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Long term economic impact associated with childhood bullying victimisation

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Long term economic impact associated with childhood bullying victimisation**Abstract**

Being bullied is associated with mental health problems in childhood, with increasing evidence of persisting negative impacts, and increased mental health service use, into adulthood. There are also impacts of bullying victimisation on employment, income and being in poverty, but little is known about the long-term economic impacts. We therefore aimed to estimate the most important economic consequences at age 50 of being bullied in childhood: to our knowledge this is the first study that does so. Using 1958 British birth cohort data collected in 1965, 1969, 1991, 2003 and 2008 (study samples size 7,323-9,242), we find substantial and durable individual and societal economic impacts four decades after the childhood bullying occurred. Both men and women who were bullied in childhood were less likely to be in employment and had accumulated less wealth in the form of home-ownership or savings than participants who were not bullied. Individual earnings from paid employment were lower for women who were bullied in childhood. Frequent bullying in childhood was also associated with higher societal employment-related costs for men and higher health service costs for women. Our findings underline the importance of preventing bullying in childhood and, as the consequences are so long-lasting and pervasive, supporting people still experiencing the negative consequences in the decades that follow.

Keywords

UK; childhood bullying; long-term; economic impact; mental health; health service use; employment; wealth

24 **Introduction**

25

26 A substantial body of evidence in the UK and internationally shows that bullying victimisation is
27 associated with mental health problems in childhood (e.g. Arseneault *et al.*, 2018). There is also
28 increasing evidence of persisting negative impacts into the adult years (e.g. Wolke and Lereya, 2015;
29 Arseneault, 2017). Relatedly, it is not surprising that childhood bullying victimisation is associated
30 with increased mental health service use in childhood, adolescence, and early and mid-adulthood up
31 to age 50 (Evans-Lacko *et al.*, 2016; Sourander *et al.*, 2009; Sourander *et al.*, 2016).

32

33 There are also socio-economic consequences of bullying victimisation. In a United States (US) cohort,
34 childhood bullying victimisation was associated with more difficulties keeping a job when aged 24 to
35 26 (Wolke *et al.*, 2013). We similarly found that men who were bullied in childhood were more likely
36 to be unemployed at age 50 than their peers (Takizawa *et al.*, 2014), using British birth cohort data
37 (the National Child Development Survey; NCDS). In other analyses of the NCDS, bullied children had
38 lower incomes than their peers at ages 23 and 33, although not at age 42 (Brown and Taylor, 2008).
39 This study suggested that being bullied at school lowered wages earned during adulthood directly, as
40 well as indirectly through educational attainment. Finally, in the US cohort, bullied children were
41 more likely to be living in poverty when aged 24 to 26 than their non-bullied peers (Wolke *et al.*,
42 2013).

43

44 As these findings suggest, being bullied in childhood has adverse long-term consequences, but little
45 is known about the long-term *economic* impacts, whether individual or societal. We aimed to
46 estimate the most important economic consequences at age 50 of being bullied at ages seven and
47 eleven, looking at a range of individual impacts (employment status, earnings and wealth) and
48 societal impacts (costs of health service use for mental health problems and employment-related
49 costs to society). These outcomes are linked not only to individual financial wellbeing and potential

50 costs to the state but may have other implications since wealth, both savings and home-ownership,
51 is of key importance to individuals and society in a range of respects, including mental and physical
52 health, social care and pensions (Crossley and O'Dea, 2010; ; Dunatchik, 2016; Marmot *et al.*, 2010;
53 Pierse *et al.*, 2016; Pollack *et al.*, 2007).

54

55 **Data and Methods**

56

57 **Sample**

58 Participants are from the NCDS, the 1958 British birth cohort (Power and Elliott, 2006). Information
59 was collected on 98% of all births in one week in 1958 in England, Scotland and Wales. During
60 follow-up rounds of data collection at ages seven, eleven and sixteen years, the sample was
61 augmented by 920 immigrants to the UK born in the study week, resulting in a total of 18,558 cohort
62 members. Our sample for analysis comprises all cohort members for whom we have complete data
63 on bullying in childhood and a range of outcomes at age 50: mental health service use (n=9,242);
64 employment (n=8,581); earnings (n=7,323); housing tenure (n=9,222) and savings (n=7,559). Data
65 used in our analysis were collected in 1965, 1969, 1991, 2003 and 2008.

66

67 Ethical approval was obtained by NCDS via NHS Research Ethics Committees (RECs) or, prior to their
68 set-up in 1997, through internal review. Ethical approval for the biomedical survey was given by the
69 South East Multi-Centre REC.

70

71 **Measures**

72 **Assessment of bullying**

73 Exposure to bullying was assessed via parental interviews when participants were aged seven and
74 eleven years. At each age, parents were asked if their child was bullied by other children 'never',

75 'occasionally' or 'frequently'. We combined responses from both interviews to create a three-level
76 indicator of exposure to childhood bullying: 0 = never bullied (never at both seven and eleven years);
77 1 = occasionally bullied (occasionally at either seven or eleven years); 2 = frequently bullied
78 (frequently at either seven or eleven years, or occasionally at both ages). Where only one parental
79 interview was available, responses from that interview were used, providing bullying assessments
80 for 86% of cohort members.

81

82

83 ***Individual economic impacts at age 50***

84 We looked at three possible *individual* economic impacts of childhood bullying: economic status,
85 weekly earnings and wealth. Earnings penalties of bullying victimisation were based on comparisons
86 of self-reported weekly net individual earnings from paid employment at age 50. In NCDS, this
87 question was only asked of participants in paid employment and so did not include people in self-
88 employment, unemployed or economically inactive. Measures of wealth at age 50 were housing
89 tenure and savings. Housing tenure was categorised as either owner-occupation or renting, the
90 latter comprising both private and social renting. For savings, we created a categorical variable of
91 'no-to-low' savings, defined as savings between zero and £392.92, 'low-to-median' savings and
92 above median savings. The upper level for no-to-low savings (£392.92) was based on the PSE2012
93 (Poverty and Social Exclusion in the UK) Individual Deprivation Measure (Gordon, 2017) deflated to
94 2008 values (i.e. the year when NCDS cohort members were age 50), using the Retail Price Index.

95

96 ***Societal economic impacts at age 50***

97 We considered two measures of *societal* economic impact: costs associated with health service use
98 for mental health problems and employment-related costs to society. In estimating these, we used
99 2008 cost levels throughout, to match with the date of the age 50 data collection.

100

101 Health service use for mental health conditions

102 As the majority of mental health care occurs outside of specialty 'mental health' care settings
103 (Brown *et al.*, 2014; Evans-Lacko, 2017), and there is a widespread reluctance among individuals to
104 report seeking help for mental health problems (Clement *et al.*, 2015), we included service use for
105 mental health conditions occurring in both specialty mental health *and* general health settings. We
106 looked at three types of health service use reported by participants at age 50: specialty mental
107 health service use over the previous four years, general hospital outpatient service use and general
108 hospital inpatient service use over the previous eight years. To estimate costs associated with
109 hospital inpatient service use, we multiplied the number of hospital inpatient days reported by the
110 participant over the previous eight years by the World Health Organization mean cost estimate for
111 the UK per hospital inpatient bed-day in 2008 (WHO, 2011). For frequency of outpatient service use
112 in the previous eight years, possible responses included: none, one or two, three to five, six to ten
113 and more than ten. The median number of visits for each respondent was multiplied by the mean
114 unit cost per outpatient visit in 2008 (Curtis, 2008). As frequency of specialty mental health service
115 use at age 50 is unavailable in NCDS, we estimated annual service use frequency and associated
116 costs according to national averages stratified by gender from the 2000 Adult Psychiatric Morbidity
117 Survey for the sub-sample aged 42 to 50. To enable aggregation of costs across all three types of
118 health service use, annual specialty mental health costs were multiplied by eight to give estimated
119 eight-year costs.

120

121 Employment-related societal costs at age 50

122 We estimated employment-related costs to society using the human capital approach, which has
123 been widely used in other economic evaluations (e.g. Park *et al.*, 2014). Costs were calculated for
124 individuals in employment, self-employment, unemployment or economically inactive through
125 temporary or permanent sickness or disability. We considered full-time employment to be 35 or
126 more hours per week and applied the national minimum hourly wage in 2008 (£5.73 an hour) to

127 hours worked per week less than the 35-hour full-time equivalent. This was then multiplied by 48 on
128 the assumption of 48 working weeks in one year. Finally, we estimated aggregate annual societal
129 costs of being bullied in childhood by multiplying per-person societal costs by the estimated
130 numbers aged 50 in 2008 who had been bullied in childhood. This was estimated using prevalence of
131 being frequently bullied in childhood from our NCDS sample and mid-year estimates of the UK
132 population aged 50 in 2008 (ONS, 2012).

133

134 ***Covariates***

135 ***Childhood confounders***

136 We controlled for childhood confounders known to be associated with bullying, and with the
137 outcomes under study (Takizawa *et al.*, 2014; Evans-Lacko *et al.*, 2016). Childhood IQ was assessed
138 at age eleven using a standardized 80-item general ability test (Douglas, 1964). Scales of childhood
139 emotional and behavioural problems were derived from teacher ratings on the Bristol Social
140 Adjustment Guides (Stott, 1969) at ages seven and eleven years. We used the mean of scores across
141 ages seven and eleven years where both measures were available, and single-age measures for the
142 remainder of the sample. Family social class in childhood was classified on the basis of the father's
143 occupation when the sample member was aged seven years, and categorised as 'I and II'
144 professional/managerial/technical, 'IIINM' other non-manual, 'IIIM' skilled manual, and 'IV and V'
145 unskilled manual (OPCS, 1980). Childhood adversity was assessed from both prospective and
146 retrospective reports. Prospectively, information collected from parents and teachers was used to
147 create an eight-item scale of low parental involvement and activity with the child at ages seven and
148 eleven (Power and Elliott, 2006). Retrospectively at age 45, participants completed a 16-item
149 questionnaire about their exposure to a range of childhood adversities including poverty, parental
150 mental ill-health and drug/alcohol problems, family conflict, and physical and sexual abuse
151 (Rosenman, 2004), but not childhood bullying.

152

153

154

155 Adult covariates

156 In follow-on analyses, we also controlled for covariates in adulthood (age 33) known to be
157 associated with both being bullied in childhood (Brown and Taylor, 2008; Takizawa *et al.*, 2014) and
158 with the economic impacts. These covariates were partnership status, highest educational
159 qualification and psychological distress as measured by the Malaise Inventory, a nine-item
160 questionnaire with validity in population samples (Rodgers, 1999). Data on these covariates were
161 collected after the bullying victimisation took place and before the economic impacts at age 50, so
162 could indicate ways in which childhood bullying victimisation might affect economic outcomes at age
163 50.

164

165 Analysis

166 We report descriptive statistics to characterise the sample by bullying victimisation and by gender,
167 with Chi-squared tests and tests of means used to determine any group differences. In comparing
168 economic outcomes by bullying victimisation, we considered two sets of regression models. Firstly,
169 bivariate analyses compared economic outcomes between participants who were occasionally or
170 frequently bullied in childhood with those who were not. The second set of regression models
171 additionally controlled for childhood confounders. For linear outcome variables – earnings, health
172 service costs and employment-related costs - we utilised two-part generalised linear models (GLM)
173 (Mullahy, 1998). As the dependent variables may have skewed distributions, we used a modified
174 Park test (Manning and Mullahy, 2001), to select the most appropriate distribution for the purposes
175 of estimation. The marginal effect of bullying status on each outcome was estimated for each
176 regression model, generating estimates of mean cost differences for people who were occasionally
177 bullied and frequently bullied compared to people who were never bullied. For categorical outcome
178 variables - economic status, housing tenure and savings category - we used logistic regression

179 models. As health service use, employment rates, earnings and wealth tend to differ by gender
180 (Evans-Lacko *et al.*, 2016; ONS, 2013; ONS, 2016), we estimated economic impacts separately for
181 women and men.

182

183 Finally, we explored potential mediators of these economic impacts, by additionally controlling for
184 adult (age 33) covariates - partnership status, highest educational qualification and psychological
185 distress - in our regression models. Covariates that reduce the size of the effect can be considered as
186 potentially plausible explanations for the observed associations.

187

188 All tests of statistical significance used robust standard errors. A significance level of 0.05 was used
189 as the criterion to determine statistical significance and 0.10 to indicate marginal significance. We
190 conducted the analyses using Stata 14.2 (StataCorp, 2015).

191

192 **Attrition**

193 To investigate whether attrition was associated with the variables in our analysis, we explored the
194 savings variable as this had the highest proportion of missing data. Descriptive data showed that
195 data non-availability because of attrition and/or missingness was unrelated to childhood bullying but
196 was associated with the childhood confounders, except adversity (supplementary table available
197 from authors on request). To account for potential attrition bias, the analyses incorporated inverse
198 probability weights to address this differential sample attrition. These were derived from logistic
199 regression analyses predicting availability of complete data on childhood bullying and each outcome
200 at age 50, including all the childhood confounder variables except adversity.

201

202

203

204

205 **Results**206 ***Childhood and early adult correlates of bullying victimisation***

207 Rates of childhood bullying victimisation were higher among men than women (table 1). Being
208 occasionally or frequently bullied in childhood was associated with a range of potential childhood
209 confounders. Both women and men who were bullied in childhood had lower general ability test
210 scores, and elevated levels of internalising and externalising problems in childhood compared to
211 those who were never bullied. They were more likely to come from skilled or unskilled manual social
212 class backgrounds than those who were never bullied. They were at higher risk of experiencing other
213 forms of childhood adversity. Table 1 also shows that being occasionally or frequently bullied in
214 childhood was associated with having lower educational qualifications and higher psychological
215 distress at age 33 for both men and women and less likelihood of having a partner at age 33 for men.

216

217

<TABLE 1 ABOUT HERE>

218

219 ***Economic impacts at age 50: women***

220 Our bivariate analysis showed that, for women, being occasionally or frequently bullied in childhood
221 was significantly associated with worse economic outcomes at age 50 in every domain (table 2). The
222 addition of childhood confounders reduced the odds ratios (OR), relative risk ratios (RRR), or costs of
223 poorer economic outcomes associated with bullying alone, in some cases substantially. However,
224 even after accounting for these childhood factors there were still significant economic consequences
225 at age 50 of being frequently bullied in childhood. The main exception was societal employment
226 costs where differences in costs by bullying for women were accounted for by differences in the
227 childhood confounders.

228

<TABLE 2 ABOUT HERE>

229

230 Controlling for childhood confounders, women who were occasionally or frequently bullied in
231 childhood had marginally higher odds of 1.34 (95% CI=0.97, 1.84) and 1.39 (95% CI=0.94, 2.06)
232 respectively of being unemployed or economically inactive due to sickness or disability compared to
233 women who were never bullied. Women who were frequently bullied in childhood had lower net
234 weekly earnings from paid employment (on average £22.74 a week lower at 2008 values) and less
235 likelihood of owning a property at age 50 (OR=0.76; 95% CI=0.57, 1.01) than women who were not
236 bullied, even controlling for childhood confounders. Additionally, women who were frequently
237 bullied in childhood had higher odds of having accumulated only no-to-low (RRR=1.68; 95% CI=1.23,
238 2.29) or low-to-median (RRR=1.80; 95% CI=1.37, 2.38) savings by mid-life compared to those who
239 were never bullied.

240

241 Focusing on societal impact, being frequently bullied in childhood was associated with £717 higher
242 health service costs for mental health conditions over an eight-year period at mid-life among
243 women, even controlling for childhood confounders. Aggregated to the estimated affected
244 population, this was an estimated £4.5 million annually.

245

246 ***Economic impacts at age 50: men***

247 Bivariate analysis showed that for men, being frequently bullied in childhood was associated with
248 worse economic outcome at age 50 in every domain and occasionally bullied with worse outcomes
249 in most domains (table 3). Similarly to women, the addition of childhood confounders reduced the
250 odds or costs of the economic outcomes associated with being bullied, although significant
251 economic impacts were still observed in many areas. The exceptions were weekly income and health
252 service costs where childhood confounders explained the differences seen.

253

254 Controlling for childhood confounders, men who were frequently bullied in childhood were at
255 increased risk (OR=1.49; 95% CI =1.04, 2.13) of being unemployed or economically inactive due to

256 sickness or disability compared to men who were never bullied. We did not observe differences in
257 weekly net earnings at mid-life for men who experienced bullying in childhood. Men who were
258 frequently bullied in childhood had lower odds of owning a property at age 50 compared to their
259 non-bullied peers (OR=0.74; 95% CI=0.56, 0.97), and marginally higher risk of having no-to-low
260 savings (RRR=1.31; 95% CI=0.97, 1.78).

261

262

<TABLE 3 ABOUT HERE>

263

264 Moving on to societal impacts, we found employment-related societal economic impacts were
265 higher for men who were frequently bullied in childhood compared to those who were never
266 bullied, with extra costs to society of £271 annually, even controlling for childhood confounders.
267 Applied to the estimated affected population in 2008, this represents an aggregate cost to society of
268 an estimated £17.9 million a year.

269

270

271 ***Adult mediators of economic impacts***

272 We then turned to possible mediators of the economic impacts of being bullied in childhood:
273 partnership status, highest educational qualification and psychological distress, all at age 33 (Table
274 4).

275

276

< TABLE 4 ABOUT HERE >

277

278 Adding these adult covariates to the model reduced the earnings difference for women frequently
279 bullied in childhood compared to never bullied by about a quarter and reduced the odds ratio of
280 being unemployed or economically inactive for women who were occasionally bullied compared to
281 never bullied. The adult covariates did not appear to have much effect on any of the other *individual*

282 outcomes for women, although they did reduce estimates of the *societal* costs of health service use
283 for mental health conditions by just under a third. For men, the addition of adult covariates
284 appeared to make little difference to odds of being unemployed/economically inactive due to long-
285 term sickness or disability, odds of owner-occupation nor odds of having no-to-low savings when
286 aged 50, although societal employment-related costs were reduced by a third. These results suggest
287 that partnership status, highest educational qualification and psychological distress at age 33 are
288 potential explanations for *some* of the economic impacts at age 50 of being bullied in childhood.
289 However, in most cases, economic impacts were still observed even after additionally controlling for
290 these factors.

291

292 **Discussion**

293 To our knowledge, this is the first study that looks at the long-term economic consequences of
294 childhood bullying victimisation. We find substantial and durable individual and societal economic
295 impacts at mid-life of being bullied in childhood. Four decades after the bullying occurred, both men
296 and women who were bullied in childhood were less likely to be in employment and had
297 accumulated less wealth in the form of home-ownership or savings than participants who were not
298 bullied. Additionally, women who were bullied in childhood had lower earnings from paid
299 employment. We also identified societal economic impacts associated with childhood bullying:
300 frequent bullying in childhood was associated with higher employment-related costs at age 50 for
301 men and higher health service costs at age 50 for women. The latter is consistent with the higher
302 mental health service use seen by adults who were bullied as children in other research (Evans-Lacko
303 *et al.*, 2016; Sourander *et al.*, 2016).

304

305 The reasons for lower earnings and higher unemployment among those who were bullied during
306 childhood are likely to be similar. Both are associated with lower educational attainment, and bullied
307 children have lower educational attainment than their non-bullied peers (Brown and Taylor, 2008)).

308 Bullied children miss more school than non-bullied children (Brown *et al.*, 2011), which may be
309 because being bullied at school results in reluctance to attend and/or because of the
310 contemporaneous mental and physical ill-health associated with bullying. Bullied children may find it
311 harder to concentrate when they are in school, again either directly because of the bullying or
312 because of the associated health problems, psychological difficulties in particular. Furthermore,
313 bullying victimisation may lead to cognitive problems which can affect educational attainment
314 (Takizawa *et al.*, 2014). Low self-esteem associated with bullying victimisation (Smokowski and
315 Holland, 2005) is another potential mechanism by which educational attainment may be affected
316 (Waddell, 2006).

317

318 Many of the adulthood consequences of childhood bullying victimisation may also directly impact on
319 employment and earnings. The lower self-esteem and confidence of adults who were bullied as
320 children (Waddell, 2006) plausibly impacts on job-seeking or promotion-seeking, working hours, or
321 performance at work. Another potential pathway is that being bullied may alter physiological
322 responses to stress (Ouellet-Morin *et al.*, 2011) which may lead to withdrawal from the labour
323 market or reduction in working hours. Poorer mental health is associated with higher unemployment
324 and lower income, as are physical health problems. For example, the poorer mental and physical
325 health reported by adults who have been bullied as children often stands in the way of work (Allison
326 *et al.*, 2009) and in our analysis the costs associated with non-employment include those who are
327 permanently or temporarily unable to work because of sickness. Relationship status is associated
328 with employment and people who are bullied in childhood are less likely to be in a relationship than
329 their non-bullied peers (Takizawa *et al.*, 2014). In our analysis exploring the role of educational
330 attainment, mental health and relationship status further, we found that these factors at age 33
331 appear to be potential explanations in the earnings differences for frequently bullied women and
332 the employment costs for frequently bullied men.

333

334 We found wealth penalties of being bullied in two domains: housing and savings. Wealth can be
335 considered a measure of accumulation of assets over the life-course. Our findings thus show not
336 only the economic consequences of bullying four decades after being bullied in childhood, but also
337 point to accumulative, life-course, economic consequences. There are significant implications of
338 having low wealth in mid-life. Wealth can provide protection against both present and future
339 financial shocks associated with, for example, unemployment, serious illness or relationship
340 breakdown, and hence provide a measure of financial resilience. The cut-off point for low savings we
341 use is drawn from a robust scale of deprivation items (Gordon, 2017). Savings above this level can
342 provide some financial protection against unexpected, but necessary, expenses. Without this, there
343 is higher risk of debt, which could become unmanageable, or going without necessities.

344

345 Savings wealth is linked to other types of wealth which provide financial protection: for example,
346 those with higher savings are more likely to own their home and to contribute to pension schemes
347 (Crossley and O'Dea, 2010). As well as having individual economic impacts, savings wealth has other
348 implications, both individual and societal. One currently quite high-profile example is paying for
349 social care. For example, at present in England, savings wealth determines financial eligibility for
350 state funding for social care. Furthermore, research in England has shown a relationship between
351 level of savings and unmet need for services (Dunatchik, 2016). Wealth, especially housing wealth, is
352 an important factor for better physical and mental health (Pierse *et al.*, 2016; Pollack *et al.*, 2007)
353 and can be considered one of the most important contributors to socio-economic health inequalities
354 (Marmot *et al.*, 2010; Pollack *et al.*, 2007;).

355

356 Accumulation of wealth results from being consistently in adequately paid employment over the
357 longer term, and thus some of the potential ways in which bullying may impact on earnings and/or
358 employment are also relevant to wealth. Another factor may be inheritance, which plays a role in
359 both home-ownership and wealth. However, our analyses controlled for family socio-economic class,

360 one measure of family wealth and hence inheritance, and the association of home-ownership with
361 bullying still remains. People who have been bullied in childhood are less likely to be in relationships
362 as adults (Takizawa *et al.*, 2014), and partnership status is strongly associated with home-ownership
363 (Thomas and Mulder, 2016). However, once again, the negative association between home-
364 ownership and being bullied remains even when controlling for partnership status age 33.

365
366 The possible ways in which bullying in childhood may impact on mental ill-health in adulthood even
367 four decades after its occurrence have been reviewed elsewhere (Evans-Lacko *et al.*, 2016;
368 Sourander *et al.*, 2016; Takizawa *et al.*, 2014; Wolke and Lereya, 2015) and include long-term trauma
369 of early adverse experiences increasing vulnerabilities to later mental health problems (Shonkoff *et*
370 *al.* 2009), interpersonal processes (Kendler *et al.*, 2003), and physiological responses (Ouellet-Morin
371 *et al.*, 2011). There may be other common factors for being exposed to bullying and mental health
372 problems which we did not control for.

373
374 Mental health problems associated with bullying might translate into higher health service use
375 among bullied children and there is certainly some evidence for this (Evans-Lacko *et al.*, 2016;
376 Sourander *et al.*, 2016). However, the relationship between health service use for mental health
377 problems and the existence of those problems is by no means straightforward. Under- or mis-
378 diagnosis, stigma, sub-threshold mental health problems and lack of available and/or suitable
379 services are some of the reasons why the presence of a mental health problem does not necessarily
380 result in accessing services for that problem; it is telling that differences in health service costs,
381 although significantly reduced, remain for women even after controlling for one measure of
382 psychological distress in adulthood. Nonetheless our previous research found a significant
383 relationship between bullying victimisation in childhood and mental health service use in adulthood,
384 although at age 50 this was only the case for women (Evans-Lacko *et al.*, 2016). Here we have
385 extended that analysis, factoring in intensity of service use by considering both frequency and type

386 of health service use, and then estimating different costs by gender. Using this method, we found
387 that health service costs for women who were frequently bullied were more than £700 higher than
388 for their non-bullied peers, with no significant differences in costs for men. Reasons for this gender
389 difference may be to do with the greater help-seeking among women with mental health problems
390 seen in other research (Evans-Lacko *et al.*, 2014).

391
392 There were other gender differences observed in our study. Women who were bullied in childhood
393 had lower earnings than their non-bullied peers, whereas bullied men did not. This is likely to be due
394 to differences in hours worked per week, which is a more important determinant of earnings for
395 women than for men (Blundell *et al.*, 2013). Both men and women had higher odds of having no-to-
396 low savings if they had been frequently bullied in childhood. However, women who were frequently
397 bullied in childhood also had higher odds of having low-to-median savings whereas there were no
398 differences for men. Both men and women were less likely to be in employment if they had been
399 bullied in childhood, but it was men for whom there were associated societal costs. Overall, we
400 found that childhood bullying appeared to have a differential, and worse, economic impact in later
401 life for women than for men. This may be because women and men are differently affected by
402 childhood bullying in the first place, and/or because the negative impacts of being bullied manifest
403 differently for women and men because of gender differences in the wider socio-economic
404 environment. Although there are no other studies on the long-term economic consequences of
405 being bullied in childhood, research on childhood maltreatment concluded that women were more
406 vulnerable than men to the long-term economic impacts of childhood abuse or neglect (Currie and
407 Widom, 2010).

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409 There are a number of limitations to our study. Attrition by age 50 and missing data reduces the
410 number of cases for some of our outcomes. However, we controlled for effects of selective attrition
411 by utilising inverse probability weights in the analyses. Information on exposure to bullying was

412 assessed via parental interviews in NCDS so may underestimate incidence, as not all childhood
413 bullying is known about by parents. Shakoor and colleagues (2011) found 'modest' (52-56%)
414 agreement between mother and child reports of bullying at this age but similar associations
415 between child emotional and behavioural problems and bullying victimisation, regardless of
416 informant. Whilst data from more than one informant is the preferred option, in the absence of child
417 self-reports, mothers' reports can be considered a viable alternative.

418

419 Another potential limitation of our study is that there may be recall bias, in particular for service use,
420 although self-report is considered an acceptable method for collecting service use data (Patel *et al.*,
421 2005). Self-reports of earnings can also be subject to recall or estimation bias, although the NCDS
422 question asked about very recent, and short, timeframes. Reported earnings can also be sensitive to
423 social desirability bias, but the self-completion or computer-assisted methods used in NCDS reduces
424 this risk considerably. Earnings are limited to earnings from paid employment, an approach that has
425 been used in other similar research using NCDS. Use of average frequencies of service use
426 interpolated over the time frame and average national costs for estimation of health service costs
427 may have resulted in under- or over- estimates of actual costs. Using the minimum wage to estimate
428 societal employment-related costs is also likely to be an underestimate. Furthermore, although we
429 have looked at both individual and societal impacts, and in a number of domains, there may be
430 other economic consequences of bullying which we have not estimated here.

431

432 The strengths of our analyses are that they are based on a large nationally representative cohort
433 dataset with rich data on childhood bullying victimisation and on a range of outcomes collected
434 through to age 50 to which we can apply individual and societal costs. We have also been able to
435 control for key confounders, showing that our analyses are robust. Using these data, our study is the
436 first to estimate individual and societal costs in mid-life in a number of spheres of bullying in
437 childhood.

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Conclusions

Bullying in childhood is widespread, with consistent evidence of negative impacts across diverse samples in terms of age of being bullied, time, geographic location and culture. Internationally, one in three children report having been bullied at some point in their lives, with 10% to 14% experiencing chronic bullying lasting for more than six months (World Health Organization, 2012). Bullying was reported by 34% to 46% of school children in England in recent surveys (Department of Health, 2015), similar to the prevalence in our NCDS sample. Vulnerable children are at higher risk of being bullied (Arseneault *et al.*, 2018; Chatzitheochari *et al.*, 2014; Gower *et al.*, 2015; McMahon, 2010; Woods *et al.*, 2009). That it has personal and economic consequences for both individuals and society four decades later should raise significant concerns.

By showing the economic consequences for individuals and society of being bullied in childhood, our study further underlines the importance of investing in the implementation of effective policies and practices to prevent or reduce bullying in schools and thus mitigate negative outcomes and costs. Of course, tackling bullying is particularly a concern because of the quality of life effects on those who are bullied. There is evidence of effective anti-bullying initiatives (see for example the meta-analysis by Ttofi and Farrington, 2011) and indeed cost-effective initiatives, many of which are low cost (from £8-16 per person per year) (Beecham *et al.*, 2011; McDaid *et al.*, 2017). This compares to our estimated annual societal costs per person of being bullied of £90 for women and £271 for men at age 50 in 2008. As risk of being bullied is higher among already disadvantaged children and the poorer economic outcomes seen here compound that disadvantage in later life, anti-bullying initiatives also have a potentially important role to play in supporting vulnerable, disadvantaged children and reducing inequities in later life.

464 As the consequences of childhood bullying are long-lasting and pervasive, it is imperative that
465 response in this area should be multi-faceted. It needs to prevent bullying, to provide support for
466 children (and adults) who are currently being bullied, and to provide support for people who were
467 bullied previously (whether in childhood or subsequently) and who are still experiencing the
468 negative consequences of it in the years that follow. Better integration of mental health and anti-
469 bullying provision could prevent young victims developing long-term mental health problems, and
470 the costs associated with this. Given the potential mediating role in adulthood of psychological
471 distress, and educational qualifications and relationship status, supporting adults bullied as children
472 might usefully include relationship and other social support, access to adult education and support
473 with mental health problems.

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Table 1. Descriptive statistics of sample childhood socio-demographic characteristics by bullying and gender

Bullied in childhood	Female (n=4,702)			Male (n=4,540)		
	Never % (N)	Occasionally % (N)	Frequently % (N)	Never % (N)	Occasionally % (N)	Frequently % (N)
	61.6 (2,895)	26.2 (1,231)	12.3 (576)	55.7* ¹ (2,527)	28.5* ¹ (1,296)	15.8* ¹ (717)
CHILDHOOD CONFOUNDERS						
General ability test score (mean; SD)	48.0 (14.9)	44.7* (15.3)	42.2* (15.2)	45.5 (15.3)	43.3* (16.0)	41.8* (16.2)
Internalising score (mean; SD)	1.75 (0.85)	1.90* (0.88)	2.01* (0.97)	1.89 (0.86)	2.06* (0.94)	2.22* (0.98)
Externalising score (mean; SD)	1.76 (0.84)	1.84* (0.90)	1.94* (0.93)	1.97 (0.97)	2.08* (1.03)	2.22* (1.08)
Parental social class % (N)						
Skilled professional/ managerial/technical	23.6 (676)	18.7*(230)	16.2*(93)	25.3 (634)	19.4*(250)	15.6*(112)
Skilled non-manual	10.5 (302)	10.0*(123)	7.64*(44)	9.9 (248)	11.4*(147)	8.7*(62)
Skilled manual	42.7 (1,224)	43.7*(536)	44.3*(255)	40.7 (1,020)	42.1*(543)	50.5*(362)
Unskilled manual	23.3(668)	27.6*(339)	31.9*(184)	24.1 (604)	27.1*(349)	25.2*(181)
Childhood adversity score (mean; SD)	1.51 (2.29)	1.74* (2.38)	1.90* (2.38)	1.19 (1.80)	1.41* (2.09)	1.52* (2.08)
Low parental involvement score (mean; SD)	0.90 (1.25)	1.11* (1.40)	1.15* (1.40)	0.93 (1.30)	1.11* (1.40)	1.42* (1.67)
ADULT COVARIATES (AGE 33)						
Partner % (N)	83.5 (2,098)	80.2 (865)	83.6 (418)	83.1 (1,754)	80.5*(860)	75.1*(432)
Highest educational qualification % (N)						
None	9.2(232)	12.5*(134)	17.6*(88)	7.4 (156)	8.7*(93)	13.9*(80)
CSE, O Level or equivalent	49.6(1,256)	52.9*(569)	54.5*(273)	39.4 (835)	42.8*(458)	41.2*(237)
A Level or equivalent	27.3(691)	23.6*(254)	20.6*(103)	36.0 (763)	33.2*(355)	33.9*(195)
Degree or higher	13.9(351)	11.1*(119)	7.4*(37)	17.3 (368)	15.4*(165)	11.1*(64)
Psychological distress (mean; SD)	1.07 (1.53)	1.36* (1.73)	1.51* (1.86)	0.58 (1.15)	0.74* (1.29)	0.90* (1.46)

*p < .05; reference group is never bullied except (1) where reference group is women

Table 2. Association between being bullied in childhood and individual and societal economic impact for women at age 50

INDIVIDUAL ECONOMIC IMPACTS	Bullied at age 7 & 11		Economic impact: bivariate results	Economic impact controlling for childhood confounders ¹
Economic status		%		Odds ratio (95% CI)
Unemployed or economically inactive	Never (n=2,544)	6.8	-	-
	Occasionally (n=1,099)	8.7	1.44* (1.09, 1.91)	1.34~ (0.97, 1.84)
	Frequently (n=504)	11.9	1.85* (1.32, 2.58)	1.39~ (0.94, 2.06)
Earnings		Mean		Earnings difference (95% CI)
Mean weekly earnings (£) from paid employment	Never (n=2,015)	301.25	-	-
	Occasionally (n=883)	281.27	-21.05* (-37.76, -4.34)	-8.72 (-25.92, 8.48)
	Frequently (n=386)	258.50	-41.92* (-60.89, -22.96)	-22.74* (-42.05, -3.43)
Housing tenure		%		Odds ratio (95% CI)
Not owner occupier	Never (n=2,889)	14.3	-	-
	Occasionally (n=1,230)	18.3	0.76* (0.63, 0.93)	0.87 (0.69, 1.10)
	Frequently (n=573)	20.6	0.65* (0.51, 0.83)	0.76~ (0.57, 1.01)
Savings		%		Relative risk ratio (95% CI)
No-to-low savings compared to above median savings	Never (n=2,281)	20.2	-	-
	Occasionally (n=975)	25.6	1.51* (1.23, 1.85)	1.25~ (0.99, 1.58)
	Frequently (n=432)	30.1	2.03* (1.55, 2.67)	1.68* (1.23, 2.29)
Low-to-median savings compared to above median savings	Never (n=2,281)	29.6	-	-
	Occasionally (n=975)	30.2	1.27* (1.05, 1.53)	1.67 (0.95, 1.44)
	Frequently (n=432)	33.3	1.71* (1.33, 2.21)	1.80* (1.37, 2.38)
SOCIETAL ECONOMIC IMPACTS		Mean		Cost difference (95% CI)
Eight-year health service costs for mental health problems (£)	Never (n=2,884)	2516.76	-	-
	Occasionally (n=1,222)	2814.83	422.96~ (-16.28, 862.20)	371.06 (-63.65, 805.77)
	Frequently (n=570)	3470.11	1,040.33* (546.94, 1533.73)	717.08* (244.39, 1,189.76)
Mean annual societal employment cost (£)	Never (n=2,527)	2175.18	-	-
	Occasionally (n=1,093)	2284.62	243.27~ (-1.58, 488.12)	68.73 (-173.01, 310.47)
	Frequently (n=499)	2549.22	463.16* (116.88, 809.44)	123.45 (205.33, 452.23)

*p < .05; ~p < 0.10; Significant and marginal associations are highlighted in bold. 1. Controlling for family social class, adversity, low parental involvement, childhood IQ, childhood emotional and behavioural problems

Table 3. Association between being bullied in childhood and individual and societal economic impact for men at mid-life

INDIVIDUAL ECONOMIC IMPACTS	Bullied at age 7 & 11		Economic impact: bivariate results	Economic impact controlling for childhood confounders ¹
Economic status		%		Odds ratio (95% CI)
Unemployed or economically inactive	Never (n=2,472)	7.7	-	-
	Occasionally (n=1,264)	9.2	1.21 (0.92, 1.58)	0.90 (0.64, 1.27)
	Frequently (n=698)	14.0	2.06* (1.56, 2.72)	1.49* (1.04, 2.13)
Earnings		Mean		Earnings difference (95% CI)
Mean weekly earnings (£) from paid employment	Never (n=1,622)	539.72		-
	Occasionally (n=849)	524.38	-23.49(-68.27, 21.28)	-7.72 (-49.10, 34.66)
	Frequently (n=448)	464.21	-70.34* (-105.90, -34.80)	-8.55 (-46.98, 29.88)
Housing tenure		%		Odds ratio (95% CI)
Not owner occupier	Never (n=2,528)	15.0	-	-
	Occasionally (n=1,292)	17.0	0.82* (0.67, 1.00)	0.99 (0.78, 1.26)
	Frequently (n=710)	22.5	0.57* (0.46, 0.72)	0.74* (0.56, 0.97)
Savings		%		Relative risk ratio (95% CI)
No-to-low savings compared to above median savings	Never (n=2,130)	16.8		-
	Occasionally (n=1,120)	20.3	1.35* (1.09, 1.67)	1.12 (0.87, 1.45)
	Frequently (n=621)	26.3	1.90* (1.49, 2.43)	1.31~ (0.97, 1.78)
Low-to-median savings compared to above median savings	Never (n=2,130)	36.0	-	-
	Occasionally (n=1,120)	35.7	1.12 (0.94, 1.33)	1.00 (0.82, 1.21)
	Frequently (n=621)	35.1	1.22~ (0.98, 1.51)	1.11 (0.87, 1.40)
SOCIETAL ECONOMIC IMPACTS		Mean		Cost difference (95% CI)
Eight-year health service costs for mental health problems (£)	Never (n=2,515)	2270.53	-	-
	Occasionally (n=1,288)	2777.60	554.80* (65.77, 1,043.84)	-97.2 (-510.31, 315.92)
	Frequently (n=714)	3199.91	1,141.25* (348.19, 1,934.31)	481.03 (-116.11, 1078.17)
Mean annual societal employment cost (£)	Never (n=2,459)	921.98		-
	Occasionally (n=1,253)	1117.06	189.19~ (-35.31, 407.69)	14.64 (-183.38, 212.66)
	Frequently (n=693)	1588.72	728.31* (417.70, 1038.93)	270.70* (5.66, 535.74)

*p < .05; ~p < 0.10; Significant and marginal associations are highlighted in bold. 1. Controlling for family social class, adversity, low parental involvement, childhood IQ, childhood emotional and behavioural problems

Table 4: Association between being bullied in childhood and individual and societal economic impact for women and men at mid-life additionally controlling for adult covariates

INDIVIDUAL IMPACTS	Bullied at age 7 & 11	Women	Men
		Childhood confounders and Adult covariates	Childhood confounders and Adult covariates
		Odds ratio (95% CI)	
Economic status			
Unemployed or economically inactive	Occasionally	1.07 (0.73, 1.56)	-
	Frequently	1.22 (0.78, 1.91)	1.37 (0.92, 2.06)
		Cost difference (95% CI)	
Earnings			
Mean weekly earnings (£) from paid employment	Occasionally	-	-
	Frequently	-16.58~ (-55.22, 2.12)	-
		Odds ratios (95% CI)	
Housing tenure			
Not owner occupier	Occasionally	-	-
	Frequently	0.84 (0.61, 1.56)	0.78 (0.57, 1.07)
		Relative risk ratio (95% CI)	
Savings			
No-to-low savings compared to above median savings	Occasionally	1.16 (0.90, 1.50)	-
	Frequently	1.55* (1.08, 2.22)	1.22 (0.87, 1.73)
Low-to-median savings compared to above median savings	Occasionally	-	-
	Frequently	1.75* (1.30, 2.36)	-
SOCIETAL ECONOMIC IMPACTS			
		Cost difference (95% CI)	
Eight-year health service costs for mental health problems (£)	Occasionally	-	-
	Frequently	520.20* (39.79, 1,000.61)	-
		Cost difference (95% CI)	
Mean annual societal employment cost (£)	Occasionally	-	-
	Frequently	-	£173.92 (-93.03,440.87)

*=p < 0.05; ~=p < 0.10; Significant and marginal associations are highlighted in bold.

Controlling for family social class, adversity, neglect, childhood IQ, childhood emotional and behavioural problems and partnership status, highest educational qualification and psychological distress age 33

Long term economic impact associated with childhood bullying victimisation**Highlights**

- First study to explore long-term economic effects of being bullied in childhood
- Sizeable individual and societal economic impacts 4 decades after bullying occurred
- Adults bullied in childhood less likely to be in employment in mid-life
- Childhood bullying impacted on individual's mid-life income and accumulated wealth
- Higher societal employment costs for men and higher health service costs for women