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Does education buffer the impact of disability on psychological distress?

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ABSTRACT

This paper investigates whether education buffers the impact of physical disability on psychological distress. It further investigates what makes education helpful, by examining whether cognitive ability and occupational class can explain the buffering effect of education. Two waves of the 1958 British National Child Development Study are used to test the hypothesis that the onset of a physical disability in early adulthood (age 23 to 33) has a smaller effect on psychological distress among higher educated people. In total 423 respondents (4.6%) experienced the onset of a physical disability between the ages of 23 and 33. We find that a higher educational level cushions the psychology impact of disability. Cognitive ability and occupational class protect against the effect of a disability too. The education buffer arises in part because individuals with a higher level of education have more cognitive abilities, but the better social position of those with higher levels of education appears to be of greater importance. Implications of these findings for the social gradient in health are discussed.

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The onset of a physical disability is a major event in the lives of individuals. Becoming disabled often results in an increase in psychological distress (Burchardt, 2003; Choi & Marks, 2008; Llena-Nozal, Lindeboom, & Portrait, 2004; Manor, Matthews, & Power, 2001; Turner & Noh, 1988). It negatively affects job opportunities and can seriously impact one's relationships and social network. In a given year in the UK, depending on the definition used, about 13–47 per 1000 people of working age experience the onset of a disability (Burchardt, 2003; Jenkins & Rigg, 2004). On average, people who faced a structural decline in physical health because of a disability, report lower well-being and more depressive symptoms. However, not everyone who experiences the onset of a physical disability becomes psychologically distressed, and those who are negatively affected by disability differ considerably in the magnitude of the psychological impact (Sharpe & Curran, 2006; Stanton, Revenson, & Tennen, 2007).

Relatively little is known about the factors that cause some people to be affected very strongly by a disability whereas others appear to cope well and experience no or only small changes in psychological distress. Previous research found that a lack of social support could exacerbate the negative effects of a disability, whereas a supportive social network may alleviate stress (Turner & Noh, 1988). Also psychological resources, such as sense of

mastery and locus of control, seem to cushion the impact of a disability (Bisschop, Kriegsman, Beekman, & Deeg, 2004; Turner & Noh, 1988).

To our knowledge, no studies so far have examined the moderating role of education. This is surprising as education is an important social determinant of health and well-being (Dupre, 2008; Link, Phelan, Miech, & Leckman Westin, 2008; Ross & Wu, 1995; Zimmer & House, 2003). We argue that there is ample reason to expect that education buffers the impact of a disability because education provides people with behavioral, material, and psycho-social resources that are positively related to health (Link et al., 2008; Ross & Wu, 1995; Stronks, Mheen, Looman, & Mackenbach, 1996). Education enables and motivates people to take control over their lives.

Some of the beneficial effects ascribed to education, may be due to the better socio-economic standing of higher educated people. Education is not just an indicator of socio-economic status; it precedes socio-economic status (Ross & Mirowsky, 2006) and the benefits that a higher education bestows on an individual are permanent (Ross & Mirowsky, 2006), unlike the benefits to a better job. Education indicates human capital, both innate ability and learned skills. The more motivated and able may be selected into higher levels of education, which in part may drive the education–health connection. To get a better grip of why educational level may differentiate the impact of disability, we will examine the role of education simultaneously with measures of ability and economic resources.

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To sum up, our main research question is: To what extent does a higher level of education buffer the impact of the onset of a physical disability on psychological distress? Furthermore, in case we find that education buffers the impact of a disability, we aim to find out what it is about education that buffers the negative effects of the onset of a disability. That leads to our second research question: To what extent do buffering effects of education remain if we control for ability and economic resources? We investigate these questions using the National Child Development Study (NCDS), one of the large UK birth cohort studies. We study the effects of disability on psychological distress in early adulthood, between ages 23 and 33.

We aim to contribute to the literature in three respects. First, this study integrates two largely distinct literatures on the effect of disability on mental health and on educational disparities in health. By doing so, it improves our understanding of how disparities in health take shape over the life course and how social inequalities influence the relationship between health and well-being. There has been relatively little attention for socio-economic factors in the literature on disability onset and mental health; we found only one longitudinal study (Smith, Langa, Kabeto, & Ubel, 2005). Smith et al. (2005) found that, among older people, those who were wealthier prior to the onset of a disability suffered a smaller decrease in well-being than those below the median wealth level. Our second contribution is that we study the non-elderly general population. A number of longitudinal studies has investigated the well-being of samples of patients and disabled people in relation to their socio-economic circumstances (e.g.: Waltz, Badura, Pfaff, & Schott, 1988), but these studies lack control groups and are hard to generalize to the general population. Most previous research that looked into possible moderators focused on the elderly (e.g.: Yang, 2006; for an exception see: Turner & Noh, 1988). The onset of a disability, however, is a negative and often unexpected event, especially for younger people. People who become disabled at a young age have many years of bad health awaiting them. Gaining insight into the consequences of early disabilities is thus of high importance. Third, we aim to make an empirical contribution. The NCDS contains detailed information on health and socio-economic resources of a large cohort of individuals; as a result we observe a sizeable number of people who become disabled. As such, the NCDS offers a unique opportunity to examine variation in the effect of becoming disabled on psychological distress.

Theory

Compelling evidence shows that the onset of a disability is a source of psychological distress (Choi & Marks, 2008; Lucas, 2007; Manor et al., 2001; Oswald & Powdthavee, 2008). People who become disabled have to deal with the loss of bodily function, irrespective of physical pain, and this can lead to a sense of loss and to mourning. Being disabled is associated with numerous related stresses in social life and daily hassles (Friedland & McColl, 1992; Turner & Noh, 1988). A disability may severely limit people in performing their daily social roles, such as the role of partner, parent, and bread-winner (Friedland & McColl, 1992). Furthermore, the impact of becoming disabled on psychological distress may be mediated by the loss of job and income and by an increase in expenses (Burchardt, 2003; Jenkins & Rigg, 2004). The loss of social roles, such as job loss, is well known to be associated with psychological distress (Dooley, Fielding, & Levi, 1996; Llana-Nozal et al., 2004; Wheaton, 1990) and material deprivation is a strong psychological burden (Stronks, van de Mheen, Looman, & Mackenbach, 1998). In addition, the threat that a disability poses to future prospects may have psychological repercussion too.

How does education moderate the impact of disability on psychological distress? Note that we start with the basic premise that a decline in physical health may confront anyone. We acknowledge that those with lower levels of education are more likely to experience such declines (e.g.: Burchardt, 2003; Zimmer & House, 2003), but given a major decline in health we hypothesize that those with higher levels of education are better able to deal with the consequences. Therefore education acts as a buffer to deteriorations in well-being due to the onset of a disability.

First, education may moderate the effects of a disability on functioning and health. People with higher educational levels are known to display more healthy behaviors (Lantz et al., 1998; Ross & Wu, 1995) and have more medical knowledge. Furthermore, those who are stricter in keeping up with doctor's instructions may increase their chances of recovery and/or lessen the disabling effects of an illness (but see Zimmer and House (2003)). Moreover, people with higher educational qualifications may get superior treatment because they may be better able to communicate with their doctors (Willems, De Maesschalck, Deveugele, Derese, & De Maeseneer, 2005) and know their way in the medical system.

Second, the stressful aspects of a disability may be better dealt with by people who have more psychological resources and higher levels of social support (Turner & Noh, 1988). People with a higher educational level are known to have more psychological resources, such as a stronger sense of mastery and an internal locus of control (Stronks et al., 1998). In addition, they have higher levels of social support (Ross & Wu, 1995). Turner and Noh (1988) found a beneficial moderating effect for the level of social support but not for sense of mastery in a longitudinal sample of younger people.

Third, the negative socio-economic consequences of a disability may be less harmful for more educated people because they have more secure jobs, and even if they loose their jobs they may be better able to put their lives on a different footing. They can more easily learn new skills, and therefore change jobs or sector/professional fields if the disability interferes with the current job. So, a higher level of education allows people to adjust and/or they may be better able to adapt work and family circumstances (e.g.: arrange a flexible work schedule, work from the home). Furthermore, on a more basic level, the higher educated, enjoy better living circumstances and have more material resources and so they can more easily avoid stresses and hassles that a disability may bring. In sum, we expect that those with a higher level of education suffer less psychological distress from a disability.

Ideally, we would like to investigate these mechanisms directly, but the NCDS lacks information on social and psychological resources. We have, however, detailed information on cognitive ability and economic resources, which may help to get a grasp of why education may act as a buffer. Those with a higher level of education generally are more cognitively able and attain better positions in life (Link et al., 2008). Thus, it may in part be ability and economic resources that drive the education–health connection. If controlling for ability or economic resources indeed reduces the buffering effect of education, this would indicate that part of the effect of education may be attributable to the higher ability of those with a higher level of education or their better economic resources. The remaining effect of education may be interpreted as a sign of the importance of skills and knowledge acquired in the educational system, and of other socio-cultural benefits to a better education (including social and psychological resources). We label this as 'socio-cultural resources' (see Fig. 1). The moderating effect of education may thus occur because of higher abilities, more economic resources, and higher socio-cultural resources. The above outlined mechanisms of the moderating influence of education are hard to separate.

Fig. 1.

We use childhood cognitive ability to take the selection of more able people into higher levels of education into account. Occupational class and employment status prior to onset of a disability capture the effect of economic resources.

Methods

Data

The National Child Development Study (NCDS) follows a sample of nearly all children (>98%) born in England, Wales and Scotland in the week of 3–9 March 1958 (Power & Elliott, 2006). Information on 17,634 children was gathered at age 0. Follow-ups took place when the respondents were 7, 11, 16, 23, and 33. Immigrants born in the same week have been added to the sample at ages 7, 11 and 16. At age 23 12,537 respondents participated. The 9810 respondents who participated at both the waves at the age of 23 (1981) and 33 (1991) were selected for this paper (60.0% of those still alive and not permanently migrated by the age of 33; 78.3% of those participating at 23). Taking missing information into account reduced the number of respondents in our sample to 9543 (list wise deletion). As we study the impact of the onset of a disability, respondents who were already disabled at the age of 23 ($N = 265$) were excluded from the analyses. We used the following criteria to define disability at 23: 1) physical illness and limited in daily activities, 2) registered as disabled, 3) health limited choice of work, and/or 4) difficulty in work or could not work at all. Our final analytical sample contains 9278 respondents.

Disability onset

We define a disability as a physical illness or disorder that leads to a limitation of daily activities.

The interview at 33 asked the respondents whether they suffer from (up to four) long-standing illnesses, disabilities or infirmities and whether these limit their daily activities compared to people of their own age. A dummy was coded whether respondents suffered from such a non-mental illness, disability or infirmity at age 33; this in effect indicates onset of a disability as those already disabled at 23 were excluded from the sample. We excluded mental disorders based on ICD (9th revision) codes, in order to better assess the possible impact of a disability on psychological distress. Obviously, there will be variation in the severity of the disabilities, unfortunately the NCDS does not contain additional information, such as an ADL scale. We deal with this issue by carrying out an ancillary analysis where we included proxies for severity (discussed in detail below).

Psychological distress

Psychological distress is measured in the NCDS with the Malaise Inventory (at 23 and 33). The Malaise Inventory contains 24 statements on symptoms of anxiety, depression, and psychosomatic distress with which the respondents either agree or disagree. Examples of items are: “Do you often feel miserable or depressed?”, “Do you often get worried about things?”, and “Are you scared to be alone when there are no friends near you?”. The item whether respondents ‘ever had a nervous breakdown’ has been excluded because that item can logically only increase over time.

Rodgers, Pickles, Power, Collishaw, and Maughan (1999) found that one general factor of psychological distress underlies the Malaise scale (for 24 items). We calculated tetrachoric correlations (correlation for binary items) among the items at both ages and performed factor analysis (principal components) on the correlation structures for each age separately. Results yield clear one-factor solutions. The factor loadings of the solutions have been used to compute sum scores of psychological distress at each age. We extrapolated the scores if fewer than the 23, but at least 20 items were answered. Kuder–Richardson reliabilities (Cronbach’s alpha for dichotomous items) were .78 at age 23 and .80 at age 33.

The change in psychological distress is measured by taking the difference between the two waves (33 minus 23). A higher change score indicates an increase in psychological distress, and vice versa.

Education, cognitive ability, occupational class and controls

We distinguish five levels of educational attainment at the age of 23: (1) no qualification; (2) up to O-level or equivalent; (3) A-level or equivalent; (4) higher qualifications; (5) degree or higher than degree.

At the age of 16, 11, and 7 respondents completed reading and math tests at school. Our measure of cognitive ability takes the mean of the most recent available reading and math score (standardized score in each year). For 78.6% it is the mean score at 16, for 18.8% at 11, and for 2.7% at 7. The thus computed scores were again standardized. We assume that cognitive ability is a stable trait.

The NCDS contains the UK Registrar General’s Office 1980 classification of the current or last occupation that respondents reported at 23. We group the six classes into four categories: 1) “I professional and II managerial/technical”, 2) “IIIa skilled non-manual”, 3) “IIIb skilled manual”, 4) “IV semi-skilled manual and V unskilled”. Respondents with a job in the armed forces (.5%) and those with missing information (1.9%) are set to the missing category.

Parental background is measured with the last known occupational class of the father (reported at 16, 11, 7 or 0), which uses the same categorization.

We created dummies indicating whether respondents were living with a partner (marriage and cohabitation) at 23, and whether respondents were employed/self-employed/in full time education at 23 (2% were still students). Non-employment comprises the unemployed and homemakers. General health at 23 was measured with a dummy for self-reported fair/poor health.

Table 1 provides information on the distributions of the variables used in the analysis. Table 2 illustrates to what extent cognitive ability, economic resources, and disability onset vary with the level of education. For each step on the educational ladder the mean level of cognitive ability, the percentages employed/studying, and the percentages of people in the higher occupational groups rises steeply, whereas the percentage of people in semi-skilled and unskilled jobs decreases. Only the

Table 1 Descriptives of the variables used in the analysis ($N = 9278$).

	Mean	s.e.	Max	Min
Change in psychological distress	.002	.629	−3.68	4.93
Onset of a disability	.046		0	1
High psychological distress at 23	.200		0	1
Male	.483		0	1
Partner	.517		0	1
Fair/poor health	.076		0	1
Father social class:				
Unknown	.009		0	1
Semi-skilled (IV) and unskilled (V)	.151		0	1
Skilled manual (III _m)	.436		0	1
Skilled non-manual (III _n)	.097		0	1
Professional (I), managerial and technical (II)	.268		0	1
Educational level:				
No qualification	.244		0	1
Up to O-level	.385		0	1
A-level	.173		0	1
High qualification	.090		0	1
Degree+	.108		0	1
Cognitive ability (std)	0	1	−3.19	2.62
Employed/full time student	.784		0	1
Occupational class:				
Missing	.024		0	1
Semi-skilled (IV) and unskilled (V)	.185		0	1
Skilled manual (III _m)	.237		0	1
Skilled non-manual (III _n)	.336		0	1
Professional (I), managerial and technical (II)	.219		0	1

two highest educational groups do not differ substantially in economic resources; cognitive ability, however, does differ. The relatively low percentage of employed/studying among the lower educated arises because of high male unemployment rates at that time (1981) and low female labor participation. The column for disability onset shows that there are sufficient observations in each educational category. Furthermore, the percentages indicate that the crude rate of disability onset decreases as education goes up.

Analytic strategy

We employ a so-called *semi-first difference* panel model. This is a *first-difference* model because the dependent variable is the change in psychological distress and our main independent variable refers to the change in disability status (onset) between the two time points. The regression models we estimate include time invariant predictors on the right hand side of the regression equation and therefore are *semi-first difference* models. This variant is chosen as we wanted to include the indicators of the

respondent's resources also as main effects in the models, to control for the possibility that people with different resources are on different trajectories (Finkel, 1995).

We use interaction terms of the onset of a disability with education, and in further steps with cognitive ability, occupational class, and initial employment status to uncover whether these moderate the disability–psychological distress relationship.

In addition, we add a number of controls. In particular, we control for sex and having a partner. Previous research shows that men and women differ in trajectories of mental health (e.g. Llena-Nozal et al., 2004) and that the partner can be important in shaping the impact of a disability on well-being (Choi & Marks, 2008). We allow the effect of a disability to differ by sex and partner status. In addition, we control for fathers' occupational class to take the influence of parental background on educational and occupational attainment into account. Furthermore, we include self-perceived general health at 23 to control for pre-existing health differences. Finally, we control for possible ceiling effects. The onset of a disability has a greater potential to cause psychological stress in a relatively psychologically healthy person (Finkel, 1995). Therefore, we add a dummy variable indicating whether people already had high levels (top 20%) of psychological distress at 23. This indicator is also interacted with disability onset. Previous research found that psychological distress may predict the onset of disability (Armenian, Pratt, Gallo, & Eaton, 1998).

Sample attrition

Health selection may be a problem for this study: If the less healthy at age 23 and those whose health deteriorates are more likely to drop out of the sample, we are likely to underestimate the effect of disability. To deal with possible selective attrition we estimated a Heckman selection regression model (Heckman, 1979). As instruments for the selection equation we used variables indicating interest and commitment to the NCDS study and variables capturing participation in society at large measured in the age 23 wave. The selection instruments predicted participation at age 33, but were not related to the change in psychological distress (see Table 5 of appendix).

The results of the Heckman model hardly differ (see Table 6 of the appendix). For ease of presentation we will only discuss the regression results. The Heckman selection variable predicted an increase in psychological distress. So, those likely to experience an increase in distress were more likely to drop out. A high level of distress at age 23 did not influence future participation; neither did having a poor/fair health at age 23. This bolsters our assumption that health selection did not affect our results substantially. Males were more likely to attrite, whereas respondents with more resources were less likely to drop out.

Table 2

Cognitive ability, economic resources, and onset of disability by educational level.

	Cognitive ability (std.)	Employed or student	Occupational class		Onset of a disability	
Educational level:	mean	%	% I and II	% IV and V	N	%
No qualification	−1.40	61.5	5.2	42.2	123	5.4
Up to O-level	.027	78.5	10.8	15.7	171	4.8
A-level	.948	90.5	20.5	8.4	58	3.6
High qualification	1.04	90.1	66.2	3.5	36	4.3
Degree+	2.34	86.8	64.1	4.2	35	3.5
F-test (4, 9273)	1774.3***					
$\chi^2(df)$		628.8***(4)		4030***(4)		10.47*(4)

* $p < .05$; ** $p < .01$; *** $p < .001$.

Results

The onset of a disability

About 1 in 20 respondents ($n = 423$) experienced the onset of a disability between the ages of 23 and 33. Table 3 depicts the models of change in psychological distress depending on the onset of disability. The first column shows the main effects model (model 1). The results confirm our expectation that the onset of a disability increases distress ($b = .260$). Furthermore, with regard to the baseline level of distress, we observe a regression to the mean; respondents in the highest 20% bracket of psychological distress at age 23 tend to become less distressed over time, whereas the reference group of those who had a normal to low psychological distress become somewhat more distressed over time (b constant = .143). The effect of becoming disabled does not significantly differ between the two groups.

There is no main effect of education on the change in psychological distress given that we control for the main effects

of cognitive ability and economic resources. Note, however, that in a model without these controls, those with higher levels of education experience a decrease in distress over the investigated period. In other words, the existing educational disparities in distress at the age of 23 appear to widen over the 10-year period if we do not take the level of cognitive ability and economic resources within each educational group into account (see Table 2). We further find that people with a higher cognitive ability experience a decrease in psychological distress over time. Those in work or full time education at 23 experience a decrease in distress over time. Occupational class has no significant effect.

A number of the control variables in the model 1 show significant effects. Men experience a small increase in psychological distress over time, but the effects of disability do not differ by sex. People with a partner at the age of 23 do not differ from those without, and having a partner does not protect against the effects of a disability. Those with a fair/poor health at 23 show a decrease of distress over time. Father's occupational class does not affect the change in distress. The effects of the controls are consistent across the different models.

Does education buffer?

The second column of Table 3 shows our main model (model 2), which includes interaction terms of educational level with the onset of disability. These interaction terms evaluate our central hypothesis whether education moderates the impact of a disability on psychological distress.

The first thing to note is that the effect of the onset of a disability on psychological distress now reflects the effect of a disability for the reference group of those with no qualifications. As expected, model 2 shows that there is a significant interaction between level of education and onset of a disability on distress. Those with up to O-level and A-level education appear to suffer about a quarter less from a disability than the reference group with no qualifications (e.g.: .104/.414). People with higher education and with a degree or higher appear to deal with a disability even better (effect is about 75% smaller ((.414 – .309)/.414) than for people with no qualifications). The difference between people with no qualifications and those with A-levels is not statistically significant, probably due to the relatively low number of cases of disability (see Table 2). In a model with education collapsed in three groups (no qualifications; up to A-level; and higher than A-level) all differences are statistically significant.

Fig. 2 shows the predicted change in psychological distress by education and the onset of a disability for the low distress at baseline group (estimates of model 2). The protective effect of education for those who become disabled is clearly visible, but for those who remain physically healthy there is no significant relation of education with the change in distress. These results lend support for our main hypothesis that a better education buffers the impact of disability. A higher educational level does not offer general protection against an increase in psychological distress (given that we control for main effects of cognitive ability and occupational class), i.e. both the lower and higher educated experience, on average, similar change in distress, but a higher level of education does buffer the impact of a disability.

In contrast to model 1, it appears now that people who reported high levels of psychological distress at age 23 compared to those with low levels of distress suffered less from the onset of a disability, as the interaction is negative and statistically significant. This suggests that there is, in fact, a ceiling effect.

Table 3
Regression of change in psychological distress between 23 and 33.

	Model 1		Model 2	
	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>
Onset of a disability	.260***	(.057)	.414***	(.080)
High psychological distress at 23	–.621***	(.016)	–.619***	(.016)
High psychological distress at 23 × disability	–.093	(.065)	–.156*	(.068)
Male	.038**	(.014)	.039**	(.014)
Male × disability	–.048	(.059)	–.061	(.059)
Partner	.011	(.013)	.013	(.013)
Partner × disability	.110	(.058)	.082	(.059)
Fair/poor health	–.097***	(.023)	–.097***	(.023)
Father social class:				
Not known/missing	–.022	(.063)	–.023	(.063)
Semi-skilled and unskilled (IV and V) (ref.)	—		—	
Skilled manual (III _m)	.006	(.016)	.006	(.016)
Skilled non-manual (III _n)	.024	(.024)	.024	(.024)
Prof., managerial and tech. (I and II)	.020	(.019)	.021	(.019)
Educational level:				
No qualification (ref.)	—		—	
Up to O-level	.004	(.017)	.010	(.018)
A-level	.006	(.023)	.011	(.023)
Higher education	–.002	(.028)	.011	(.028)
Degree+	–.007	(.030)	.005	(.030)
Cognitive ability (std)	–.028***	(.008)	–.028***	(.008)
Employed/full time student	–.041**	(.016)	–.041**	(.016)
Occupational class:				
Not known/missing	–.062	(.043)	–.063	(.043)
Semi-skilled and unskilled (IV and V) (ref.)	—		—	
Skilled manual (III _m)	–.029	(.020)	–.028	(.020)
Skilled non-manual (III _n)	–.023	(.019)	–.023	(.019)
Prof., managerial and tech. (I and II)	–.040	(.023)	–.040	(.023)
Interactions with disability:				
Educational level				
No qualification (ref.)			—	
Up to O-level			–.119*	(.072)
A-level			–.104	(.095)
Higher education			–.309**	(.115)
Degree+			–.322**	(.116)
Constant	.143***	(.026)	.136***	(.026)
<i>N</i>	9278		9278	
<i>r</i> ²	.170		.171	

* $p < .05$; ** $p < .01$; *** $p < .001$, 2-sided; disability*educational level interactions one-sided p -values.

Fig. 2. Predicted change in psychological distress by the onset of disability and educational level for the low distress group (model 2).

Possible mechanisms

In an effort to better understand why education acts as a buffer for the impact of disability, we examined the role of cognitive ability and economic resources. We added interactions of education, cognitive ability, and economic resources at 23 (employment status and occupational class) with the onset of a disability separately and in combinations to model 1 (a model including all the main effects and controls). Table 4 only shows the estimated interaction terms, as the main effects and controls are very similar to coefficients of model 2. The second column of Table 4 shows the estimated interactions if they are added separately (note that the effect of the education indicators is the same as in model 2). Model 3 and 4 show what happens to the moderating effect of education if we control for interactions with either cognitive ability or economic resources. The last column shows results from model 5 that investigates whether the moderating effect of education remains when we simultaneously add the interactions of both cognitive ability and economic resources.

The estimated interactions of the separate models in the second column of Table 4 indicate that, as expected, cognitive ability and economic resources also protect against the distressing

effect of becoming disabled. When we just consider the three models with one resource interacted at a time, the effects of occupational class and education are similar; the highest levels of education and occupational class experience much smaller increase in distress due to disability compared to the lowest groups (about 75% for education and about 70% for occupational class). Whether one worked or was a full-time student at 23 does not affect the impact of disability. One standard deviation change in cognitive ability is about one fifth of the main disability effect (.059 of .276).

To what extent can the buffering effect of education be explained by differences in cognitive ability? The model in the third column shows that adding cognitive ability to the model as a moderator decreases the effect of education somewhat (the effects are reduced, and the difference between “up to O-level” and “no qualifications” is no longer significant). The interaction effect of cognitive ability is much reduced and no longer significant. These results show that the protective effect of education is not solely due to the higher cognitive skills of people with a higher level of education.

Does the education buffer remain if we control for the buffering effect of economic resources? The third column of Table 4 shows that adding occupational class and employment status to model 2 reduces the interaction effect of education. The interaction effect of occupational class is no longer significant in a model with simultaneous interactions. This suggests that education has an independent buffering effect even if we take the strong association between the level of education and social position into account. In a model with buffering effects for cognitive ability and economic resources, cognitive ability was no longer significant (not shown). When cognitive ability and economic resources are added simultaneously the education effect remains. In the full model, economic resources do not significantly moderate the effect of disability.

Alternative explanation: severity of the disability

We measured disability as a dichotomous indicator whether an illness limits daily activities. Unobserved heterogeneity may be a problem because those who report to be disabled may differ in the extent and severity of their limitations. As discussed above we carried out an ancillary analysis where we included proxies for

Table 4

Regression coefficients for the simultaneous moderating effects of education, cognitive ability and economic resources ($N = 9278$).

	Separate models		Model 3		Model 4		Model 5	
	<i>b</i>	se	<i>b</i>	se	<i>b</i>	se	<i>b</i>	se
Educational level								
No qualification (ref.)	—		—		—		—	
Up to O-level	−.119*	(.072)	−.112	(.079)	−.097	(.074)	−.102	(.080)
A-level	−.104	(.095)	−.092	(.110)	−.077	(.101)	−.086	(.113)
Higher qualification	−.309**	(.115)	−.297**	(.127)	−.269*	(.132)	−.278*	(.139)
Degree+	−.322**	(.116)	−.306*	(.140)	−.299**	(.128)	−.312*	(.147)
Cognitive ability (std)	−.059*	(.029)	−.008	(.037)			.007	(.039)
Employed/full time student	.061	(.071)			.072	(.072)	.072	(.072)
Occupational class:								
Not known/missing	.252	(.245)			.355	(.250)	.353	(.250)
Semi-skilled and unskilled (IV and V) (ref.)	—		—		—		—	
Skilled manual (III _m)	−.075	(.087)			−.054	(.088)	−.053	(.088)
Skilled non-manual (III _n)	−.160*	(.081)			−.120	(.085)	−.124	(.087)
Prof., managerial and tech. (I and II)	−.249**	(.091)			−.117	(.106)	−.121	(.108)
r^2			.171		.171		.171	

All models include the main effects (see model 1 and 2).

* $p < .05$; ** $p < .01$; *** $p < .001$, one-sided p -values.

severity. It could be that more educated people suffer from less severe disabilities and the buffering effects are therefore spurious. Educational differences in the chance to become ill and the extent to which an illness leads to limitations, however, would be perfectly in line with our hypothesis.

We tested this alternative explanation in the following way. The NCDS collects information on the number and type of illnesses that limit daily activities reported at age 33. This information was used to create two proxies for the severity of the disability. First, we followed the approach of Burchardt (2003) by creating a dummy variable that measured whether respondents experienced the onset of two or more disabilities (40 respondents). A second proxy for the severity of disability was derived based on the type of illness of the first reported disability (based on main ICD-9 groupings). Exploratory analyses identified a split in the psychological consequences of disability related to the type of illness. The half that was afflicted with respiratory, muscular–skeletal, or injury/accidental/poisoning related disabilities suffered significantly less than those afflicted by an illness related to the nervous system, with sensory impairments, an unknown/ill-defined illness, or those in a heterogeneous group of all remaining infrequent illnesses (<25 respondents per category).

Our estimates of the buffering effects hardly change when we add these proxies (results available upon request), even though we find that those who experience the onset of two or more disabilities and those whose first disability is in a ‘bad’ category suffer much more from the onset of a disability. Apparently, to the extent that our proxies are reliable indicators of disability severity, the buffering effects of education are not due to spurious relationships.

Conclusion and discussion

Main findings

Does education buffer the effect of the onset of a disability on psychological distress? To our knowledge this study is the first to investigate that question. In a large cohort of young British adults followed from their 23rd to their 33rd year of age, about 1 in 20 experienced the onset of a disability. In line with previous research, we found that the onset of a disability leads to a sharp increase in psychological distress. The results support our hypothesis that a higher educational level lessens the impact of the onset of disability on psychological distress.

In addition, we investigated to what extent the beneficial buffering effects of education could be ascribed to the higher cognitive abilities of people with a higher level of education or to their better economic resources. As expected, people with higher cognitive ability and higher occupational class suffered less from the impact of a disability. People who had a job at baseline did not do better; it is the kind of job that matters. In simultaneous analyses, the buffering effect of education is reduced somewhat if we control for cognitive ability or occupational class. The education buffer remains significant and substantial, however, even if we control for cognitive ability and occupational class simultaneously. A further striking finding is that the buffering effect of cognitive ability completely disappeared once we controlled for buffering effects of education or economic resources.

We conclude that education buffers the impact of a disability. The buffering effect of education probably arises only in part because the higher educated have better economic resources and to an even lesser extent because they have higher cognitive abilities. Furthermore, there remained a substantial direct education buffer.

This suggests that acquired skills and knowledge, and other benefits of education (socio-cultural resources) are of great importance to people who experience the onset of a disability. For example the better educated may be better able to verbalize their needs to health professionals and to mobilize the resources in their social network.

This study has shown the importance of personal resources in shaping the psychological impact of health decline in young adulthood. The onset of a disability is a major distressing event, but for people with a higher level of education this appears to be much less the case. Interestingly, we find that education offered a general protective effect (disparities along educational boundaries in psychological distress widened over time). On top of this general effect, education was more beneficial for people who became disabled. This shows that a protective factor such as education may be more beneficial under specific circumstances. Researchers should thus be careful in dismissing or adopting a protective factor based on average effects. The onset of a disability is a rare event, but many people will suffer the onset of a disability during their adult life, as such the buffering effect of education may contribute to health disparities even though the overall effect of education appears to be moderate.

Limitations

Some limitations of this study should be discussed as well. First, it is important to note possible selective non-response and attrition in subsequent waves of the NCDS. In preliminary analyses we found that those who reported a poorer health at age 23 were more likely to experience the onset of a disability in the period to the subsequent wave. Disabled people and those who reported a poorer health at age 23 also had a lower chance to participate in the subsequent wave. This suggests that individuals who became disabled in between waves were less likely to continue to participate (health selection). Respondents with a higher level of education were more likely to participate in subsequent waves and less likely to become disabled in the continuously-observed sample. We tried to remedy a possible bias by including an indicator for baseline self-reported health and to differentiate between those with high and low levels of psychological distress at age 23. Furthermore, we applied a Heckman selection model to account for remaining bias; the Heckman corrected-estimates hardly differed. We are further reassured that within those with poorer health at baseline there were no differences in non-response at the subsequent wave by the level of education. Any lingering bias probably leads us to underestimate the effect of disability on psychological distress and to underestimate the buffering effects, as the physically and mentally worst-off individuals with fewer resources tend to attrite. We are therefore more likely to err on the conservative side in our estimates of the buffering effect of education, cognitive ability, and occupational class.

Second, the study may be criticized for treating the onset of a disability as a uniform event. People may differ in the timing, process and severity of their illnesses. The 10-year time interval between the waves of the NCDS makes us lump together distant and recent disability onsets, although the effects of a recently started disability may be quite different from a disability that started longer ago (Lucas, 2007; Oswald & Powdthavee, 2008; Stanton et al., 2007). The disabilities we investigated are probably the result of on the one hand older chronic illnesses and more recent illnesses. As such, we possibly did not observe some disabilities that occurred in the intervening period, but of which people fully recovered before they were 33. This may lead to an

underestimation of the buffering effects because people with more resources may be more likely to recover.

Furthermore, the NCDS contains little information on the severity of disablement. This leaves room for an alternative explanation of our findings: The buffering effect of education may occur because of an education gradient in the severity of disability: the most severely disabled persons were those with a lower level of education and they suffered the most psychological distress. We tried to rule out this explanation by incorporating two proxies for severity (number of disabilities and a split by the type of underlying illness). Including these proxies did not change the findings. Self-reports have obvious advantages and disadvantages, we therefore would like to repeat this study for more objective measures of disability.

Directions for future research

This study focused on the role of education. Investigations into other potential buffers that positively correlate with education, such as social capital, income, wealth and socio-psychological resources, should be on top of the research agenda. Part of the beneficial effects of education may operate because those with a higher level of education have more of these resources. Further

study of potential buffering factors and possible mediators for the educational buffer can go hand-in-hand. In addition, it would be interesting to replicate this study for other countries because educational level might be a stronger determinant of health and social position in societies that are less class-based than the United Kingdom. The buffering effect of education may be even stronger in other countries.

This study has demonstrated that people's economic resources moderate the impact of a disability on psychological distress in young adulthood. The striking variability in the psychological effects of disability should be of prime interest to policymakers, as it gives hope on the one hand that the future of disabled people may be malleable to interventions, and on the other a warning that there are large social inequalities in the effects of disability for well-being. Pursuing this line of research will shed new light on how the large social disparities in well-being and health take form over the life course.

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Appendix

Table 5

Multivariate analyses of change in psychological distress and of full response given participation at age 23.

	Linear regression: change in psychological distress 23–33			Logistic regression: being in sample (1 = yes)		
	1	2	3	4	5	6
<i>Instrumental variables:</i>						
# of visits to address at 23	–.011		.003	–.196***		–.201***
# of calls made at 23	–.001		–.004	–.086***		–.094***
Participated in wave at age 16	.015		.010	.516***		.375***
Ever youth club member at 23	–.004		–.015	.215***		.145***
Voted in 1979 elections	.013		.006	.192***		.156***
Union member at 23	–.001		–.011	.154***		.153***
Church attendance at 23	.003		.002	.117***		.084***
<i>Model variables, except disability and interactions:</i>						
High distress at 23		–.633***	–.632***		.006	.031
Male		.036*	.038**		–.371***	–.343***
Partnered		.014	.015		.110*	.186***
Fair/poor health		–.081***	–.081***		–.166*	–.129
Father social class:						
Not known/missing		–.031	–.031		–.315	–.239
Semi-skill. & unskill. (IV and V) (ref.)		—	—		—	—
Skilled manual (III _m)		.007	.007		.017	.008
Skilled non-manual (III _n)		.023	.023		.067	.068
Prof., managerial and tech. (I and II)		.019	.019		.143*	.161*
Educational level						
No qualification (ref.)		—	—		—	—
Up to O-level		.006	.007		.253***	.205***
A-level		.004	.005		.294***	.237**
higher qualification		–.002	–.001		.324**	.243*
degree+		–.008	–.008		.228*	.219
cognitive ability (std)		–.029***	–.028**		.158***	.142***
employed		–.045**	–.043**		.333***	.329***
Occupational class:						
Not known/missing		–.066	–.072		–.114	–.100
Semi-skilled and unskilled (IV and V)		—	—		—	—
Skilled manual (III _m)		–.031	–.031		.178**	.172*
Skilled non-manual (III _n)		–.029	–.030		.149*	.143*
Prof., managerial and tech. (I and II)		–.042	–.043		.058	.066
Constant	–.002	.159***	.162***	.868***	.837***	.751***
N	9278	9278	9278	11927	11927	11927
r ²	.000	.162	.162			

Legend: * $p < .05$; ** $p < .01$; *** $p < .001$, two-sided p -values.

Table 6

Heckman selection model of change in psychological distress (continued on next page)

	Education buffer	Cognitive ability	Occupation. class	Education & cogn.	Educ & occ class	Full model
Onset of a disability	.408***	.273***	.360***	.403***	.421***	.430***
High psychological distress at 23	–.628***	–.629***	–.629***	–.628***	–.628***	–.628***
High psych. distr. at 23 × disability	–.163*	–.141*	–.125	–.165*	–.157*	–.155*
Male	.038**	.038**	.040**	.038**	.040**	.040**
Male × disability	–.059	–.048	–.093	–.059	–.094	–.096
Partnered	.011	.010	.010	.011	.011	.011
Partner × disability	.096	.101	.115	.095	.102	.104
Fair/poor health	–.097***	–.096***	–.097***	–.097***	–.097***	–.097***
Father social class:						
Not known/missing	–.027	–.025	–.028	–.027	–.028	–.028
Semi-skilled and unskilled (IV and V) (ref.)	—	—	—	—	—	—
Skilled manual (III _m)	.005	.005	.005	.005	.005	.005
Skilled non-manual (III _n)	.024	.025	.024	.024	.024	.024
Prof., managerial and tech. (I and II)	.021	.020	.020	.021	.020	.020
Educational level						
No qualification (ref.)	—	—	—	—	—	—
Up to O-level	.010	.004	.004	.010	.009	.009
A-level	.009	.004	.004	.009	.008	.008
Higher qualification	.009	–.004	–.004	.009	–.007	.008
Degree+	.004	–.010	–.010	.003	–.003	.003
Cognitive ability (std)	–.028**	–.025**	–.028**	–.028**	–.028**	–.028**
Employed or full-time student	–.042**	–.042**	–.044**	–.042**	–.045**	–.045**
Occupational class:						
Not known/missing	–.060	–.060	–.064	–.060	–.069	–.069
Semi-skilled and unskilled (IV and V)	—	—	—	—	—	—
Skilled manual (III _m)	–.028	–.028	–.024	–.028	–.025	–.025
Skilled non-manual (III _n)	–.024	–.024	–.017	–.024	–.019	–.018
Prof., managerial and tech. (I and II)	–.041	–.041	–.030	–.041	–.036	–.035
Interactions with disability:						
Educational level						
No qualification (ref.)	—	—	—	—	—	—
Up to O-level	–.121	—	—	–.114	–.097	–.104
A-level	–.114	—	—	–.103	–.084	–.095
Higher qualification	–.306**	—	—	–.295*	–.269*	–.279*
Degree+	–.317**	—	—	–.301*	–.295*	–.311*
Cognitive Ability (Std)	—	–.061*	—	–.008	—	.009
Employed/student	—	—	.050	—	.061	.061
Occupational class:						
Not known/missing	—	—	.256	—	.358	.356
Semi-skilled and unskilled (IV and V)	—	—	—	—	—	—
Skilled manual (III _m)	—	—	–.066	—	–.044	–.044
Skilled non-manual (III _n)	—	—	–.162*	—	–.121*	–.126
Prof., managerial and tech. (I and II)	—	—	–.239**	—	–.107	–.111
Constant	.138***	.145***	.141***	.138***	.137***	.137***
Selection equation:						
<i>Model variables, except disability onset and interactions:</i>						
High psychological distress at 23	.018	.018	.018	.018	.018	.018
Male	–.193***	–.193***	–.193***	–.193***	–.193***	–.193***
Partnered	.109***	.109***	.109***	.109***	.109***	.109***
Fair/poor health	–.078	–.078	–.078	–.078	–.078	–.078
Father social class:						
Not known/missing	–.144	–.144	–.144	–.144	–.144	–.144
Semi-skilled and unskilled (IV and V) (ref.)	—	—	—	—	—	—
Skilled manual (III _m)	.007	.007	.007	.007	.007	.007
Skilled non-manual (III _n)	.042	.042	.042	.042	.042	.042
Prof., managerial and tech. (I and II)	.092*	.092*	.092*	.092*	.092*	.092*
Educational level:						
No qualification (ref.)	—	—	—	—	—	—
Up to O-level	.121***	.121***	.121***	.121***	.121***	.121***
A-level	.139**	.139**	.139**	.139**	.139**	.139**
Higher qualification	.140*	.140*	.140*	.140*	.140*	.140*
Degree+	.126	.126	.126	.126	.126	.126
Cognitive ability (std)	.082***	.082***	.082***	.082***	.082***	.082***
Employed/student	.188***	.188***	.188***	.188***	.188***	.188***
Occupational class:						
Not known/missing	–.055	–.055	–.055	–.055	–.055	–.055
Semi-skilled and unskilled (IV and V)	—	—	—	—	—	—
Skilled manual (III _m)	.104**	.104**	.104**	.104**	.104**	.104**
Skilled non-manual (III _n)	.088*	.088*	.088*	.088*	.088*	.088*
Prof., managerial and tech. (I and II)	.044	.044	.044	.044	.044	.044

Table 6 (continued)

	Education buffer	Cognitive ability	Occupation. class	Education & cogn.	Educ & occ class	Full model
<i>Instrumental variables:</i>						
# of visits to address at 23	-.120***	-.120***	-.120***	-.120***	-.120***	-.120***
# of calls made at 23	-.054***	-.054***	-.054***	-.054***	-.054***	-.054***
Participated in wave at age 16	.220***	.220***	.220***	.220***	.220***	.220***
Ever youth club member at 23	.084***	.084***	.084***	.084***	.084***	.084***
Voted in 1979 elections	.082***	.082***	.082***	.082***	.082***	.082***
Union member at 23	.090***	.090***	.090***	.090***	.090***	.090***
Church attendance at 23	.048***	.048***	.048***	.048***	.048***	.048***
Constant	.467***	.467***	.467***	.467***	.467***	.467***
Rho (correlation of error terms)	.001	-.001	-.001	.000	-.001	.000
Inverse Miller ratio	-.558***	-.558***	-.558***	-.558***	-.558***	-.558***
N censored observations	2649	2649	2649	2649	2649	2649
N uncensored observations	9278	9278	9278	9278	9278	9278

* $p < .05$; ** $p < .01$; *** $p < .001$, two-sided p -values.

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