

Supplementary Online Content:

Childhood psychological distress and youth unemployment: evidence from two British cohort studies

Section 1: Details of data-sets & distress measurements.

Section 2: Descriptive statistics.

Section 3: Supplementary regressions:

3a: Regressions using standardized distress variables in Study 1 and 2.

3b: Regressions using extended control variables in Study 1 and 2.

3c: Regressions excluding all inactive participants in Study 1.

Section 4: Extended analysis of the interaction between psychological distress and the 1980s UK recession in Study 2.

Section 1: Details of data-sets & distress measurements.

Data-sets Used

National Childhood Development Study (accessed October 12th 2013)

1. NCDS Activity Histories, 1974-2008 (NCDS 6942).
2. NCDS Childhood Data, Sweeps 0-3, 1958-1974 (NCDS 5565).
3. NCDS Sweep 4 data (NCDS 5566).

Longitudinal Study of Young People in England (accessed October 15th 2013)

1. Wave Two LSYPE Family Background File.
2. Wave Two LSYPE Young Person File.
3. LSYPE Main Activity Waves 4-7.

All data-sets were downloaded from the UK Data Service:

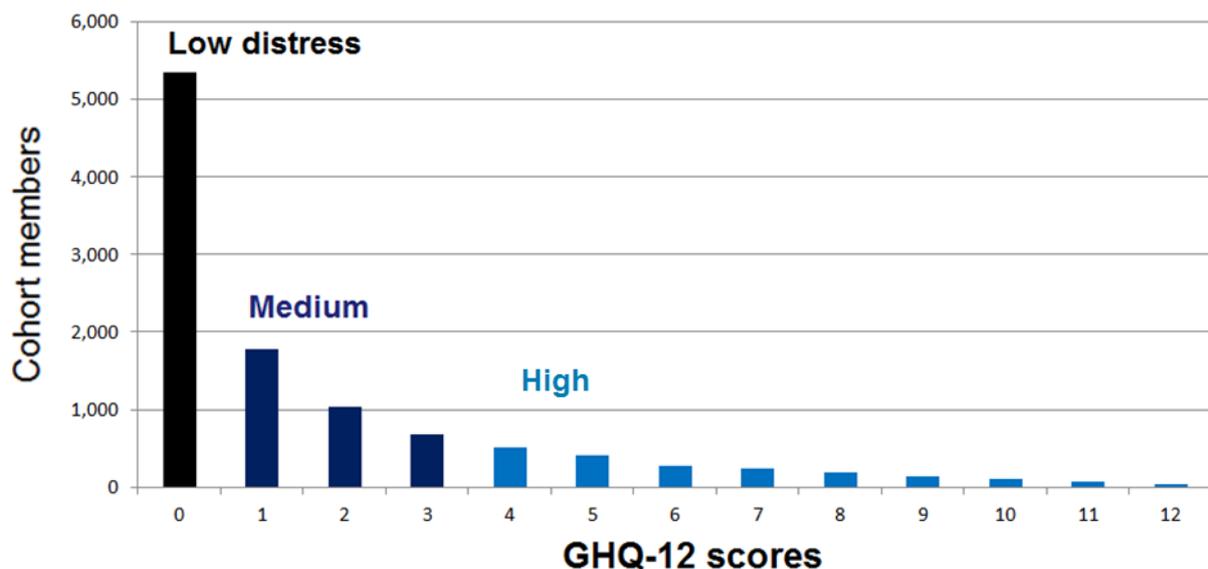
<http://discover.ukdataservice.ac.uk/>

Details of distress measurements

Longitudinal Study of Young People in England (Study 1)

The cohort members in the LSYPE completed the 12-item version of the General Health Questionnaire (Goldberg & Williams, 1988) when they were 14 years old. We do not list the GHQ items here because they are copyrighted. The four possible responses to each question were scored in the LSYPE in the form 0-0-1-1 for a maximum score of 12 where a higher score means worse mental health. Figure S1 describes the distribution of scores for this variable in the sample of 10,232 cohort members (Mean=1.69, SD=2.51).

Figure S1: Distribution of GHQ12 scores in Study 1 and the codings used to generate the categorical distress variable used in the main analysis.



National Child Development Study (Study 2)

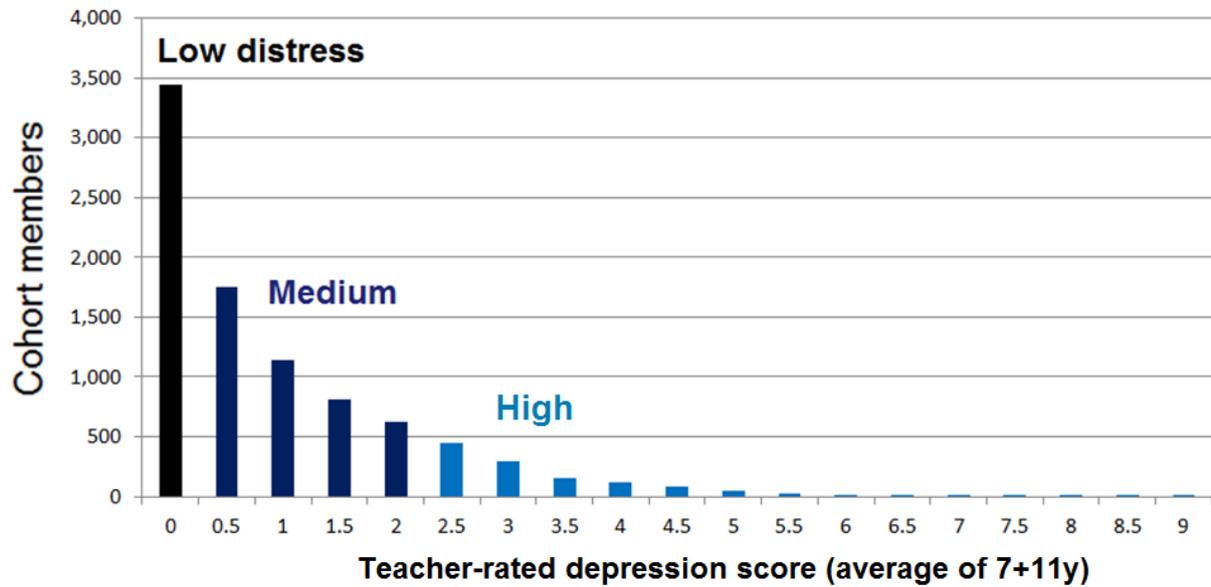
Childhood Distress

At ages 7 and 11 the cohort members were assigned a ‘depression’ score by their teacher based on questions from the depression subscale of the British Social Adjustment Guide. The teachers were given the list of phrases below and asked to underline the items they thought described the child’s behaviour or attitude. The underlined phrases were then summed to create the aggregate depression score.

1. Depends on how he feels (asking teacher's help).
2. Varies noticeably from day to day (persistence in class work).
3. Sometimes alert, sometimes lethargic in team games.
4. In free activity sometimes lacks interest.
5. Persistence in manual tasks varies greatly.
6. Impatient, loses temper with job (persistence - manual tasks).
7. Flies into a temper if provoked (physical prowess).
8. Can work alone but has no energy (persistence in class work).
9. Lacks physical energy (persistence manual tasks).
10. Has no life in him (class room behaviour).
11. Apathetic (just sits) (attentiveness).
12. Shuffles restlessly (posture).
13. In asking teacher's help too apathetic to bother.
14. Dull listless eyes.
15. Always sluggish, lethargic in team games.
16. Sometimes wanders off alone (companionship).
17. Speech is thick, mumbling, inaudible.
18. Expression is miserable, depressed (under the weather) seldom smiles.

To create our distress variable, we took the average of the two ‘depression’ scores. Although the maximum score possible is 18, we observe scores ranging from 0 to 9 in our working sample of 8,985 cohort members. Figure S2 describes the distribution of our composite variable (Mean=0.94, SD=1.18).

Figure S2: Distribution of distress scores in Study 2 and the codings used to generate the categorical distress variable used in the main regression analysis.



Adult Distress

At age 23 the NCDS cohort members were asked to complete the Malaise Inventory, comprised of 24 'yes-no' questions covering emotional disturbance and related physical symptoms (Rutter, Tizard & Whitmore, 1970). We focused on the 9 questions related to psychological functioning to create the adult distress variable (Cronbach's alpha = 0.70). Each 'yes' answer was given a score of 1 for a possible score range of 0-9 where a higher score indicated more psychological distress (M=1.24, SD=1.58)

Malaise Inventory

1. Feel tired most of the time
2. Often miserable or depressed
3. Often get worried about things
4. Often get into violent rage
5. Often suddenly become scared
6. Easily upset or irritated
7. Constantly keyed-up + jittery
8. Things get on your nerves
9. Heart often races like mad

Section 2: Descriptive statistics.

Table S1

Descriptive Statistics in the LSYPE by levels of childhood disress.

Distress	Low / None	Medium	High	All
N	5,100	3,301	1,831	10,232
Socio-demographics				
Female	41.8%	49.6%	66.3%	48.7%
<i>Parental SES</i>				
I (highest)	5.6%	6.3%	5.2%	5.7%
II	25.7%	27.8%	26.9%	26.6%
III	13.0%	14.1%	14.7%	13.7%
IV	6.1%	5.4%	4.8%	5.6%
V	8.7%	9.5%	8.0%	8.8%
VI	20.0%	18.2%	18.6%	19.2%
VII	11.1%	10.5%	12.0%	11.0%
VIII (lowest)	9.8%	8.2%	9.8%	9.4%
Employment activity				
Months of data	39.30 (10.65)	39.75 (10.22)	39.84 (10.08)	39.54 (10.41)
Months unemployed	3.05 (6.83)	3.14 (6.93)	3.57 (7.19)	3.17 (6.93)

Table S2

Descriptive Statistics in the NCDS by levels of childhood distress.

Distress	Low / None	Medium	High	All
N	3,441	4,337	1,207	8,985
Socio-demographics				
Intelligence (0-79)	50.37 (13.65)	42.32 (15.14)	32.70 (14.98)	44.11 (15.69)
Female	59.0%	45.9%	39.4%	50.0%
Self-Control (0-10.5)	10.00 (0.83)	8.91 (1.64)	7.94 (1.90)	9.20 (1.60)
<i>SES</i>				
I (highest)	5.1%	3.9%	1.7%	4.1%
II	15.9%	12.3%	8.8%	13.2%
III	61.4%	62.1%	60.6%	61.6%
IV	10.9%	12.5%	15.3%	12.3%
V (lowest)	6.7%	9.2%	13.6%	8.8%
Employment activity				
Months of data	61.9 (26.38)	68.26 (24.63)	73.47 (21.89)	66.54 (25.29)
Months unemployed	2.5 (5.82)	4.08 (8.97)	7.35 (13.87)	3.91 (8.95)
% months unemployed				
1974-79 (Pre-recession)	5.8%	6.3%	9.2%	6.5%
1980-82 (Post-recession)	7.6%	10.8%	16.4%	10.3%

Section 3: Supplementary regressions:
3a. Regressions using standardized distress variables.

LSYPE (Study 1)

In the main text we created a categorical distress variable derived from GHQ scores ranging from 0-12. Here we present analysis using a standardized variable derived from the same GHQ scores. Although this method does not account for the large differences in unemployment outcomes between those with Medium and High distress, the central finding of distress predicting unemployment remains robust, as described in Table S3. A 1 SD increase in distress significantly predicts an average 0.7 percentage point increase in unemployment during the 2006-10 period ($b = 0.007$, $SE = 0.002$, $p < 0.01$) and significantly higher total months unemployed ($b = 0.092$, $SE = 0.031$, $p < 0.01$).

Table S3

Regression of unemployment on standardized childhood psychological distress between ages 16 and 21 in the LSYPE sample (N=10,232).

Outcome variable	Monthly unemployment status ^a	Total months of unemployment ^b
Observations	404,556	10,232
Distress	0.007*** (0.002)	0.092*** (0.031)

Included in analyses but not shown are: gender, parental socioeconomic status (both columns) and month of observation (col. 1).

^a Regressions contain Probit Marginal Effects coefficients, clustered by id.

^b Regressions contain negative binomial coefficients.

Robust standard errors in parentheses.

*** $p < 0.01$

NCDS (Study 2)

Our test of the relationship between a continuous measure of distress and unemployment in Study 2 is described in Table S4. A 1 SD increase in distress significantly predicts a 1 percentage point increase in unemployment during the 1974-82 period ($b = 0.010$, $SE = 0.002$, $p < 0.01$) and significantly higher total months unemployed ($b = 0.181$, $SE = 0.029$, $p < 0.01$).

Table S4

Regression of unemployment on standardized childhood psychological distress between ages 16 and 23 in the NCDS sample (N=8,985).

Outcome variable	Monthly unemployment status ^a	Total months of unemployment ^b
Observations	597,858	8,985
Distress ^c	0.010*** (0.002)	0.181*** (0.029)

Included in analyses but not shown are: gender, parental socioeconomic status, childhood intelligence and self-control (both columns), and month of observation (col. 1).

^a Regressions contain Probit marginal effects coefficients, clustered by id.

^b Regressions contain negative binomial coefficients.

Robust standard errors in parentheses.

*** p<0.01

3b. Regressions using extended control variables.

LSYPE (Study 1)

Table S5 describes our extended LSYPE regressions using a range of childhood controls that may affect employment trajectories. These controls can broadly be grouped into (i) childhood environmental factors such as the number of siblings in the childhood home, whether English was the main language, parental marital status and whether the child had a disability and (ii) demographic measures such as race and region of birth. The distress coefficients do not substantially change following the addition of these controls.

Table S5

Regression of unemployment between ages 16 to 21 on childhood psychological distress in the LSYPE sample with extended controls (N=10,232).

Variable	Monthly unemployment status ^a	Monthly unemployment status fully adjusted ^a	Total months of unemployment ^b	Total months of unemployment fully adjusted ^b
Observations	404,556	394,197	10,232	9,964
Med.Distress ^c	0.005 (0.004)	0.006 (0.004)	0.065 (0.070)	0.087 (0.070)
High Distress ^c	0.020*** (0.005)	0.022*** (0.005)	0.265*** (0.086)	0.287*** (0.087)
Female	-0.030*** (0.003)	-0.029*** (0.003)	-0.346*** (0.063)	-0.341*** (0.064)
<i>Parental SES (base=I)</i>				
II ^d	0.007 (0.005)	0.003 (0.007)	0.112 (0.143)	0.058 (0.145)
III ^d	0.015** (0.006)	0.005 (0.007)	0.217 (0.154)	0.039 (0.161)
IV ^d	0.024*** (0.008)	0.011 (0.009)	0.353* (0.183)	0.114 (0.190)
V ^d	0.051*** (0.008)	0.034*** (0.009)	0.631*** (0.166)	0.404** (0.175)
VI ^d	0.036*** (0.006)	0.016** (0.007)	0.468*** (0.147)	0.198 (0.158)
VII ^d	0.069*** (0.008)	0.035*** (0.009)	0.774*** (0.159)	0.370** (0.172)
VIII ^d	0.086*** (0.009)	0.048*** (0.011)	0.910*** (0.164)	0.474** (0.187)
Time ^e	0.002*** (0.000)	0.002*** (0.000)	N/A N/A	N/A N/A
<i>Parents Education (base=Degree)</i>				
Higher ed. below degree		-0.001 (0.005)		-0.058 (0.109)
GCSE A-C / lower quals.		0.016*** (0.005)		0.161 (0.112)
No qualifications.		0.046*** (0.007)		0.415*** (0.132)
<i>Race (base=white)</i>				
Mixed		-0.007 (0.008)		-0.099 (0.150)
Indian		-0.044*** (0.006)		-0.661*** (0.141)
Pakistani		-0.014* (0.008)		-0.074 (0.173)

Variable	Monthly unemployment status ^a	Monthly unemployment status fully adjusted ^a	Total months of unemployment ^b	Total months of unemployment fully adjusted ^b
Observations	404,556	394,197	10,232	9,964
Bangladeshi		-0.032*** (0.009)		-0.309 (0.201)
Black Caribbean		-0.008 (0.010)		-0.088 (0.191)
Black African		-0.044*** (0.009)		-0.668*** (0.211)
Other		-0.038*** (0.010)		-0.403* (0.231)
<i>Childhood Home</i> (base # siblings = 0)				
1 Sibling		0.001 (0.005)		-0.005 (0.097)
2 Siblings		0.010* (0.005)		0.129 (0.106)
3 Siblings		0.039*** (0.007)		0.446*** (0.130)
4+ Siblings		0.041*** (0.009)		0.517*** (0.159)
English not main language		-0.013* (0.008)		-0.142 (0.140)
<i>Region (base=N. East)</i>				
North West		-0.012 (0.010)		-0.096 (0.163)
Yorkshire & Humber		-0.009 (0.010)		-0.078 (0.171)
East Midlands		-0.015 (0.010)		-0.161 (0.177)
West Midlands		-0.004 (0.010)		-0.002 (0.169)
East England		-0.019* (0.010)		-0.169 (0.171)
London		-0.023** (0.010)		-0.206 (0.169)
South East		-0.023** (0.009)		-0.217 (0.164)
South West		-0.028*** (0.010)		-0.338* (0.178)
<i>Parents' marital status</i> (base =married)				
Cohabiting		0.036*** (0.007)		0.443*** (0.122)
Lone father		0.030** (0.015)		0.229 (0.255)
Lone mother		0.047***		0.456***

No parents	(0.005) 0.087*** (0.023)	(0.082) 0.763** (0.352)
<i>Childhood disability</i> (base=none)		
Mild	-0.013** (0.005)	-0.094 (0.120)
Severe	0.065*** (0.010)	0.626*** (0.136)

^a Regressions contain Probit marginal effects coefficients, clustered by id.

^b Regressions contain negative binomial coefficients.

^c Base category is Low Distress = a GHQ score of 0; Medium Distress = GHQ scores 1-3; High Distress = 4+.

^d SES is derived from main parent's occupation where I = Higher managerial, administrative and professional occupations, II = Lower managerial, administrative and professional occupations, III = Intermediate occupations, IV = Small employers, V = Lower supervisory occupations, VI = Semi-routine occupations, VII = Routine occupations, VIII = Never worked and long-term unemployed.

^e Time tracks the 45 months between September 2006-May 2010.

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

NCDS (Study 2)

Table S6 describes our extended NCDS regressions using a diverse range of childhood controls that might influence employment trajectories. These controls can broadly be grouped into (i) adverse childhood experiences and mental health such as whether the childhood home had housing or financial difficulties, domestic tension or mental illness (ii) physical health such as low birth weight, headaches, epilepsy or psychiatric problems and (iii) demographics such as region of birth and race. The distress coefficients remain essentially unchanged following the addition of these controls.

Table S6

Regression of unemployment on childhood psychological distress between ages 16 and 23 in the NCDS sample with extended controls (N=8,985).

Variable	Monthly unemployment status ^a	Monthly unemployment status fully adjusted ^a	Total months of unemployment ^b	Total months of unemployment fully adjusted ^b
Observations	597,858	321,950	8,985	4,925
Med. Distress ^c	0.009*** (0.003)	0.009*** (0.003)	0.205*** (0.056)	0.229*** (0.075)
High Distress ^c	0.030*** (0.005)	0.027*** (0.006)	0.513*** (0.086)	0.568*** (0.119)
Female	0.011*** (0.003)	0.011*** (0.003)	-0.022 (0.051)	0.060 (0.070)
Intelligence ^d	-0.013*** (0.002)	-0.003 (0.002)	-0.215*** (0.027)	-0.068* (0.040)
Self-Control ^d	-0.010*** (0.001)	-0.006*** (0.002)	-0.178*** (0.031)	-0.147*** (0.045)
<i>Parental SES (base=I)</i>				
II ^e	-0.016** (0.008)	-0.013 (0.010)	-0.168 (0.140)	-0.071 (0.174)
III ^e	-0.010 (0.008)	-0.008 (0.009)	0.062 (0.128)	0.033 (0.160)
IV ^e	-0.000 (0.008)	-0.006 (0.010)	0.243* (0.143)	0.182 (0.184)
V ^e	0.026*** (0.009)	0.013 (0.011)	0.566*** (0.150)	0.483*** (0.198)
Time ^f	0.009*** (0.000)	0.008*** (0.001)	N/A N/A	N/A N/A
<i>Region (base=North)</i>				
North West		-0.003 (0.008)		-0.052 (0.144)
East & West Riding		-0.018** (0.008)		-0.371** (0.160)
North Midlands		-0.029*** (0.008)		-0.503*** (0.160)
Midlands		-0.017** (0.008)		-0.203 (0.152)
East		-0.036*** (0.007)		-0.848*** (0.162)
South East		-0.036*** (0.006)		-0.753*** (0.139)
South		-0.040*** (0.007)		-0.795*** (0.178)
South West		-0.026*** (0.008)		-0.343** (0.167)
Wales		0.002 (0.009)		-0.002 (0.174)

Scotland		0.002 (0.008)		-0.083 (0.143)
Variable	Monthly unemployment status ^a	Monthly unemployment status fully adjusted ^a	Total months of unemployment ^b	Total months of unemployment fully adjusted ^b
Observations	597,858	321,950	8,985	4,925
<i>Family difficulties (base=0)^g</i>				
1 difficulty		0.005 (0.005)		0.075 (0.105)
2-6 difficulties		0.015* (0.008)		0.071 (0.157)
Household size ^h		0.007*** (0.001)		0.147*** (0.026)
Father's age in 1958 (17-72)		0.001** (0.000)		0.013** (0.005)
Non-white race		-0.011 (0.015)		-0.142 (0.409)
Low birth weight (1= <88oz)		0.003 (0.007)		0.028 (0.160)
Psychiatric problems at age 11 (1=yes)		0.037*** (0.010)		0.653*** (0.211)
Headaches or epilepsy (1=frequent)		0.007 (0.005)		0.119 (0.117)
Mental retardation (1=yes)		0.004 (0.012)		0.055 (0.286)

^a Regressions contain Probit marginal effects coefficients, clustered by id.

^b Regressions contain negative binomial coefficients.

^c Base category is Low distress = a score of 0; Medium distress = distress scores 0.5-2; High distress = 2.5-9.

^d Intelligence and Self-Control are standardized. Intelligence was rated by a general ability test at age 10. Self-control was teacher rated at age 7 and 11.

^e SES is derived from the father's occupation where I = Higher admin, II = Managerial or technical occupations, III = skilled workers, IV = semi-skilled workers and V = Unskilled workers.

^f Time ranges from 1-93 and refers to the months between June 1974-Feb 1982.

^g Family Difficulties Scale is a composite measure which sums 9 dummy variables relating to whether the childhood home experienced housing, financial or other difficulties, domestic tension, alcoholism, physical handicap, unemployment, mental illness or the death of a parent.

^h Household size is coded 0 = 1-3, 1 = 4, 2 = 5, 3 = 6, 4 = 7, 5 = 8+.

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

3c. Regressions excluding all inactive participants in Study 1.

LSYPE (Study 1)

Table S7 describes regressions in the LSYPE using single wave outcome variables drawn from waves 4-7. These variables, shown in columns 1-4, are coded 0 = in employment, education or training and 1 = unemployment. They therefore exclude completely from the analysis the small number of inactives present in the main regressions (see Table 1), which use an unemployment variable derived from the monthly NEET data.

On average, high distress in the four waves (cols. 1-4) is associated with a 2 pct point higher probability of unemployment, which matches the 2 pct points higher probability in the main data (col. 5).

Table S7

Regression of unemployment (excluding those of inactive status in cols. 1-4, including inactives in col. 5) on childhood psychological distress between ages 16 and 21 in the LSYPE sample.

Wave	Wave 4 ^a	Wave 5 ^a	Wave 6 ^a	Wave 7 ^a	All waves ^a
Observations	10,109	8,831	7,217	7,217	404,556
Wave	Wave 4	Wave 5	Wave 6	Wave 7	All waves
Med. Distress	-0.001 (0.005)	-0.002 (0.005)	0.005 (0.006)	0.005 (0.006)	0.005 (0.004)
High Distress	0.009 (0.006)	0.016** (0.008)	0.027*** (0.009)	0.027*** (0.009)	0.020*** (0.005)

Included in analyses but not shown are: gender, parental socioeconomic status (all columns) and month of observation (col. 5).

^a Regressions contain Probit marginal effects coefficients, clustered by id.

*** p<0.01, ** p<0.05

SECTION 4

Extended analysis of the interaction between psychological distress and the 1980s UK recession in Study 2.

In the main text, we discuss the interaction of childhood psychological distress and the beginning of the 1980s UK recession in order to investigate whether those with poor mental health were disproportionately more likely to become unemployed during this time. Due to space constraints we omitted some detail which is now provided here.

The NCDS data tracks the monthly employment status of participants for an eight-year period from school-leaving past the onset of the 1980s recession. In contrast to Study 1, the NCDS cohort experienced a recession several years after finishing secondary education so we avoid the problem of separating the effects of school leaving and economic recession on unemployment. In order to determine whether those with high childhood distress were more likely to become unemployed after the recession began, we first examined raw descriptive

unemployment statistics before and after the recession began in January 1980. In the pre-recession period (June 1974 – December 1979) the high distress group had an average unemployment rate of 8.3 per cent compared to 4.9 per cent for the medium group and 3.2 per cent for the low distress group. In the post-recession period (January 1980 – February 1982) these rates rose to 15 per cent, 8.9 per cent and 5.9 per cent respectively. This means the unemployment gap between the high and low group increased by 78 per cent after the recession began (from a 5.1 point gap to a 9.1 point gap).

We then specified an OLS regression using the form described in Model 5 and found a significant negative interaction for the high distress variable with our recession dummy ($b = 0.036$, $SE = 0.008$, $p < 0.01$), described in Table S8, column 2.

Table S8

Regression of unemployment on childhood psychological distress interacting with the 1980 economic recession in the NCDS sample (N=8,985).

Variable	Monthly unemployment status ^a	Monthly unemployment status ^a
Observations	597,858	597,858
Med. Distress ^b	0.006** (0.003)	0.002 (0.003)
High Distress ^b	0.031*** (0.006)	0.022*** (0.005)
Recession ^c		0.015*** (0.003)
Med. Distress*Recession		0.013*** (0.004)
High Distress*Recession		0.036*** (0.008)

Included in analyses but not shown are: gender, parental socioeconomic status, childhood intelligence and self-control and month of observation.

^a Regressions contain OLS coefficients, clustered by id.

^b Base category is Low distress = a score of 0; Medium distress = Distress scores 0.5-2; High Distress = 2.5-9.

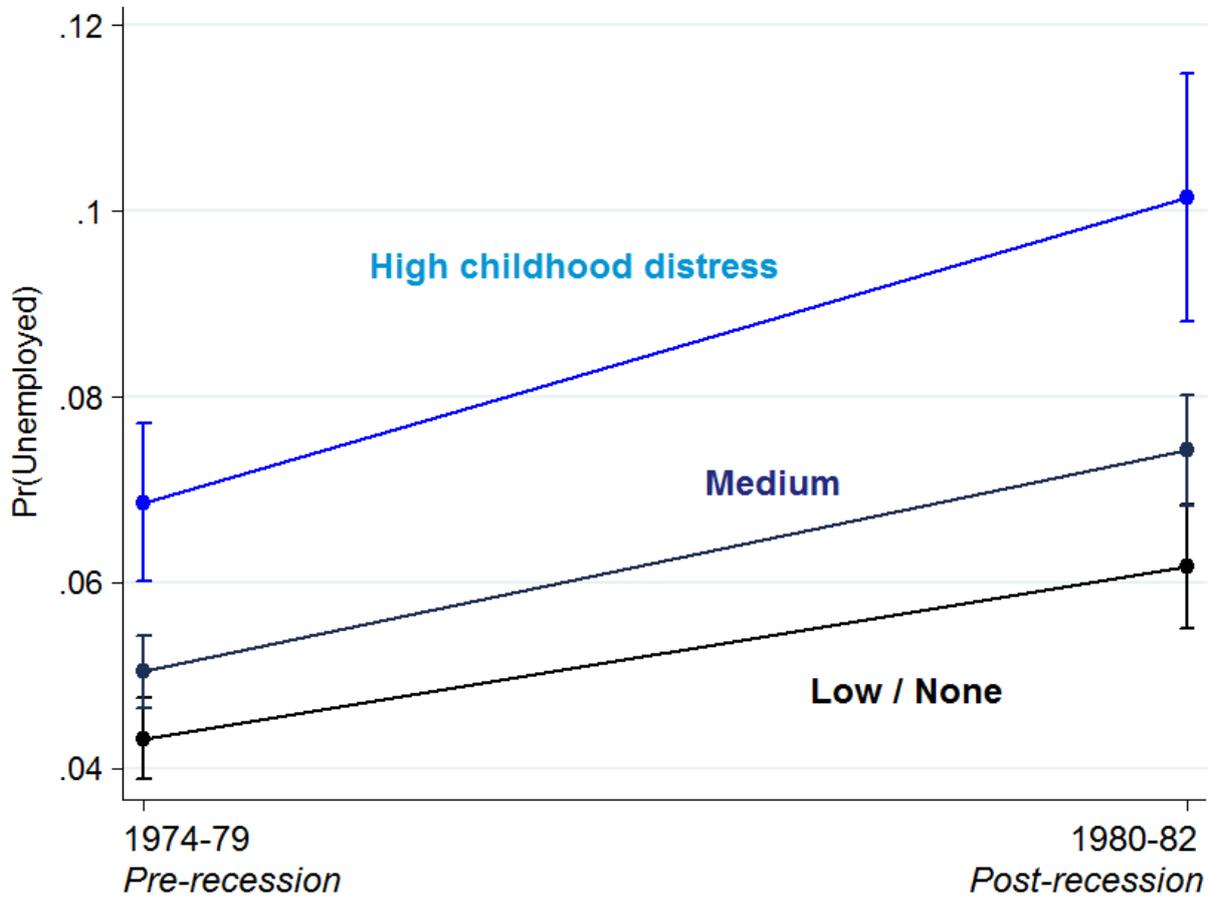
^c Recession is a dummy where 0 = June 1974 – December 1979 and 1 = January 1980 – February 1982.

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$

Lastly, we examined this interaction using the Probit specification in Model 5, the predictive margins of which are visualized in Figure S3. The average predicted probability of unemployment for the low distress group rose from 4.3 per cent in the pre-recession period to 6.2 per cent in the post-recession period, whereas the probability of unemployment for the high group increased from 6.9 per cent to 10.1 per cent. The unemployment gap between the high and low distress groups therefore increased by 50 per cent (from a 2.6 point gap to a 3.9 point gap) after controlling for our covariates, indicating that the high distress group were disproportionately more likely to be unemployed after the recession began.

Figure S3: Predictive margins with 95% CIs examining the probability of unemployment in Study 2 for different levels of distress in the pre- (June 1974 – December 1979) and post-recession (January 1980 – February 1982) period. These figures were produced using the margins command after a Probit regression of the specification in Model 5, holding covariates at their specified values.



References

Goldberg, D., & Williams, P. (1988). *A user's guide to the General Health Questionnaire* (1st ed.). NFER-NELSON.

Rutter, M., Tizard, J. & Whitmore, K. (1970). *Education, Health and Behaviour*. London: Longman.