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The impact of financial hardship in childhood on depression and anxiety in adult life: Testing the accumulation, critical period and social mobility hypotheses

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ABSTRACT

This paper examines the association between financial hardship in childhood and adulthood, and depression and anxiety in adulthood with reference to the accumulation, critical period and social mobility hypotheses in lifecourse epidemiology. Using the BBC Stress test, linear regression models were used to investigate the associations for the whole population and stratifying by gender and adjusting for age and highest education attainment. The critical period hypothesis was not confirmed. The accumulation hypothesis was confirmed and stratifying by gender women had a higher estimated mean GAD score if they were poor in both childhood and adulthood compared to men. Our findings do not support the social mobility hypothesis. However, stratifying by gender, a clear difference emerged with upward mobility having a favourable impact (lower) on women's mean GAD scores, while upward social mobility in adulthood did not attenuate the impact of financial hardship in childhood or men. The impact of financial hardship in childhood on later mental health outcomes is particularly concerning for future health outcomes as current levels of child poverty increases in the UK.

1. Introduction

Poor mental health is increasing globally, with 17.3% or approximately 84 million European residents have a mental health problem (IHME, 2018). Two of the most common mental health disorders (CMD) are depression and anxiety (IHME, 2018). Besides the costs on health care systems, mental health problems also result in substantial costs in terms of social security benefits as well as negative labour market impacts in terms of reduced employment and productivity. In 2015, the overall costs related to mental ill-health are estimated to have exceeded 4% of Gross Domestic Product (GDP) across the 28 EU countries, equating to more than €600 billion (OECD, 2018). The most recent Adult Psychiatric Morbidity Survey for Great Britain (2014) found that one in six people or 17.7% of the population aged 16+ reported having symptoms of depression or anxiety, in the week before being surveyed (McManus et al., 2016). Consistent with international research (Verropoulou, Serafetinidou, & Tsimbos, 2019), the survey found that about 25% of woman and 12% of men reported a CMD with overall rates of CMD in England steadily increasing in women, but remaining largely stable for men (McManus et al., 2016). It is estimated that poor mental

health in the UK exceeds 4% of GDP in the UK, equating to €106 million (OECD, 2018). Understanding what factors impact negatively on mental health outcomes is important in deciding the most effective policy measures for population mental health.

The link between socioeconomic status (SES) and both physical and mental health is one of the most well documented associations in social sciences (Berndt & Fors, 2015; Darin-Mattsson, Andel, Celeste, & Kåreholt, 2018). It persists over space and time, regardless of medical and technological development (Phelan, Link, & Tehranifar, 2010). In response, health researchers and practitioners have focused on the need to redistribution wealth and services across the adult population. However, despite relatively generous welfare policies in Europe, health inequalities persist for both physical and mental health outcomes (Mackenbach, 2012). Various explanations have been put forward for these counterintuitive findings ranging from mathematical artifact, socioeconomic changes and relative deprivation to an overall crisis of welfare systems (Bambra, Netuveli, & Eikemo, 2010; Burton-Jeangros, Cullati, Sacker, & Blane, 2015; Mackenbach, 2012). At the same time, a growing body of research has begun to argue that the overwhelming focus on SES in adulthood is short sighted and that health outcomes in

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adulthood may also be causally affected not only by current social and economic conditions, but also by childhood socioeconomic conditions (Lindström et al., 2015).

The notion that exposure to risk factors in early life may causally affect health later in life was first empirically investigated by Barker (1995, 1998). While Barker (1995, 1998) suggested that the last trimester of life in utero was a "critical period", further research has conceptualised early childhood more broadly as a sensitive period. The concept of a critical period was expanded from Barker's (1995, 1998) initial focus on in utero as a critical period, to embrace any development period when adverse exposures might have long-lasting, detrimental effects on later health (Kuh, Ben-Shlomo, Lynch, Hallqvist, & Power, 2003). As research on lifecourse epidemiology has grown, two further hypotheses have emerged: the accumulation of risk hypotheses, and the social mobility hypothesis (Ben-Schlomo & Kuh, 2002; Hallqvist et al., 2004). The accumulation of risks hypothesis posits that it is the overall burden of low SES across the lifecourse rather than low SES at a particular lifecourse stage that contributes to poor health outcomes, with disadvantage at multiple stages particularly deleterious for health (Green & Popham, 2017; Pudrovska & Anikputa, 2013). Statistically, the accumulation of risks mechanism can be modelled as additive effects and interactive effects (Green & Popham, 2017; Pudrovska & Anikputa, 2013). In the case of additive effects, low SES in childhood, adulthood, and later life each contributes to increased risk of poor health "independent" of other periods (Nettle & Bateson, 2017). In the case of interactive effects, SES at multiple life stages affects health synergistically such that the effect of SES at an earlier stage depends on SES at later stages (Nettle & Bateson, 2017; Pudrovska & Anikputa, 2013). In the additive model, early-life disadvantage and later life disadvantage are related to health independently, whereas in the interactive model, these effects are conditional on each other and surpass their mere sum (Nettle & Bateson, 2017; Pudrovska & Anikputa, 2013).

The social mobility hypothesis is linked to the concept of social mobility, with upward social mobility believed to compensate for early risk and lead to better health outcomes in adulthood. (Hallqvist, Lynch, Bartley, Lang, & Blane, 2004; Lynch et al., 1994; Pudrovska & Anikputa, 2013). Statistically, the evidence presented to support this hypothesis is a comparison of stable high, stable low, upward mobility, and downwardly mobile groups showing that risk of interest (CMD in this instance) are intermediate to the two stable groups (Murray et al., 2011). Thus, contrary to the critical period model, the social mobility model predicts that early-life effects are modified by later circumstances (Pudrovska & Anikputa, 2013). The social mobility and the accumulation of risks mechanisms are modelled similarly however whereas the accumulation of risks model evaluates the synergistic effects of persistent disadvantage, the social mobility model emphasizes the transitions from social advantage to disadvantage, and vice versa (Murray et al., 2011; Pudrovska & Anikputa, 2013).

The literature concerning childhood experiences of low socioeconomic status and their effects on depression and anxiety in adulthood is growing (Darin-Mattsson et al., 2018), with adverse childhood conditions linked with lower cognition and more mental disorders in later life (Darin-Mattsson et al., 2018; Fors, Lennartsson, & Lundberg, 2009; Laaksonen et al., 2007; Lindström et al., 2015). However, further complexity is added when one considers SES and gender and its role across the lifecourse (Pudrovska & Anikputa, 2014). Socioeconomic circumstances and their related health behaviours operate differently between men and women (Hamil-Luker & O'Rand, 2007; Morrissey, Kinderman, Pontin, Tai, & Schwannauer, 2016; Verropoulou et al., 2019). Research consistently demonstrates poorer health outcomes for CMD for women compared to men (Verropoulou et al., 2019). With the exception of recent research by Verropoulou et al. (2019) on depression, little research has focused on examining gender differences with regard to mental health or CMDs more specifically.

SES is a very broad concept that includes both financial and non-financial dimensions. Given the data available in the BBC Stress test,

this paper focuses on the economic dimensions of SES, specifically financial hardship. Research has shown that the association between mental disorders and financial circumstances seems stronger than the association between mental disorders and either education or social class. (Laaksonen et al., 2007; Linander, Hammarström, & Johansson, 2015). Following this research, this paper examines the association between parental financial hardship in childhood and adulthood, and depression and anxiety in adulthood with reference to the accumulation, critical period and social mobility hypotheses in lifecourse epidemiology. Understanding the different ways in which financial hardship across the lifecourse can impact on adult health is important as it allows policymakers to devise policies across an individual's lifespan. The focus on the impact of financial hardship in childhood on adult health outcomes, in this instance CMD, is particularly important as evidence from the UK demonstrates that childhood poverty is increasing (Wickham, Anwar, Barr, Law, & Taylor-Robinson, 2016). At the same time, the UK government has abolished previous plans and policies that attempted to eradicate childhood poverty (Wickham et al., 2016). Given evidence that demonstrates gender differences exist in the effects of childhood financial circumstances on adult health outcomes, the paper also explores whether and how the three lifecourse mechanisms of interest potentially differ for men and women. Methodologically the accumulation of risk hypothesis is explored from both an addictive and interactive perspective.

2. Data

2.1. BBC stress test

The British Broadcasting Corporation (BBC) is the public service broadcaster of the UK and includes television, radio and online platforms, which are available both nationally and internationally (Morrissey, 2016; Kinderman et al., 2015). In response to other online 'citizen science' projects the BBC Lab UK was launched in 2009. The BBC Lab UK invited members of the public to take part in science experiments investigating different aspects of psychology, sociology and health by completing tests and surveys online. The website was active from 2009 to 2013 until data collection ceased in May 2013. Academic researchers designed each web experiment (see for example Kinderman et al., 2015; Rentfrow, Jokela, & Lamb, 2015; Savage et al., 2013). Each experiment was structured to give feedback to the participant, immediately after they had submitted their data. As part of the BBC Lab UK and in collaboration with an Institute of Psychology in the UK, the 'Stress Test' was launched on 'All in the Mind' a BBC Radio 4 programme in June 2011 (Kinderman, Schwannauer, Pontin, & Tai, 2011; Pontin, 2012). The test's URL was publicised on BBC Radio 4 and made available via BBC web pages and social media. Visitors to the Stress Test's homepage accessed the test by signing in using BBC online membership (Kinderman et al., 2015).

The Stress Test was a global survey with over 32,000 respondents. However, the vast majority of these respondents, 65% or just over 21,000 individuals, reported their permanent residential address in England for (Morrissey et al., 2016). Including clinical scales for common mental disorders and a wellbeing scale and detailed demographic, socioeconomic and spatial data the Stress Test offers a unique dataset offering insight on the mental health of the English population. However, given that the Stress Test was an online survey, advertised predominately through the BBC, sample selection bias was a concern. In response, Morrissey et al. (2016) used a Two Step Probit Selection Model to test for sample selection bias. Their research found that survey participants who accessed and completed an online survey were not systematically different from non-participants on the variables of substantive interest (Morrissey et al., 2016), thus confirming the survey's usefulness for further scientific research.

2.2. Measures

Depression and anxiety were measured within the Stress Test using the Goldberg Anxiety and Depression Scale (GADs) which can detect levels of psychological disturbance in the general population and are widely used in psychological research. The GADs test is eighteen-item self-report symptom inventory with 'yes' or 'no' responses to items asking how respondents had been feeling in the past few weeks. Nine items each comprise the anxiety and depression scales and the scales can be separated to examine the case prevalence of depression (GDs) or Anxiety (GAs) alone. However, research also supports the use of the GADs as a composite depression and anxiety score as a measure of psychological distress (Heesch, Burton, & Brown, 2011; Jorm et al., 2005). The inclusion of the GADs in the Stress Test is important as the majority of publicly available data on depression do not use a clinical scale and instead rely on self-reported variables (Morrissey, 2016). The inclusion of a clinical scale in the Stress Test overcomes the issues associated with using clinical data based on admissions, and the well-known issues associated with self-reported measures of health (Morrissey, 2016). The mean GAD score for the sample of interest was 9.39 with a standard deviation of 4.5.

Including the GADs, the Stress Test consisted of 12 sections and included; demographic and socio-economic questions; familial mental health; social inclusion; negative life events (historic and recent); neurocognitive responses to negative feedback and positive and negative stimuli; and psychological processes (response style and attribution style). Participants were also asked to write, using free text, their first and second biggest cause of stress (Pontin, 2012). Table 1 provides descriptive statistics for respondents to the Stress Test that reside in

Table 1
Descriptive statistics for respondents to the stress test (n = 18,718).

Age	
Average Age	43 years old
Age Range	18–85 years old
Percentage Individuals aged 66 years and older	4%
Ethnicity	
White	96%
Education	
No GCSE	1.8%
GCSE	8.2%
Post 16 Vocational Course	2.2%
A-levels	13%
Undergraduate education	47%
Postgraduate education	27%
Occupational Status	
Still at school/university	5.7%
FT employment	55%
PT Employment	14%
Self Employed	9.8%
Unemployed	5%
Retired	8.5%
Voluntary	1.8%
Income	
Up to £9,999 (less than £199 per week)	9.2%
£10,000 - £19,999 (£200–389 per week)	15.5%
£20,000 – £29,999 (£390–579 per week)	18%
30,000 – £39,999 (£580–769 per week)	16%
£40,000 – £49,999 (£770–969 per week)	12%
£50,000 – £74,999 (£970–1,449 per week)	16%
£75,000 plus (£1,450 plus per week)	13%
Relationship Status	
In a relationship (not married/not living together)	8%
Cohabiting	16%
Married (first marriage)	38%
Civil partnership	0.68%
Divorced	6.8%
Divorced and remarried	7.33%
Separated (but still legally married)	2.54%
Widowed	1.7%
Widowed and remarried	0.4%
Single and never married	19%

England. Descriptive statistics presented by Kinderman et al. (2011) found that Stress Test respondents were predominantly white, had slightly higher earnings, and were better educated than the general population.

There is a substantial and growing body of literature showing that the impact of financial hardship in childhood in terms of later life health and wellbeing. However, access to the appropriate longitudinal data to test this relationship has been limited to date. A solution to this problem is collecting data about people's earlier life, retrospectively by asking them to recall their fertility, health, work, partnership, and residential history as well as other information about their circumstances in childhood (Jivraj, Goodman, Ploubidis, & de Oliveira, 2020). Within this tradition, the Stress Test included a recall item concerning perceived parental income in childhood. The question asked respondents to compare their parental income to the rest of the population across four categories, 'much lower than others, bottom 25 percent of the population' to 'much higher than others, highest25 percent of the population'. This question was used to form a dichotomous variable for childhood subjective financial hardship, with participants responding that their parental income was 'much lower than others, bottom 25 percent of the population' denoted as having financial hardship in childhood.

Presented as a series of seven categories in the Stress Test (see Table 1), respondent's current income was used to indicate adult financial status with respondents earning less than £20,000 denoted as experiencing financial hardship. Thus, adult financial circumstances were also modelled as a dichotomous variable. It is important to note that the use of personal income may be problematic for certain groups, particularly respondents that are still in education and individuals that are retired and may not rely on personal income for financial stability. However, given that only 8% and 6% of respondents recording that they were retired or still in education, respectively (Table 1), and that childhood financial circumstances were based on an income variable for consistently, current adult income was used. Similarly, although possible to derive a composite continuous variable for adult socioeconomic status, as the BBC Stress Test had only one childhood socioeconomic measure, it was felt that the measurement of adult financial circumstances should be equally simple to try to maintain some level of comparability. To date, much of the research on the impact of child and adult circumstances on CMD have used incomparable scales, with much more information available for adult circumstances. Thus, to maintain information comparability, it was decided to specify the two independent variables as simple income based binary variables.

2.3. Covariates

Age as a continuous variable and highest education level achieved (see Table 1 for description) were included in all models. The variable 'highest education level achieved' was included in all models as it has been found to be an important factor attenuating the effects of childhood socioeconomic status (Schaan, 2014).

3. Methods

The dependent variable of interest, GAD score was tested for normality. The distribution was confirmed as normal and linear regression models were used to investigate the associations stratifying by sex. All analyses were conducted in Stata 14. Low socioeconomic status in childhood and low socioeconomic status in adulthood (current situation) were analysed and combined to address the three hypotheses, critical period, accumulation, and social mobility.

3.1. Critical period hypothesis

The critical period hypothesis was tested by including both economic stress in childhood and adulthood as two separate and categorised variables in the same multiple models.

3.2. Accumulation of risks hypothesis

The accumulation of risk hypothesis was modelled as the accumulation of exposure over time (Hallqvist et al., 2004) and in terms of its interaction affects (Pudrovska & Anikputa, 2013). The additive accumulation hypothesis was investigated by adding the number of time periods in which an individual was exposed to economic stress. The categories were 0 (no economic stress), 1 economic stress in either childhood or adulthood and 2 economic stress in both childhood and adulthood. A response of not poor in childhood or adulthood are considered the optimal combination. The synergistic accumulation hypothesis was modelled by including childhood financial circumstances, and financial circumstances in adulthood and their interaction (Montez, 2013; Nettle & Bateson, 2017).

3.3. Social mobility hypothesis

The categories used for the accumulation hypothesis can be further separated to examine the impact of inter-generational social mobility (Hallqvist et al., 2004). Table 2 presents the 4 possible mobility combinations (1) never experienced financial hardship; (2) financial hardship in childhood, but not adulthood (upwards mobility); (3) financial hardship in adulthood, not childhood (downward mobility); (4) always experienced financial hardship. Mishra et al. (2009) refer to this as a general model of mobility where all downward and all upward changes are hypothesised to be equally harmful or beneficial, regardless of the time period in which they occur.

4. Results

Table 2 presents descriptive statistics of the financial circumstances of respondents to the BBC Stress test at two points in their life, childhood and adulthood. 14% of respondents reported experienced what we define as financial hardship in childhood, as measured by their perception that their parent's income was in the lowest quarter during their childhood. 25% of respondents reported financial hardship in adulthood (defined as having a current income less that £20,000 per annum). Looking at transitions between financial circumstances, 5% of respondents indicated that they always experienced financial hardship, 66% of respondents indicated that they never experienced financial hardship, 10% of respondents reported that they experienced financial hardship in childhood but not in adulthood (upward mobility), while 20% of respondents noted that they experienced financial hardship in adulthood but not in childhood (downwards mobility). With regard to gender, reported rates of financial hardship was equal across genders in childhood; however, more women than men (28% versus 20%) reported financial hardship in adulthood. A slightly higher percentage of men (11%) than women (8.5%) reported upwards mobility, while a higher percentage of women (22.5%) than men (16%) reported downward mobility between childhood and adulthood. Fig. 1 presents two boxplots examining GAD score by child and adult financial circumstances. Respondents categorised as having financial hardship in either childhood

Table 2
SES in childhood and SES in adulthood and mobility between the 2 points in time, total population and stratified by sex. Total (n = 18,718), Men (n = 7,246) and women (n = 11,472). The BBC Stress Test.

Financial circumstances	Total	Men	Women
Financial hardship in childhood	14%	15%	14%
Financial hardship in adulthood	25%	20%	28%
Always experienced financial hardship	5%	4%	5%
Never Poor experienced financial hardship	66%	69%	64%
Upwards mobility: Financial hardship in childhood, not adulthood	10%	11%	8.5%
Downward mobility: Financial hardship in adulthood, not childhood	20%	16%	22.5%

or adulthood had higher mean GAD scores, 10.10 and 10.15, compared to respondents with better financial circumstances (9.27 and 9.13), respectively.

4.1. Critical period hypothesis

Examining the critical period model, Table 3 presents three linear regression models for the total sample and by gender: Model 1 represents associations between childhood financial hardship and GAD scores adjusted for age and highest education level achieved. Model 2 represents associations between adult financial hardship and GAD scores adjusted for age and highest education level achieved. Model 3 presents the association between childhood and adult financial hardship together, adjusted for age and highest education level achieved. Financial hardship (compared to no financial hardship) in both childhood and adulthood were significant for all three models. Examining models 1 and 2 first, adjusting for age and highest education level achieved finds that both childhood financial hardship and adult financial hardship have a similar impact on mean GAD scores (0.83, CI: 0.63, 1.01 and 0.82, 95% CI: 0.68, 0.99). However, stratifying by gender, financial hardship in childhood had a higher coefficient for men (0.77, CI: 0.47, 1.08) than women (0.72, CI: 0.48, 0.96), while the opposite is true for the adult model. Here financial hardship in adulthood was associated with a higher mean GAD score for women (0.83, CI: 0.65, 1.02) compared to men (0.64, CI: 0.37, 0.92).

Model 3 is a total population model including both child and adult financial circumstances. Here the association of financial circumstances is slightly attenuated and again similar in both childhood (0.84, CI: 0.66, 1.03) and adulthood (0.83, CI: 0.68, 0.99). However, stratifying by gender, financial hardship in childhood had a higher coefficient for men (0.86, CI: 0.56, 1.17) than women (0.77, CI: 0.58, 0.95), while the opposite is true for the adult model. Here financial hardship in adulthood was associated with a higher mean GAD score for women (0.73, CI: 0.55, 0.92) compared to men (0.48, CI: 0.21, 0.76). Stratifying by gender finds that childhood financial hardship has a much higher impact on mean GAD scores for men compared to adult financial hardship, while childhood and adult financial hardship have a similar impact on mean GAD scores for women.

4.2. Accumulation hypothesis

Table 4 presents the results of the OLS regression examining the accumulation hypothesis. The category for 'no financial hardship' acts as the reference category and denotes individuals who had never experienced financial hardship, which we define as an accumulation dose of zero. The second category represents respondents who either experienced financial hardship in childhood but not in adulthood or vice versa, which we define as an accumulation dose of one. The third category represents respondents who experienced financial hardship in both childhood and adulthood and represents an accumulated dose of two. Two models were fitted: the first model included adult and childhood financial circumstances additively; and the second included adult and childhood financial circumstances and their interaction. With regard to the additive model, the first column of Table 4 shows a large response gradient in GAD risk score, increasing from 0.67 (CI 95%: 0.52 0.81) to 1.65 (CI 95% 1.34 1.97) as the accumulated periods of low SES increases. The same is observed for the gender stratified model, 1.48 (CI 95%: 0.90 2.06) and 1.63 (CI 95%: 1.25 2.00) for men and women respectively, with women showing a higher GAD risk score if they were poor in both childhood and adulthood compared to men.

Testing the synergistic model, when the interaction between childhood and adult financial circumstances were tested for the total population, the interaction term remained insignificant and did not improve model fit. Stratifying by gender, resulted in the same insignificant outcome. Therefore, childhood and adulthood financial circumstances were deemed to be independent predictors of mental health outcomes.
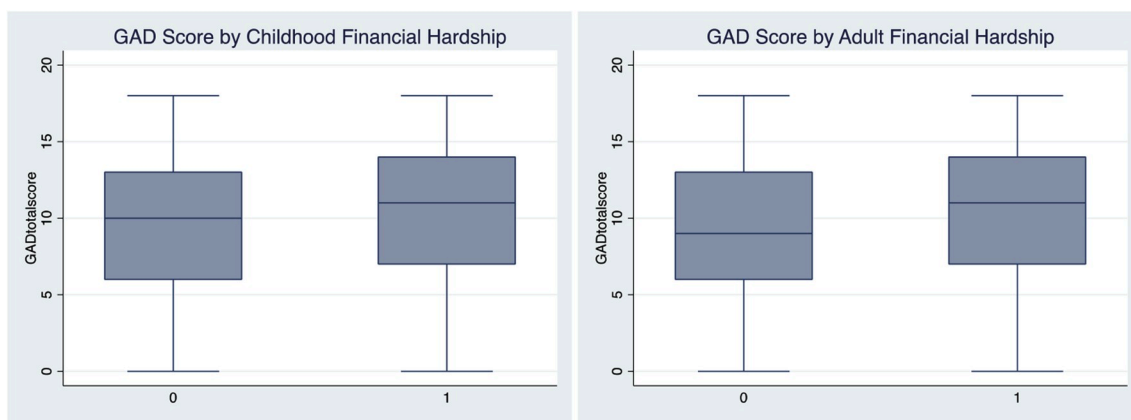
Fig. 1. Boxplot of average Goldberg Anxiety & Depression (GAD) score by childhood and adulthood financial hardship.

Table 3
Total and Gender Stratified Estimates (age and education adjusted) of effects of financial hardship on mean GAD scores according to the critical period hypothesis (95% CI). Total (n = 18,718), Men (n = 7,246) and women (n = 11,472). The BBC Stress Test.

	Total	Male	Female
	(95% CI)	(95% CI)	(95% CI)
Model 1. Childhood financial hardship	0.82 (0.63 1.01)	0.77 (0.47 1.08)	0.72 (0.48 0.96)
Model 2. Adulthood financial hardship	0.83 (0.68 0.99)	0.64 (0.37 0.92)	0.83 (0.65 1.02)
Model 3. Both Childhood + Adulthood financial hardship			
Childhood financial hardship	0.77 (0.58 0.95)	0.68 (0.56 1.17)	0.72 (0.49 0.96)
Adulthood financial hardship	0.72 (0.57 0.87)	0.48 (0.21 0.76)	0.73 (0.55 0.92)
Observations	18,718	7,246	11,472

*All estimates presented are statistically significant at p < 0.01.

Table 4
Total and Gender Stratified Estimates (age and education adjusted) of effects of financial hardship on mean GAD scores according to the accumulation hypothesis (95% CI). Total (n = 18,718), Men (n = 7,246) and women (n = 11,472). The BBC Stress Test.

	Total	Male	Female
Adjusted	(95% CI)	(95% CI)	(95% CI)
Never experienced financial hardship (0)	Reference	Reference	Reference
Financial hardship in either Childhood or Adulthood (1)	0.67 (0.52 0.81)	0.60 (0.35 0.84)	0.65 (0.47 0.83)
Always experienced financial hardship (2)	1.65 (1.34 1.97)	1.48 (0.90 2.06)	1.63 (1.25 2.00)
Observations	18,718	7,246	11,472

*All estimates presented are statistically significant at p < 0.01.

For parsimony, the interaction models are not shown.

4.3. Social mobility

Table 5 presents the results of the OLS regression to examine the impact of inter-generational social mobility; defined as a different financial category in adult life than in childhood, on psychological distress in adulthood. Participants that experienced upward or downward mobility between childhood and adulthood were compared with respondents who had experienced financial hardship throughout their lifecourse. Adjusting for age and highest education level achieved, respondents that reported that they experienced financial hardship in both childhood and adulthood had mean GAD scores that were 1.65 (CI 95%:

Table 5
Total and Gender Stratified Estimates (age and education adjusted) of effects of financial hardship on mean GAD scores according to the social mobility hypothesis (95% CI). Total (n = 18,718), Men (*n* = 7,246) and women (*n* = 11,472). The BBC Stress Test.

	Total	Male	Female
	(95% CI)	(95% CI)	(95% CI)
Never experienced financial hardship	Reference	Reference	Reference
Financial hardship in childhood, but not adulthood	0.67 (0.45 0.89)	0.70 (0.36 1.05)	0.50 (0.21 0.80)
Financial hardship in adulthood, but not in childhood	0.67 (0.50 0.83)	0.58 (0.38 0.88)	0.73 (0.53 0.93)
Always experienced financial hardship	1.65 (1.34 1.97)	1.48 (0.90 2.07)	1.64 (1.26 2.01)
Observations	18,718	7,246	11,472

*All estimates presented are statistically significant at p < 0.01.

1.34, 1.97) relative to the reference category, never poor. Of interest is that the impact of both upwards and downwards mobility had the same impact on mean GAD scores, 0.67 (CI: 0.50, 0.83 & CI 0.50, 0.83, respectively). Stratifying by gender found that the impact of financial hardship in childhood on GAD scores is greater for men than in adulthood (0.70, CI: 0.36, 1.05). This indicates that upward social mobility in adulthood does not attenuate the impact of financial hardship for men or that childhood financial circumstances have a greater impact on male GAD scores across the lifecourse. In contrast, the impact of downward mobility is associated with poorer GAD scores for women (0.73, CI: 0.53, 0.93).

5. Discussion

This paper examined the impact of financial hardship in childhood on CMD outcomes in adulthood according to three widely debated hypotheses; the critical period, social mobility and accumulation hypothesis. Adjusting for age and highest level of education attained, the accumulation hypothesis was fully confirmed. The critical period hypothesis was not confirmed as financial hardship in both childhood and adulthood were significantly and consistently associated with higher GAD scores. The benefit of upward mobility to mental health was not confirmed, as both upward and downward mobility have the same effect on psychological distress in adulthood. This paper provides evidence that bolsters the lack of support for the critical period model and indicates that the duration and persistence of financial hardship are more important to mental health than their specific timing.

Stratifying by gender, a clear difference emerged with upward mobility having a favourable impact (on women's mean GAD scores). In contrast, the impact of childhood financial hardship on GAD scores is

greater for men than financial hardship in adulthood, indicating that upward social mobility in adulthood does not attenuate the impact of financial hardship for men. Financial hardship in childhood has a greater impact on male GAD scores across the lifecourse. These results are consistent with recent research by Serafetinidou et al. (2019), which found that economic stress in childhood seems to be more important for men, while economic stress in adulthood has a greater impact on women.

Extensive research in neuroscience, molecular biology, genomics, and epigenetics has demonstrated that experiences of adversity in childhood are embedded biologically (i.e., "built into our bodies") and contributes to poorer mental and physical health throughout life (Shonkoff et al., 2012). However, less is known about the impact of social mechanisms such as poverty and inequality in childhood and how they impact on future adult health (Darin-Mattsson et al., 2018). Darin-Mattsson et al. (2018) finds no support for accumulation hypothesis but explains childhood effects by direct effects (sensitive period) and chain of risks. While, Lynch, Kaplan, & Shema (1997) found that the accumulation of low SES from childhood to adulthood has a significant effect on poor mental health outcomes in adulthood. Research in Sweden (Lindstöm et al., 2014) found support for both the accumulation and social mobility hypotheses with regard to poor psychological health. Similar to Lynch et al., (1997), this study found that the accumulation or the sustained occurrence of financial hardship from childhood to adulthood has a significant effect on poor mental health outcomes in adulthood. However, there was no statistical evidence of an interaction between early and later life financial disadvantage, that is the effect of financial difficulties in childhood on poor mental health in adulthood does not depend on financial circumstances at later stages.

This paper examined accumulation in both its strictest sense, as the accumulation of one single exposure over time (Hallqvist et al., 2004) and in terms of its interaction affects (Pudrovska & Anikputa, 2013). Based on these results we propose that as hypothesised by Hallqvist et al. (2004) that childhood offers an important period not because it is a critical period as hypothesised by Barker (1998), but because it provides an opportunity to decrease the number of episodes of low SES that an individual may experience throughout their lifecourse. This paper indicates that the accumulation of financial hardship is more important than (i) the timepoint in which a person experiences financial hardship, or (ii) if they experience different social trajectories throughout their life (upward or downward mobility). Thus, the goal should be minimising financial hardship across the lifecourse rather than focusing on one period of time or trying to reverse the impact of financial hardship in later years.

Previous research on lifecourse epidemiology notes the three life-course hypotheses are interconnected, and it is artificial to juxtapose these as competing hypotheses. In reality each hypothesis operates closely together in complicated ways (Hallqvist et al., 2004; Rosvall, Chaix, Lynch, Lindstr.m, & Merlo, 2006; Darin-Mattsson et al., 2018). The social mobility hypothesis partly entails parts of the accumulation hypothesis, because when one, for example, moves down the social hierarchy, you add an exposure to low socioeconomic status to your lifetime exposure and vice versa (Rosvall et al., 2006). Regardless of these overlaps, each model implies somewhat different interventions for preventing CMD in adulthood. For example, from a preventive perspective, it is important to understand when to target mental health interventions (Rosvall et al., 2006). As such, this paper stresses the need to develop policies that can meet people's needs over the lifespan, rather than focusing on resource redistribution in adulthood alone. Using a unique dataset for England, this paper adds to the health and lifecourse literature by presenting further evidence of the role of childhood circumstances, in this instance material resources, on psychological health in adulthood.

5.1. Study limitations

A limitation of this study which is common in retrospective data is the problem of recall bias (Pakpahan, Hoffmann, & Kröger, 2017a,b). Our childhood financial circumstances variable was based on participants capacity to correctly recall their parent's income relative to neighbours during their adolescents. Respondents may systematically misremember their childhood situation in light of their old age health conditions, which introduces measurement error to our analysis (Pakpahan et al., 2017a,b; Jivraj et al., 2020). Studies that have directly tested for recall bias show that it is compounded by the length of time since an event or circumstance and it is also affected by the period during the life course that it occurred (Jivraj et al., 2020). Of note, the average age of the respondents in the BBC Stress Test is 43 years old, with only 4% of respondents aged 66 years plus. While recall bias is an issue with the measure of childhood financial difficulties used in this study, recent research by Jivraj et al. (2020) found that retrospective data does not appear to produce biased estimates with respect to the direction of association between life course exposures and mid-life wellbeing when compared with similar prospective data. Similar to Pakpahan et al. (2017a,b), Jivraj et al. (2020) conclude that when longitudinal cohort data is not available, retrospective lifecourse data is an important method for collecting data on childhood circumstances.

Related to the retrospective nature of the data used, our study consists of references to only two observation points in time. The investigation of the effects of lifecourse social and economic conditions on health is stated to require at least three points of observation in time (Hallqvist et al., 2004). The fact that we only have two observation points in time, one retrospective and one current, makes it harder to separate the test of the accumulation hypothesis from the test of the social mobility hypothesis in the analyses (Lindström, Fridh, & Rosvall, 2014). This also necessitates the separation of measures of accumulation from measures of social mobility, which we have done as much as possible in this study. However, while there are limitations with the financial hardship variable that was used, information concerning financial circumstances in childhood is scarce, so the presence of this variable in the data is a clear strength. Finally, this paper took advantage of a unique dataset, the BBC Stress Test to examine the association between financial hardship in childhood and adulthood, and depression and anxiety in adulthood with reference to the accumulation, critical period and social mobility hypotheses in lifecourse epidemiology. However, to fully understand the mechanisms that underpin the impact of financial hardship in childhood and mental health outcomes, a longitudinal research design is necessary. Future work will focus on exploring these results using available longitudinal datasets, such as the British Birth Cohorts.

6. Conclusion

On balance, our results indicate that childhood and adult financial hardship are independently important predictors of CMD in adulthood and combine over time to determine the risk of having a CMD. This result is in line with previous international literature on the impact of childhood circumstances on CMD (Darin-Mattsson et al., 2018; Lindström et al., 2014). The retrospective capacity of this paper demonstrates that historical policies to decrease the financial hardship of families in England have not been enough to reduce the impact of financial hardship in childhood on adult health outcomes. Furthermore, stratifying our results by gender we note that all policies should consider the differential health impacts of social policies resulting from the varying differences in opportunities and resources available to sub-groups within the overall population. Within health research, gender is conceptualised as a status position that frames access to personal and social resources (Matheson & Moineddin, 2006; Morrissey, 2016). Within this context, social explanations of gender differences in health posit that women report higher levels of CMDs and other health

problems because of reduced access to material and social conditions that foster health (Bassett & Moore, 2013; Matheson & Moineddin, 2006). As such, this paper reinforces Verropoulou et al. (2019) conclusion that policies to address mental health outcomes in adulthood needs to address childhood adversity while considering the differential vulnerability of men and women.

Author statement

Karyn Morrissey: conceptualisation; methodology; investigation; writing original draft, reviewing and editing. Peter Kinderman: Survey conceptualisation; funding acquisition; methodology; investigation, writing original draft.

Ethics statement

This study complies with the guidelines of the 1964 Declaration of Helsinki. Ethical approval was obtained by the University of Liverpool's School of Population, Community and Behavioral Science Research Ethics Committee May 2009.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmph.2020.100592.

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