92)	0.00
Lack of amenities	-0.18	(-0.57, 0.15)	0.26	-0.50	(-0.67, -0.32)	0.00	-0.17	(-0.36, 0.00)	0.06
Overcrowding	-0.22	(-0.57, 0.14)	0.24	-0.44	(-0.61, -0.27)	0.00	-0.48	(-0.68, -0.29)	0.00
Rented accommodation	-0.30	(-0.08, 0.69)	0.13	-0.40	(-0.60, -0.21)	0.00	-0.74	(-0.94, -0.54)	0.00
Teen father	-0.33	(-0.71, 0.05)	0.09	-0.03	(-0.21, 0.15)	0.71	-0.31	(-0.51, -0.10)	0.00
Teen mother	0.07	(-0.31, 0.45)	0.72	-0.15	(-0.32, 0.03)	0.10	-0.37	(-0.55, -0.18)	0.00
Childrearing and parenting									
Not breast fed	0.07	(-0.30, 0.43)	0.72	-0.21	(-0.40, -0.03)	0.02	-0.39	(-0.58, -0.19)	0.00
Parent's less caring (NSHD & BCS70 only)	-1.58	(-1.79, -1.06)	0.00				-1.34	(-1.59, -1.09)	0.00
Parental overprotection (NSHD & BCS70 only)	-1.42	(-1.58, -0.83)	0.00				-0.94	(-1.20, -0.69)	0.00
Doesn’t get on well with father (NCDS only)				-0.60	(-0.80, -0.40)	0.00			
Doesn’t get on well with mother (NCDS only)				-0.43	(-0.62, -0.23)	0.00			
Parents less interested in cohort member’s education	-0.23	(-0.62, 0.17)	0.26	-0.61	(-0.80, -0.43)	0.00	-0.99	(-1.20, -0.78)	0.00
Family instability									
Parents divorced	-0.12	(-0.27, 0.44)	0.65	-0.07	(-0.24, 0.11)	0.46	-0.49	(-0.72, -0.36)	0.00
Separated from mother	-0.21	(-0.37, 0.37)	1.00	-0.07	(-0.24, 0.11)	0.03	-0.13	(-0.31, 0.07)	0.22
Residential moves	-0.30	(-0.67, 0.07)	0.11	0.03	(-0.17, 0.23)	0.78	0.01	(-0.14, 0.25)	0.60
Parental health									
Father has a health problem	-0.15	(-0.69, 0.09)	0.13	-0.37	(-0.54, -0.19)	0.00	-0.10	(-0.25, 0.12)	0.51
Mother has a health problem	-0.65	(-1.02, -0.25)	0.00	-0.15	(-0.32, 0.03)	0.10	-0.17	(-0.34, 0.03)	0.10
Mother's mental health / family mental health	-0.75	(-1.13, -0.36)	0.00	-0.25	(-0.44, -0.06)	0.01	-0.98	(-1.17, -0.78)	0.00

Adjusted for sex

Model 2: mutually adjusting within each domain

When mutually adjusting within the socioeconomic domain many of the associations between the socioeconomic measures and adult mental wellbeing were attenuated (Table 4), but father's social class, maternal education and tenure remained independently associated with adult mental wellbeing in BCS70. While there was some attenuation of parent-child relationships (parental care and overprotection in NSHD and BCS70 and how well gets on with parents in NCDS), parental interest in education (NCDS and BCS70 only), parental divorce (BCS70 only) and the parental heath measures, they remained independently associated with wellbeing.

There was evidence of variance inflation in models which included all family socioeconomic indicators together (Table 4, model 2 compared with Table 3, model 1). For this reason, in the final model we included only father's social class as this is the most widely used childhood socioeconomic indicator in life course epidemiological studies set in Britain. There was no variance inflation detected within the other childhood domains.

Table 4: Childhood factors and adult mental wellbeing, mutually adjusted within each domain (Model 2)

	NSHD			NCDS			BCS70		
	Coef	**95% CI**	***p* value**	**Coef**	**95% CI**	***p* value**	**Coef**	**95% CI**	***p* value**
Family socioeconomic circumstances									
Lower father's social class	-0.28	(-0.79, 0.23)	0.28	-0.11	(-0.34, 0.11)	0.32	-0.38	(-0.60, -0.16)	0.00
Lower father's education	-0.06	(-0.57, 0.45)	0.82	0.20	(-0.05, 0.45)	0.12	0.16	(-0.07, 0.40)	0.18
Lower mother's education	0.06	(-0.43, 0.55)	0.81	0.11	(-0.12, 0.34)	0.35	0.35	(0.12, 0.57)	0.00
Lack of amenities	-0.03	(-0.43, 0.37)	0.89	-0.39	(-0.57, -0.21)	0.00	-0.02	(-0.20, 0.17)	0.84
Overcrowding	-0.05	(-0.46, 0.36)	0.80	-0.24	(-0.43, -0.05)	0.02	-0.22	(-0.43, -0.01)	0.04
Rented accommodation	-0.15	(-0.61, 0.31)	0.52	-0.11	(-0.33, 0.11)	0.31	-0.40	(-0.62, -0.17)	0.00
Teen father	-0.46	(-0.88, -0.03)	0.04	0.04	(-0.15, 0.22)	0.69	-0.15	(-0.37, 0.07)	0.19
Teen mother	0.32	(-0.11, 0.75)	0.14	-0.11	(-0.29, 0.08)	0.27	-0.17	(-0.38, 0.03)	0.10
Childrearing and parenting									
Not breast fed	0.14	(-0.22, 0.49)	0.45	-0.18	(-0.36, 0.00)	0.06	-0.30	(-0.50, -0.11)	0.00
Parents less caring (NSHD & BCS70 only)	-1.14	(-1.55, -0.73)	0.00				-1.02	(-1.30, -0.75)	0.00
Parental overprotection (NSHD & BCS70 only)	-0.94	(-1.35, -0.53)	0.00				-0.54	(-0.82, -0.27)	0.00
Doesn't get on well with father (NCDS only)				-0.48	(-0.69, -0.27)	0.00			
Doesn't get on well with mother (NCDS only)				-0.26	(-0.46, -0.05)	0.01			
Parents less interested in cohort member's education	-0.19	(-0.57, 0.2)	0.35	-0.55	(-0.74, -0.37)	0.00	-0.81	(-1.05, -0.63)	0.00
Family instability									
Parents divorced	-0.11	(-0.47, 0.25)	0.55	-0.12	(-0.31, 0.07)	0.21	-0.53	(-0.72, -0.33)	0.00
Separated from mother	-0.19	(-0.55, 0.18)	0.31	0.21	(0.02, 0.39)	0.03	-0.03	(-0.21, 0.17)	0.78
Residential moves	-0.27	(-0.64, 0.1)	0.15	0.02	(-0.18, 0.23)	0.82	0.10	(-0.09, 0.30)	0.16
Parental health									
Father has a health problem	-0.06	(-0.46, 0.34)	0.76	-0.29	(-0.47, -0.11)	0.00	-0.06	(-0.25, 0.13)	0.52
Mother has a health problem	-0.52	(-0.91, -0.12)	0.01	-0.16	(-0.34, 0.02)	0.08	-0.02	(-0.21, 0.17)	0.84
Mother's mental health / family mental health	-0.64	(-1.03, -0.24)	0.00	-0.22	(-0.42, -0.03)	0.02	-0.97	(-1.17, -0.78)	0.00

Mutually adjusted within each domain and for sex

Model 3: mutually adjusted associations across all childhood environment domains

When mutually adjusting across all domains, (Table 5), the associations which were seen in earlier models remained. Across all cohorts having a father in a more disadvantaged social class was associated with lower wellbeing (with similar effect size across studies though not attaining statistical significance in NSHD). In all three studies, indicators of child rearing and parenting were independently associated with adult mental wellbeing. These indicators were low parental care and high parental overprotection (NSHD and BCS70), or not getting on well with father or mother (NCDS). Poor parental health was also associated with lower wellbeing in all three studies, indicated by poor maternal/family mental health (NSHD and BCS70) and health problems for the mother (NSHD) or father (NCDS). In NCDS and BCS70, but not NSHD, lack of parental interest in education was independently associated with lower levels of adult mental wellbeing. In BCS70 parental divorce remained independently associated with poorer adult mental wellbeing.

Table 5: Childhood factors and adult mental wellbeing, mutually adjusted across all domains (Model 3)

	NSHD			NCDS			BCS70		
	Coef	**95% CI**	***p* value**	**Coef**	**95% CI**	***p* value**	**Coef**	**95% CI**	***p* value**
Family socioeconomic circumstances									
Lower father's social class	-0.29	(-0.72, 0.13)	0.18	-0.25	(-0.45, -0.06)	0.01	-0.40	(-0.59, -0.20)	0.00
Child rearing and parenting									
Not breast fed	0.15	(-0.20, 0.51)	0.40	-0.14	(-0.33, 0.04)	0.13	-0.22	(-0.41, -0.02)	0.03
Parents less caring (NSHD & BCS70 only)	-1.08	(-1.50, -0.67)	0.00				-0.80	(-1.06, -0.53)	0.00
Parental overprotection (NSHD & BCS70 only)	-0.92	(-1.33, -0.51)	0.00				-0.59	(-0.85, -0.33)	0.00
Doesn't get on well with father (NCDS only)				-0.48	(-0.69, -0.27)	0.00			
Doesn't get on well with mother (NCDS only)				-0.26	(-0.47, -0.05)	0.01			
Parents less interested in cohort member's education	0.00	(-0.43, 0.43)	0.99	-0.46	(-0.66, -0.27)	0.00	-0.61	(-0.83, -0.39)	0.00
Family instability									
Parents divorced	-0.02	(-0.37, 0.34)	0.92	0.09	(-0.10, 0.27)	0.36	-0.27	(-0.47, -0.07)	0.01
Separated from mother	-0.07	(-0.43, 0.29)	0.71	-0.01	(-0.20, 0.17)	0.89	-0.03	(-0.22, 0.16)	0.78
Residential moves	-0.18	(-0.54, 0.19)	0.34	0.01	(-0.19, 0.21)	0.90	0.06	(-0.14, 0.25)	0.57
Parental health									
Father has a health problem	-0.14	(-0.54, 0.25)	0.48	-0.28	(-0.46, -0.10)	0.00	-0.10	(-0.29, 0.09)	0.29
Mother has a health problem	-0.40	(-0.79, 0.00)	0.05	-0.05	(-0.23, 0.12)	0.55	-0.03	(-0.22, 0.17)	0.79
Mother's mental health / family mental health	-0.51	(-0.90, -0.11)	0.01	-0.19	(-0.39, 0.00)	0.05	-0.65	(-0.85, -0.45)	0.00

Adjusted for sex and across all domains

DISCUSSION

We show that participants in the three studies experienced different childhood environments, whilst later born cohorts were more likely to have lived within better housing conditions they were also more likely to experience family breakdown than earlier born cohorts. Despite changes in the social context and some differences in the measurement of childhood environment consistent associations were found between childhood circumstances and adult mental wellbeing across the three cohorts. In all three studies, poorer quality parent-child relationships (including both low care and high overprotection) and poor maternal (or family) mental health were strongly and independently associated with adult mental wellbeing. Compared with these childhood variables, the association between father's social class and adult mental wellbeing was smaller in magnitude in the three studies.

This research aligns with prior evidence showing that poorer quality parent-child relationships (7) (8) (11) and poor maternal or family mental health (11) were associated with poorer adult mental wellbeing and were not explained by socioeconomic factors. However, this research extends on this by showing that the associations are independent of one another. We further extend on previous research on multiple aspects of the childhood environment and adult mental wellbeing (11) (16) (17) by showing that these associations are consistent across three birth cohorts.

We found that positive parent-child relationships were associated with better adult mental wellbeing. This could be through a number of possible explanatory pathways. Positive parenting in early childhood is associated with better quality adult relationships for their offspring (13) (31), better adult socioeconomic position (32) and lower risk of adult mental disorder (33) all of which are associated with adult mental wellbeing (34) (35). Parental mental ill health was also independently associated with poorer adult mental wellbeing. One possible explanatory pathway is through childhood and adolescent mental health, previous studies have shown that those who had parents with poor compared with good mental health are more likely to have poor mental health themselves in childhood (36) (37), and that

symptoms of poor mental health in childhood are associated with poorer adult mental wellbeing (17) (16).

Although childhood socioeconomic position did not attenuate the associations between childhood environment and adult mental wellbeing, a more disadvantaged family socioeconomic position was associated with poorer adult mental wellbeing in all three studies, though with smaller effect sizes compared with indicators from other childhood domains, as has been found previously (16). This study extends previous evidence of a stronger association between father's social class and adult mental wellbeing in BCS70 than in NSHD and NCDS (5), by adding indicators of childhood housing conditions, parental education and teen parenthood. In BCS70 many of the measures of childhood SEP were shown to be more strongly associated with adult mental wellbeing than in NSHD or NCDS, particularly parental education and tenure, which remained associated with adult mental wellbeing, independent of father's social class. This could be due to the expansion of education (with the 1944 Education Act), which would have affected the parents of the BCS70 cohort, and an increase in home ownership during the 1970s and 1980s (19). Consequently, low parental education and living in rented accommodation was less normative for BCS70 cohort, both of which may have a stronger effect on adult mental wellbeing.

Some indicators of the childhood environment were associated in only one or two studies. Parental divorce in BCS70 but not NSHD or NCDS was important for mental wellbeing in adulthood and this association was partly attenuated by adjustment for father's social class. Parental divorce has previously been shown to be associated with lower levels of wellbeing (38). Although parental divorce has become more prevalent, evidence has shown that the effects of divorce may be similar across the cohorts for adult mental health (39) and educational outcomes (40). It is currently unclear from our analysis why parental divorce is more strongly associated with adult mental wellbeing in BCS70 than in the other studies investigated.

Strengths and limitations

We took a coordinated approach to the analysis, seeking comparable indicators to capture childhood socioeconomic, psychosocial and parental health domains. Harmonisation across studies was more straightforward for the family socioeconomic variables than for variables in the other domains. Despite the challenges of attaining comparable measures, we found similar associations between variables in the childrearing and parental health domains and adult mental wellbeing across the three studies. Differences in the measurement of parental interest in education make interpretation of the different estimates for this variable across the three studies more difficult. Poor parental physical health showed associations with wellbeing that were consistent in direction though not in size across the three studies and measurement differences were substantial for these variables.

Those with missing wellbeing data were likely to have experienced poorer socioeconomic conditions in childhood, which could mean that our analysis underestimates the association between family SEP and adult mental wellbeing. WEMWBS was collected at a single but different age on each study and consequently we were unable to investigate cohort or age differences in the association between childhood environment and adult mental wellbeing. We were also limited by different sample sizes, with a considerably smaller sample size and lower statistical power in NSHD than NCDS or BCS70.

Finally, we tested for independent associations between childhood environment indicators and wellbeing but psychosocial, socioeconomic and health adversities will influence and be influenced by each other over time through childhood. Repeat measures would be needed to test more complex models.

Conclusions and implications

These three large, prospective studies provide consistent evidence that multiple components of the childhood environment are associated with adult mental wellbeing. Parent-child relationship quality and family mental health were important in all the studies and were not

explained by socioeconomic disadvantage in childhood. Socioeconomic circumstances were also independently associated with adult mental wellbeing. Both economic interventions in childhood to reduce childhood poverty and interventions to support positive parenting and parental mental health may help promote lifelong mental wellbeing.

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Conflict of interest

The authors declare that they have no conflict of interest.

Data availability statement

The NCDS and the BCS70 datasets generated and analysed in the current study are publicly available in the UK Data Archive repository:

BCS70: https://discover.ukdataservice.ac.uk/series/?sn=200001

NCDS: https://discover.ukdataservice.ac.uk/series/?sn= 2000032

The authors confirm that, due to ethical restrictions, data underlying the findings cannot be made publicly available. Data are available on request to the NSHD Data Sharing Committee. NSHD data sharing policies and processes meet the requirements and expectations of the UK Medical Research Council (MRC) policy on sharing of data from population and patient cohorts: https://mrc.ukri.org/research/policies-and-guidance-for-researchers/data-sharing/ Interested researchers can apply to access the NSHD data via a standard application procedure. Data requests should be submitted to mrclha.swiftinfo@ucl.ac.uk; further details can be found at http://www.nshd.mrc.ac.uk/data.aspx. doi:10.5522/NSHD/Q101; doi:10.5522/NSHD/Q102

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