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Adolescent psychological distress, unemployment, and the Great Recession: Evidence from the National Longitudinal Study of Youth 1997

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ABSTRACT

Rationale: Several studies have shown a link between psychological distress in early life and subsequent higher unemployment, but none have used sibling models to account for the unobserved family background characteristics which may explain the relationship.
Objective: This paper uses the National Longitudinal Study of Youth 1997 data to examine whether adolescent psychological distress in 2000 predicts higher unemployment over 2000–11, whether this relationship changed in the period following the Great Recession, and whether it is robust to adjustment for family effects.
Methods: 7125 cohort members (2986 siblings) self-reported their mental health in 2000 and employment activities over 2000–11. This association was examined using Probit and ordinary least squares regressions controlling for intelligence, physical health, other sociodemographic characteristics and family background.
Results: After adjustment for covariates and compared to those with low distress, highly distressed adolescents were 2.7 percentage points (32%) more likely to be unemployed, 5.1 points (26%) more likely to be unemployed or out of the labor force and experienced 11 weeks (28%) more unemployment. The impact of high distress was similar to a one standard deviation decrease in intelligence, and double the magnitude of having a serious physical health problem, and these estimates were robust to adjustment for family fixed-effects. The highly distressed were also disproportionately more likely to become unemployed or exit the labor force in the years following the Great Recession.
Conclusion: These findings provide strong evidence of the unemployment penalty of early-life psychological distress and suggest that this relationship may be intensified during economic recessions. Investing in mental health in early life may be an effective way to reduce unemployment.

1. Introduction

The unemployed consistently report worse mental health than the employed (Paul and Moser, 2009). Unemployment has adverse mental health consequences. However, it remains unclear whether pre-adulthood mental health leads to success in avoiding unemployment. Psychological distress, as indexed by low mood, anxiety, neuroticism, depression and psychiatric conditions, has been shown to predict worse employment prospects in longitudinal studies following both adults (Chatterji et al., 2007; Ettner et al., 1997; Layard, 2013; Uysal and Pohlmeier, 2011) and children and adolescents for several years and even decades (Egan et al., 2015; Fergusson et al., 2007; Goodman et al., 2011). While these studies typically adjust for important potential confounding variables such as parental socioeconomic status and intelligence, they have not been able to rule out the possibility that unobserved family background characteristics explain the relationship between mental health and subsequent unemployment.

A smaller set of studies have attempted to isolate the link between early life mental health and labor market outcomes by comparing the outcomes of siblings and twins, an analytic strategy which accounts for a large portion of unobserved heterogeneity by capturing unmeasured factors within the family and/or

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neighborhood environment. Smith and Smith (2010) showed that siblings who recalled having had childhood psychological problems went on to work seven fewer weeks on average in adulthood than their siblings who did not recall such problems. Currie et al. (2010) found that children diagnosed as having attention deficit hyperactivity disorder (ADHD) or conduct disorders before the age of 18 were 10 percentage points more likely to receive social assistance as adults. Fletcher (2013) found that differences in depression levels in grades 7–12 predicted 7–8 percentage points lower employment when participants were aged 30 on average, reducing to a non-significant 5 points when controlling for family fixed-effects. Finally, Lundborg et al. (2014) used data on Swedish males born between 1950 and 1970 to show that mental health conditions at 18–19 years of age strongly predicted within family variation in employment in 2003.

Whilst this literature has examined broad outcomes such as social assistance (Currie et al., 2010) and employment (Fletcher, 2013; Lundborg et al., 2014; Smith and Smith, 2010), no studies have utilized sibling models to examine unemployment specifically as an outcome. Those studies which have examined employment have derived their outcome measures as a function of earnings (e.g., creating a binary employment variable where 1 = positive earnings) or examined the total number of weeks worked in a year. This approach does not uniquely categorize the unemployed, nor adequately distinguish between those who are unemployed versus out of the labor force, making precise comparisons between the employed and unemployed difficult. Additionally, all four of these studies examined the labor market outcome only at a single point in time and before unemployment rates increased dramatically around the world as the Great Recession began to affect global labor markets in 2008–09.

This paper adds to this literature by using the National Longitudinal Study of Youth 1997 (NLSY97) data from the United States to examine whether adolescent psychological distress in 2000 predicts greater unemployment over 2000–2011 while using sibling fixed-effects analysis to isolate the link between mental health and unemployment. It makes three main contributions. First, it examines unemployment specifically as an outcome. Second, it uses the extremely rich weekly employment history data in the NLSY97 to examine unemployment trends continuously over a 12-year period. Our analytic strategy therefore allows for a precise delineation of the effect of psychological distress during the important transition from education into the labor force. Third, the time period observed (2000–2011) allows for an examination of whether the employment penalty of psychological distress intensified following the Great Recession.

2. Data and method

2.1. Participants and procedure

Participants were from the NLSY97, a nationally-representative cohort from the United States of 8984 individuals (including 3855 siblings) born in 1980–1984 and interviewed in person or via telephone on an annual basis since 1997. During these interviews the cohort members were asked to describe their recent employment history in detail. These variables were used to examine the relationship between the cohort members' mental health in 2000 and their self-reported weekly employment histories from January 2000 to December 2011. Sibling fixed-effects analysis was used to examine this relationship while accounting for unobserved family background characteristics. Difference-in-difference analyses were used to test whether those with poor mental health were more likely to become unemployed or exit the labor force (UOLF) after the onset of the Great Recession. The main analysis used a maximum sample of 4,002,558 observations for 7125 cohort members and the sibling analysis used a maximum sample of 1,684,984 observations for 2986 cohort members.

2.2. Measures

2.2.1. Mental health

Table S1 and Figure S1 describe the mental health variable used in our analysis (see Supplementary Materials, Section 1). The NLSY97 evaluates the cohort members' mental health using the 5-item version of the Mental Health Inventory (MHI-5; Berwick et al., 1991), an established predictor of depression and anxiety disorders (Rumpf et al., 2001), which has been validated for use with adolescents (Ostroff et al., 1996). When the cohort members were aged 16–20 in 2000, they were asked to rate on a four-point scale from 'none of the time' to 'all of the time' how often they felt "nervous/calm and peaceful/down or blue/happy/depressed" over the previous month. In order to create the main independent variable, these answers were coded so that a higher score indicated worse mental health, and were then summed (Cronbach's $\alpha = 0.77$) to create a composite mental health variable with a score range of 0–15 (Mean [*M*] = 4.7, standard deviation [*SD*] = 2.5). Because there is not a single validated cut-off score for the MHI-5 (Kelly et al., 2008), our analysis followed the approach of Evans-Lacko et al. (2013) and classified those individuals scoring at least 1 *SD* above the mean MHI-5 score as experiencing high levels of distress (corresponding to 942 cohort members out of 7125). Henceforth those scoring below this cut-off point are referred to as having 'low distress' and those above as having 'high distress'. The proportion of cohort members defined as having high distress using this cut-off (13%) is similar to recent estimates of the 12-month prevalence of a major depressive episode among American 16–17 year olds (11.4%) and the proportion of 18–25 year olds having any diagnosable mental illness in the past year (19.6%) (National Institute of Mental Health, 2015).

Although the MHI-5 has been administered to the cohort members every two years since 2000, our analysis used only the initial measure as our main independent variable. Our aim is to evaluate the cohort members' mental health before they have accumulated significant experience in the labor market. Using a measure of mental health elicited in adolescence should mean that labor market experiences (such as prolonged unemployment) have not yet substantially affected the mental health of the cohort members. This assumption was tested in sensitivity analyses, described in Section 4 of the Supplementary Materials, which found that our results were not substantially affected by excluding cohort members who had experienced unemployment before the mental health measure was elicited in 2000.

2.2.2. Employment outcomes

There were three outcome variables. The first was a binary variable tracking employment status over 626 weeks (January 2000–December 2011), coded as 0 if the cohort member was in full- or part-time employment, and coded as 1 if they were unemployed. This variable was used to estimate the average probability of unemployment over the 12 years surveyed. Second, a variable measuring disengagement from employment more broadly was coded as 0 for the employed and coded as 1 if the cohort member was unemployed or out of the labor force (i.e., UOLF), the latter category including those in education, homemakers, the disabled or any other non-employment status. Finally, a continuous variable measuring total weeks of unemployment over 2000–2011, was created by summing the weekly unemployment variables ($M = 40.6$, $SD = 52.6$, range = 0–449). For this measure, 54% of cohort members reported 6 months or less of

unemployment, 19% reported 6–12 months, 16% reported 12–24 months and 11% reported 24 or more months.

2.2.3. Covariates

The main covariates were gender, age, socioeconomic status, intelligence, physical health, race, and a time variable. The sample was 49% female and around 1400 cohort members were born in each year of 1980–1984. Age was measured by month of birth (ranging from January 1980 to December 1984). As a proxy for the cohort members' initial socioeconomic status (SES), the resident mother's completed years of education was used. This ranged from first grade to eight or more years of college. If cohort members were missing data for this variable, the resident father's years of education was used in order to maximize sample size. The correlation between the resident mothers' and resident fathers' years of education was 0.66 ($p < 0.001$; $N = 5704$), indicating a reasonable degree of substitutability. Intelligence was measured in 1997 using the computer adaptive Armed Services Vocational Aptitude Battery (ASVAB) which combines math and verbal scores from four key subtests (Mathematical Knowledge, Arithmetic Reasoning, Word Knowledge, and Paragraph Comprehension); this measure was standardized. Poor physical health in early life is a particularly important control variable since this could plausibly lead to both poor mental health and unemployment. Including this measure also allows for a comparison of the relative employment penalties of poor mental health vs. physical health. This binary measure was coded as 1 if a parent stated in 1997 that the cohort member had any one of 10 serious physical conditions: asthma, a heart condition, anemia, diabetes, cancer, epilepsy, infectious disease, kidney problems, allergies or a category for other conditions (10.9% of the sample had at least one condition). A categorical variable was created for the four racial groups (the sample was 53% White, 26% Black, 20% Hispanic, and 1% Mixed Race). Finally, a yearly time variable was included to take into account changing macroeconomic conditions over the 12 years surveyed.

After dropping 1865 cohort members who were missing data on either the mental or physical health variables, the remaining 7125 cohort members had modest amounts of missing data for the SES and intelligence variables (6% and 17%, respectively). Values for these two variables were imputed using a predictive mean matching approach, described in Section 2 of the Supplementary Materials.

2.2.4. Education as a pathway between distress and unemployment

Given that prior research has demonstrated that poor mental health predicts worse academic performance (Currie and Stabile, 2009; Fletcher, 2010), our analysis tested whether different levels of educational attainment could explain the relationship between mental health and unemployment in the NLSY97 sample. A measure of the cohort members' educational attainment, elicited as of the latest wave, was coded as 0 = No degree (10% of a sample of 7108 reporting education data), 1 = General Educational Development qualification (GED) (12%), 2 = High school (45%), 3 = Junior/Associate College (7%) and 4 = Undergraduate degree or higher (26%). If the inclusion of the education variable in our regressions markedly diminished the distress coefficients, this would suggest that different levels of educational attainment operated as a pathway between mental health and unemployment.

2.2.5. Recession

The National Bureau of Economic Research dates the Great Recession in the United States as beginning in December 2007 and ending in June 2009 (NBER, 2010). However, this window does not fully capture the lagged post-recession increase in unemployment rates and the persistently high subsequent unemployment rates experienced by young people. In the NLSY97 sample, the unemployment rate only rose significantly at the start of 2009 and remained high until the end of the data-range in December 2011. In order to examine whether the post-recession increase in unemployment disproportionately affected those with poor mental health, difference-in-difference analysis was used to examine average unemployment rates by levels of mental health before and after the sharp increase in unemployment in 2009. Difference-in-difference analyses rely on the assumption of parallel trends between different groups prior to some external shock. In the context of the current study, this methodology is suitable given that there is a relatively consistent difference in unemployment levels of around 3 percentage points between those with low and high distress during 2006–2008, a period when much of the sample was transitioning from education into the labor force or had already completed the transition. Comparing average unemployment rates for these two groups in 2006–08 versus 2009–2011 will show whether the post-recession unemployment increase was disproportionately larger for those with high distress. Our analysis tested this by interacting a binary recession variable (0 = January 2006 – December 2008, 1 = January 2009 – December 2011) with the mental health measure.

2.2.6. Siblings

Despite the presence of the control variables described above, it is possible, even likely, that our models omit important "third" variables which may influence both mental health and unemployment. To address the possibility that unmeasured family background factors may explain the link between adolescent distress and unemployment, our main analyses was complemented with sibling fixed-effects models. The sibling analyses omitted half-siblings since they were more likely to have different family backgrounds for at least part of their childhood, which sibling fixed-effects analysis would not adequately adjust for. The sibling analysis therefore contains only full brothers and sisters. Across sibling models are statistically identical to including a dummy variable for each family. By comparing the outcomes of siblings, these models control for stable, unobserved family-specific characteristics that differ between but not within families. In addition, the portion of genetic variation that is shared between siblings is adjusted for (i.e. 50% common variation shared by full siblings), providing a partial control for genetic endowment. This analysis can clarify whether factors common to the siblings, such as growing up in a high-crime neighborhood, having parents with mental health or substance abuse problems, having negligent parents or a disruptive childhood environment, may have been the ultimate cause of both distress and unemployment, rather than distress leading to unemployment *per se*. If the inclusion of family fixed-effects markedly reduced the distress coefficients in our regressions, this would indicate that the relationship between distress and unemployment was confounded by common unobserved family effects which correlate with both distress and unemployment. The limitations of the sibling fixed-effects approach are described in Section 3 of the Supplementary Materials.

2.2.7. Statistical methods

Probit models were specified to estimate the association between high distress in 2000 and the week-by-week probability of unemployment/UOLF over 2000–11 (*Model 1*). Marginal effects were calculated for these models in order to present the results more intuitively (Long and Freese, 2014). Ordinary least squares (OLS) regressions were specified to estimate the total number of weeks unemployed from 2000 to 11 (*Model 2*) and a difference-in-difference Probit model was specified to examine whether highly distressed cohort members were disproportionately more likely to

become unemployed/UOLF in the years following the recession (*Model 3*). This latter model used the margins command in Stata (Long and Freese, 2014) to estimate the average predicted probability of the outcome by levels of distress in 2006–2008 (pre-recession) and 2009–11 (post-recession). Standard errors were clustered by individual in Models 1 and 3 to account for repeated observations of the same individual. All models controlled for gender, intelligence, parental education, physical health problems, race and age. For sibling fixed-effects analysis, Models 1 and 2 were re-run with a set of (n-1) family-specific dummy variables included in the regressions, where n was the total number of families with complete data on the outcome variable and all covariates. The formal specification of the models is detailed below, where the subscript i indicates the individual and t indicates time:

$$\text{Model 1}: (\text{Unemployed/UOLF})_{it} = \text{b0} + \text{b1 Psychological Distress}_i + \sum \text{b2 Controls}_i + \text{b3 Year}_t + \varepsilon_{it}$$

$$\text{Model 2}: \text{Total Weeks Unemployed}_i = \text{b0} + \text{b1 Psychological Distress}_i + \sum \text{b2 Controls}_i + \varepsilon_i$$

$$\text{Model 3}: (\text{Unemployed/UOLF})_{it} = \text{b0} + \text{b1 Psychological Distress}_i + \sum \text{b2 Controls}_i + \text{b3 Recession}_t + \text{b4 Psychological Distress}_i \times \text{Recession}_t + \varepsilon_{it}$$

where

$$\text{b4} = \left[\left(\widehat{Y}_{postrecession,high\ distress} - \widehat{Y}_{postrecession,low\ distress}\right) - \left(\widehat{Y}_{prerecession,high\ distress} - \widehat{Y}_{prerecession,low\ distress}\right)\right]$$

3. Results

3.1. Descriptive statistics

Table 1 and Fig. 1 show descriptive statistics. Females had worse mental health than males (Females = 5.15, Males = 4.20; $t = -16.0$, $p < 0.0001$), in line with much of the literature. Compared to the low distress group, the highly distressed were more likely to be female (61.7% vs. 47.0%), supporting the rationale for gender controls in our model. The highly distressed also had lower intelligence scores (39.7 vs. 47.3), were more likely to report their parent having fewer than 12 years of education (28.9% vs. 20.5%) and were more likely to report having no high school degree or a GED qualification (30.6% vs. 20.2%). These patterns of lower parental education and intelligence scores among young people with high distress correspond to prior research using American data (Fletcher, 2010, 2013) and underscore the importance of including both variables as covariates when examining the link between psychological problems and later economic outcomes (Daly, 2011).

Employment statistics also varied considerably as a function of psychological distress. Over 2000–2011 the highly distressed had a higher average unemployment rate than the low distress group (16.0% vs. 10.9%), a higher out-of-labor-force (OLF) rate (30.6% vs. 24.7%), and spent more weeks unemployed (52.8 vs 38.7 weeks). Fig. 1 shows graphically that the highly distressed experienced consistently higher rates of unemployment/OLF over 2000–2011 and that these differences were exacerbated in 2009 when the Great Recession began to affect the labor market. From 2008 to 2009, the highly distressed experienced almost twice as large a drop in employment rate as the low distress group (5.8 vs 3.0 percentage points). Finally, the sibling sample did not substantially differ from the general sample on the basis of observed characteristics.

3.2. Regressions

Fig. 2 summarizes our main results, which are further detailed in Table S2 (main regressions) and Table S3 (sibling fixed-effects regressions) (see Supplementary Materials, Section 5). After adjustment for covariates and compared to those with low distress, high distress in 2000 was associated with a 2.7 percentage point (95% confidence interval [*CI*] = 2.0 to 3.5 points) higher probability of unemployment over 2000–11, a 5.1 point (95% *CI* = 3.5 to 6.8) higher probability of UOLF and 11 weeks (95% *CI* = 9.4 to 12.8) more unemployment. In percentage terms, high distress predicted a 32% higher probability of unemployment, a 28% higher probability of UOLF, and 28% more weeks of unemployment. The effect of high distress on all three outcomes was similar in magnitude to a one *SD* decrease in intelligence and around double the magnitude of having a physical health condition. High distress remained an important predictor of unemployment even after adjusting for family fixed-effects, indicating that the association between distress and unemployment was not confounded by unobserved shared family characteristics (see Fig. 2). In other words, when comparing only the outcomes of siblings, a sibling with high distress was predicted to experience substantially more unemployment on average than a sibling with low distress.

Across the three outcomes, adjusting for educational attainment reduced the distress coefficient by 20% without altering significance levels, indicating that different levels of education only partly explained why the highly distressed experienced more unemployment (see Table S2). Regressions stratified by gender (Table S5) and educational attainment (Tables S6a-c) found that high distress predicted higher unemployment for both men and women, and for both university graduates and those with no educational attainment (Supplementary Materials, Section 6).

Fig. 3 and Table S4 show our difference-in-difference results. Comparing 2006–08 to 2009–11, the average probability of unemployment for the group with low distress (high distress) rose from 6.4% to 10.2% (8.4%–13.6%). The difference in average unemployment level between these groups therefore increased by 1.5 percentage points (a 79% increase from a 1.9 to 3.5 point gap) ($p = 0.07$). Over the same periods, the average predicted probability of UOLF for the group with low distress (high distress) rose from 21.7% to 24.8% (26.0%–31.5%). The difference in average UOLF rate between these groups therefore increased by 2.5 percentage points (a 60% increase from a 4.2 to 6.7 point gap) ($p = 0.02$). These effects were partly driven by the least educated cohort members, who had disproportionately high rates of distress, being more likely to exit employment after 2009 (see Table S4).

4. Discussion

This study found that NLSY97 cohort members classified as having high distress in 2000 were significantly more likely to experience unemployment over the subsequent decade; these effects were similar to a one *SD* decrease in intelligence and double the magnitude of having a serious physical health condition. Notably, the unemployment effects were robust to adjustment for

Table 1
Descriptive statistics of the National Longitudinal Study of Youth 1997 (unweighted).

Socio-demographics	Group			
	Full sample ($N = 7125$)	Low distress ($N = 6183$)	High distress ($N = 942$)	Sibling sample ($N = 2986$)
Female	48.9%	47.0%	61.7%	48.1%
Race				
White	52.8%	53.7%	47.1%	51.1%
Black	26.6%	26.2%	29.1%	26.1%
Hispanic	19.7%	19.2%	23.3%	22.0%
Mixed	0.9%	0.9%	0.5%	0.8%
MHI-5 (0–15)[a]	4.67 (2.53)	3.96 (1.82)	9.28 (1.49)	4.72 (2.54)
Intelligence (0–100)[b]	46.3 (29.4)	47.3 (29.3)	39.7 (29.3)	43.9 (29.6)
Physical health problems[c]	10.9%	10.8%	11.6%	9.7%
Month of birth (1–60)[d]	31.4 (17.1)	31.4 (17.0)	31.4 (17.7)	31.2 (17.2)
Parental education				
1–11 years	21.6%	20.5%	28.9%	25.4%
12 years	34.9%	35.3%	32.3%	34.5%
13–20 years	43.5%	44.2%	38.8%	40.1%
Degree[e]				
None	9.9%	9.1%	14.4%	11.7%
GED	11.8%	11.1%	16.2%	12.4%
High school	45.3%	45.6%	43.8%	45.1%
Junior college	7.0%	7.1%	6.7%	6.9%
College degree	26.0%	27.1%	18.9%	23.9%
Employment activity (2000–11)[f]				
Employment rate	69.7%	70.6%	63.6%	68.7%
Unemployment rate	11.6%	10.9%	16.0%	12.2%
OLF rate	25.5%	24.7%	30.6%	26.6%
Weeks unemployed	40.6 (52.6)	38.7 (51.2)	52.8 (60.0)	41.6 (54.2)

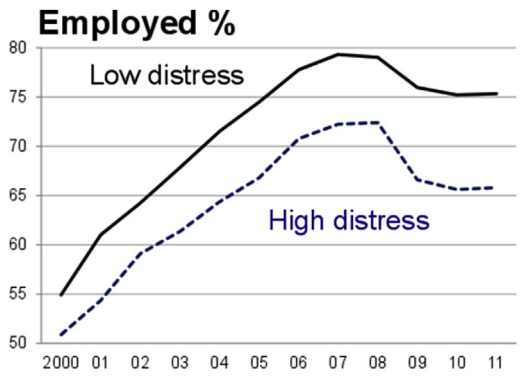
Note. Descriptive statistics are *M*ean (Standard Deviation) or Frequencies (%). The intelligence and parental education variables are missing data for 1193 and 411 out of 7125 cohort members, respectively.
Abbr. GED = General Educational Development qualification. MHI-5 = Mental Health Inventory. OLF = Out of the labor force.
[a] Higher scores indicate worse mental health.
[b] Unstandardized intelligence scores divided by 1000.
[c] Physical health problems were defined as having any one of 10 of 10 chronic conditions in 1997, including diabetes, cancer and asthma.
[d] Month of birth: 1 = January 1980, 60 = December 1984.
[e] Degree elicited as of the latest wave.
[f] Rates of employment, unemployment and OLF are averaged over 2000–11. Employed is coded as 0 = Unemployed/OLF, 1 = Employed; the number of weeks unemployed ranged from 0 to 449.

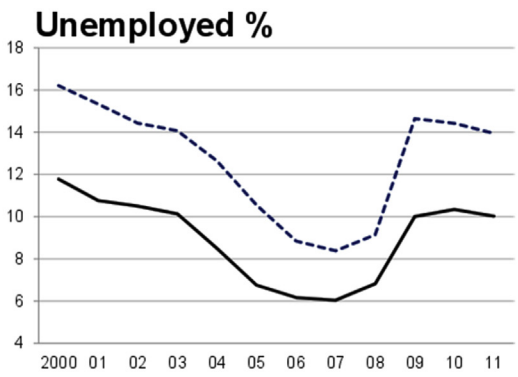
family fixed-effects. This ability to exploit sibling clusters to control for family background represents a major strength of this study given that there are many plausible unobserved background characteristics (such as an adverse childhood environment or parental mental health problems) which could be the "true cause" of the association between distress and unemployment. The fact that distress remains an important predictor of unemployment even when comparing the outcomes of siblings, while not conclusively demonstrating causality, does show that the relationship is robust to controlling for a substantial portion of potential omitted-variable bias.

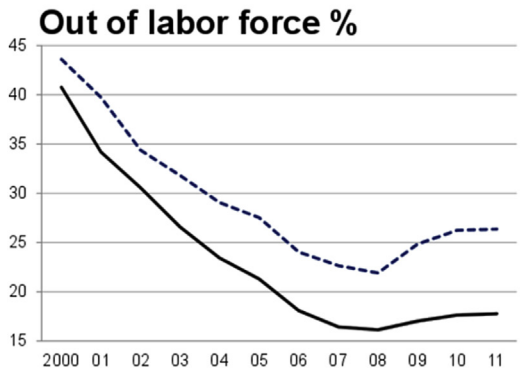
There are several reasons why early psychological distress may lead to lower employment later in life. Persistent distress may lead to less effective engagement during a person's school years, culminating in reduced educational attainment limiting future employment opportunities (Currie and Stabile, 2009; Fletcher, 2010). However, our supplementary analyses showed that controls for educational attainment could only explain a relatively small portion (approximately 20%) of the link between distress and variation in unemployment outcomes. Whilst work performance was not observed in the current study, it remains possible that anxiety and depression could have directly impaired job performance (Lerner and Henke, 2008) and work attendance (Lagerveld et al., 2010; Störmer and Fahr, 2013), leading to less positive evaluations by employers and adversely affecting job retention. Furthermore, entry into employment may also be impaired given that job search, a psychologically demanding process requiring reserves of perseverance, motivation and self-esteem, may be particularly challenging for highly distressed individuals. Finally, employers may be biased against hiring or accommodating employees with mental health issues (Scheid, 1999). These factors may be intensified by the existence of stigma related to mental health issues, low awareness of available treatments and relatively limited treatment facilities compared to those available for physical health (Layard, 2013).

A test of unemployment trends after the onset of the Great Recession found that the highly distressed were 60% more likely than those with low distress to become unemployed or exit the labor force (i.e., UOLF) in 2009–11 compared to 2006–08. This effect was partly driven by sharply increasing unemployment rates among the least educated cohort members, who also reported the highest rate of distress. This finding expands upon previous work which found that highly distressed children were later disproportionately more likely to become unemployed after the 1980 UK recession (Egan et al., 2015) and suggests that distress may be a risk factor for unemployment during recessions more generally. The rise in the reported frequency of mental health disorders among the unemployed in Europe after the Great Recession (e.g., Evans-Lacko et al., 2013) may therefore be partly due to more distressed individuals having been more likely to become unemployed, rather than unemployment worsening the mental health of previously healthy individuals.

These findings contribute to three literatures. First, while there is abundant evidence that unemployment can worsen mental health (Paul and Moser, 2009), this study provides evidence in the other direction, by using a mental health measure elicited before the cohort members had been exposed to prolonged unemployment. Second, economic downturns are typically accompanied by







	Employed %		Unemployed %		OLF %	
	Distress		Distress		Distress	
	Low	High	Low	High	Low	High
2000	54.9	50.9	11.8	16.2	40.7	43.6
2001	61.0	54.3	10.8	15.3	34.2	39.7
2002	64.2	59.1	10.5	14.4	30.5	34.4
2003	67.8	61.3	10.1	14.1	26.6	31.8
2004	71.5	64.3	8.5	12.6	23.4	29.0
2005	74.5	66.8	6.7	10.6	21.3	27.5
2006	77.7	70.8	6.2	8.8	18.1	24.0
2007	79.3	72.2	6.0	8.4	16.4	22.7
2008	79.0	72.4	6.8	9.1	16.1	21.9
2009	76.0	66.6	10.0	14.6	17.0	24.8
2010	75.2	65.6	10.3	14.4	17.6	26.2
2011	75.3	65.8	10.0	13.9	17.8	26.4

Fig. 1. Descriptive statistics (unweighted) showing the labor force status of the cohort members over 2000–11 ($N = 7125$) by the level of psychological distress measured in 2000 (High = ≥1 standard deviation above the mean score on the mental health measure, 13% of sample vs. Low = remainder of the sample). Employed is coded as 0 = Unemployed/Out of the labor force (OLF), 1 = Employed. Unemployed is coded as 0 = Employed, 1 = Unemployed. OLF is coded as 0 = Employed, 1 = OLF.

worsening population-level mental health (Cooper, 2011) such as increases in suicide rates (Chang et al., 2013) and internet searches concerning mental illness (Ayers et al., 2012). Our results suggest that an increased risk of unemployment among the distressed in the aftermath of the Great Recession could have led to further rises in distress in this group potentially contributing to population-level increases in mental health problems. Finally, there is a literature, reviewed by Suhrcke and Stuckler (2012), which finds that recessions are on aggregate good for health in so far as they promote positive lifestyle habits (e.g., less alcohol consumption, greater leisure time) and reduce a diverse range of cause-specific mortality rates (e.g., alcohol-related deaths and road accidents, although suicide rates are an important exception to this trend). Suhrcke and Stuckler suggest that this population-level improvement likely masks deteriorations in health among those who become unemployed; one question raised by our findings is the extent to which this deterioration is present among the unemployed with a history of distress.

The sizeable effect of distress on unemployment identified here is in keeping with a broader literature showing that poor mental health in early life predicts worse socioeconomic outcomes in areas such as employment, education and earnings, with greater relative penalties than the cost of early physical health problems (Delaney and Smith, 2012). Given that the total lifetime economic costs resulting from childhood psychological problems have been estimated to be over $2 trillion in the United States (Smith and Smith, 2010), the question naturally arises as to what extent poor mental health can be ameliorated. Interventions which reduce anxiety and depression, particularly if targeted early in life, might have a large economic return if they shift people into a trajectory of more active employment and increased lifetime earnings. Given that the MHI-5 and other short self-report mental health measures have proven to be reliable measures of mental health and robust predictors of future economic outcomes, they could plausibly be embedded in school, work and job search environments in order to identify at risk individuals and direct resources towards improving their mental health. Public awareness campaigns designed to reduce the stigma around mental health and promote the availability of treatments might also be an effective way to reduce the economic penalty of distress. Finally, in line with recent work emphasizing prevention rather than remediation when addressing human capital deficits (Heckman and Kautz, 2013), interventions which target determinants of child mental health (such as maternal depression; Goodman, Rouse, et al., 2011) and prevent psychological distress from developing could promote later socioeconomic success while maximizing the return on the cost of the intervention.

4.1. Limitations

This study has two main limitations. First, although the data contained a mental health measure which is a validated predictor of depression and anxiety in adolescents (the MHI-5), it is more likely to be prone to measurement error than, for example, a clinical assessment of mental health. Second, while our analyses control for cognitive ability, the data do not contain a strong measure of noncognitive skills. Noncognitive skills are increasingly recognised as important predictors of labor market outcomes (Egan et al., in press; Heckman et al., 2006) and are likely to be correlated with psychological distress. Whilst adjusting for such traits may diminish the contribution of adolescent distress to later unemployment, prior work suggests that this attenuation is unlikely to be substantial: Lundborg et al. (2014) found sizeable effects of distress on labor market outcomes even after controlling for noncognitive skills. Furthermore, re-analysis of the sample in Egan

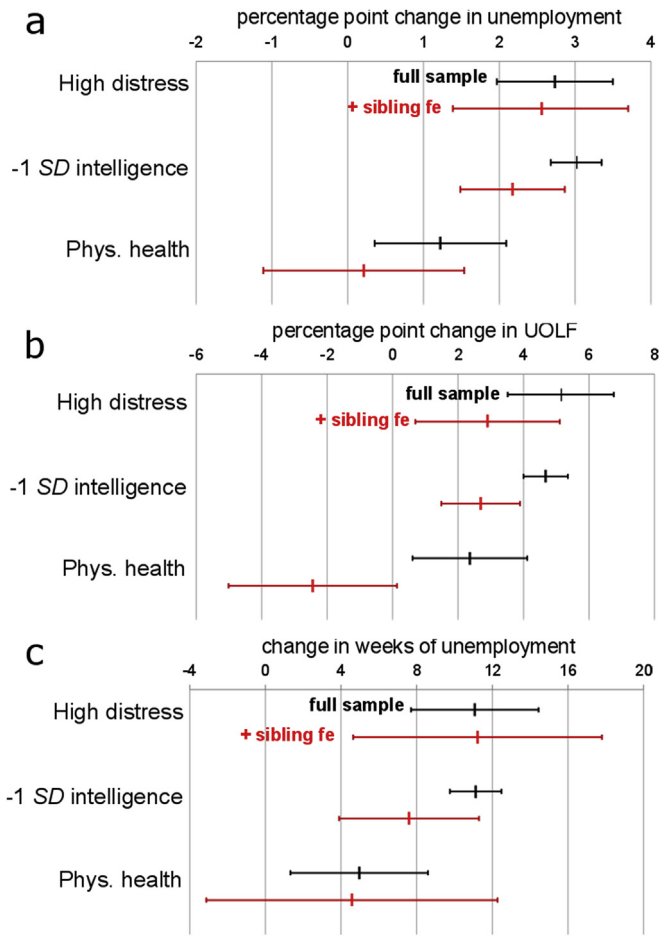


Fig. 2. Predicted effects with 95% confidence intervals of high distress, 1 standard deviation (*SD*) decrease in intelligence, and physical health problems (Phys. health) on the (a) probability of unemployment (b) probability of being unemployed or out of the labor force (UOLF), and (c) the number of weeks spent unemployed. Black bars indicate the unadjusted predicted effects; Red bars indicate the predicted effects after adjusting for sibling fixed-effects (+sibling fe). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

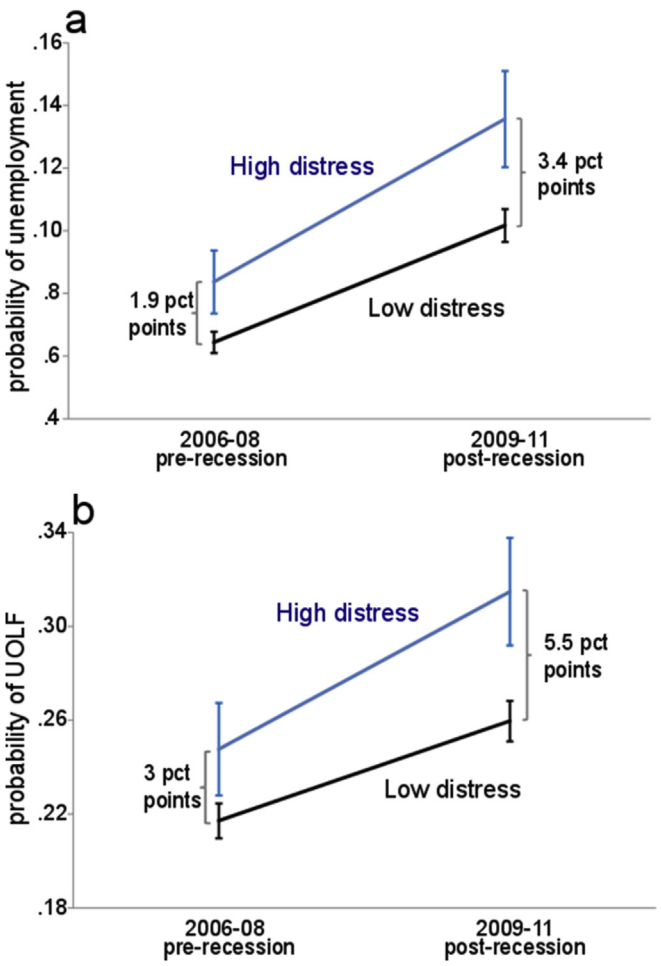


Fig. 3. Predicted probabilities with 95% confidence intervals of (a) unemployment and (b) unemployment or out of the labor force (UOLF) by levels of psychological distress (High = ≥1 standard deviation above the mean score on the mental health measure, 13% of sample vs. Low = remainder of the sample) in the pre-recession (2006–08) and post-recession (2009–11) periods. Differences between high and low levels of psychological distress are expressed as percentage (pct) points.

et al. (2015) found that adjusting for the important noncognitive trait of self-control (Daly et al., 2015) led to just a 22% reduction in the distress-unemployment link.

5. Conclusions

In a national sample, highly distressed adolescents went on to be at higher risk of unemployment as adults, and this elevated risk was accentuated during the Great Recession. Our results lend credence to the potential economic benefits of investment in adolescent mental health services. They also point to the potential value of job activation programs which aim to promote resilience by supporting the unemployed (Caplan et al., 1989) and which offer fully voluntary access to appropriate mental health services where needed. By reducing the negative impact of job loss and improving mental health, such programs could have the additional benefit of fostering reemployment (Caplan et al., 1989). Further research is needed to understand how psychological distress may hamper the transition from education to work and day-to-day job search behaviours (Wanberg, 2012), and to estimate the economic cost of mental health stigma and low awareness of available treatments. Furthermore, in ongoing research, we are examining the extent to which specific mental health conditions such as depression and schizophrenia condition life-long employment trajectories.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.socscimed.2016.03.013.

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