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**Research Report**

## Does more education protect against mental health problems?

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## DIW Roundup

Politik im Fokus

Deutsches Institut für Wirtschaftsforschung

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# Does More Education Protect against Mental Health Problems?

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# Does more education protect against mental health problems?

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Mental health conditions are a leading cause of disability-adjusted life years (DALYs) and health costs worldwide: They account for 199 million DALYs or 37 percent of healthy life years lost from non-communicable diseases. The sum of direct and indirect costs worldwide were estimated to amount to 2.5 trillion US dollars in 2010 and projected to increase to 6 trillion US dollars in 2030 ([Bloom et al., 2010](#)).

The heavy financial and societal burdens of mental health impairments also mean that prevention measures to alleviate these problems will have high financial and societal returns. Education has been theorized to be such a prevention measure. This DIW Roundup reviews contemporaneous research on the causal effect of education on mental health.

## Theory predicts a positive effect of education on mental health

The [WHO \(2014\)](#) defines mental health as “[...] a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community.” According to this definition, mental health comprises a hedonic component, which refers to subjective well-being and life satisfaction, as well as a eudaemonic component, which encompasses positive functioning, engagement, fulfillment, and social well-being ([Barry, 2009](#)). Here, in contrast to other prominent definitions, mental health and mental illness constitute separate but correlated unipolar dimensions. Thus, mental health cannot be equated with the mere absence of mental illness (Keyes, [2002](#), [2005](#)). But to account for the two different definitions of mental health, our review of theories and empirical studies in this DIW Roundup will also include the causal effect of education on mental illness.

The economic and psychological literature on how education influences mental health can be divided into two main strands: One focuses on behavioral responses to increased education and the other examines the increased economic and social resources resulting from education.

In economics, it should be noted that especially the theoretical part of the literature (e.g., Grossman, [1972a, b](#)) focuses on general health. While most of the insights of this literature are thought to be generalizable to mental health, it is still unclear whether this holds true.

Health capital theory (Grossman, [1972a, b](#)) puts great emphasis on a direct causal effect of education on health. Grossman ([1972a, b](#)) contends that more highly educated individuals are more efficient “producers” of health: They have a higher allocative or productive efficiency. Allocative efficiency refers to an increased capability to allocate health inputs in an efficient way. For instance, better educated individuals know more about the harmful effects of a particular behavior and avoid it. Productive efficiency describes the fact that better educated individuals may have higher health outputs from given inputs. For instance, more educated individuals are more likely to adhere to therapeutic instructions.

Furthermore, more highly educated individuals are more likely to adopt and act on new knowledge about healthy behaviors ([Lleras-Muney and Lichtenberg, 2005](#)). For instance, they may keep track of newly available forms of therapy or prevention measures. Psychologists emphasize that more highly educated individuals show more favorable coping strategies (e.g., [Dalgard et al., 2007](#); [Pearlin et al., 1981](#)). Additionally, better educated individuals have been shown to value health more than wealth ([Galama and van Kippersluis, 2010](#)).

Moreover, higher educated individuals typically end up in jobs with higher demand and control (Karasek and Theorell, 1990) or a higher effort and reward balance ([Siegrist, 1996](#)). An imbalance in either one or both of these two aspects of a job increase the individual’s psychological vulnerability. In addition, higher education increases income, which indirectly increases mental health through access to health care (e.g., [Cutler and Lleras-Muney, 2010](#)).

Psychologists highlight that education can also enhance an individual’s cognitive reserve (CR) ([Meng and D’Arcy, 2012](#)). The CR is defined as the ability to tolerate age-related changes and disease-related pathology in the brain without developing clinical symptoms or signs of disease. This could be explained by a more efficient use of existing neural networks or neural compensation in which alternate networks compensate for the pathological disruption of preexistent networks ([Meng and D’Arcy, 2012](#)). We would therefore expect an increase in education to enhance cognitive functioning or abilities, which can be thought of as a measure for CR in old age.

Further, education affects an individual’s relative position in society ([Marmot, 2002](#)). It has been argued that individuals at the lower end of the social hierarchy have less control over their lives and are more subject to the demands of others, which in turn causes stress and stress-related diseases. Hence, higher education can improve mental health as a result of an improved relative position in society. Likewise, better education could enhance mental health because of larger social networks providing social support, social influence, social engagement, and attachment, as well as greater access to resources and material goods ([Berkman, 1995](#); [Berkman et al., 2000](#)).

In contrast to the preceding perspectives, the conservation of resources theory seeks to explain the adverse effects of education on mental health. Individuals are hypothesized to strive for resources (e.g., objects, characteristics, or conditions) and to preserve and protect existing resources. Any loss of resources is assumed to cause stress ([Hobfoll, 1989](#)). According to that, individuals invest resources to obtain

formal educational qualifications and expect to enhance their resources as a result. If these expectations are not fulfilled, a downward spiral of losses begins to cause psychological distress.

### **Empirical identification of the causal effect of education based on exogenous variation in education**

The estimation of the causal effect on mental health outcomes is complicated by three statistical as well as theoretical issues. First, unobserved characteristics such as genetic endowments or the family environment could determine both education as well as mental health outcomes. Second, impaired mental health can severely affect educational outcomes, giving rise to reverse causality. Third, self-reported education may be subject to classical measurement error which attenuates our estimates towards zero. A consequence of these three aspects is that the resulting ordinary least squares estimates, which broadly reflect correlations, are likely to be biased and therefore do not reflect causal effects.

Since randomized control trials are not feasible for ethical and practical reasons, most researchers rely on natural experiments to obtain unbiased estimates of causal effects of education. Of particular interest are sources of variation in education caused by factors that only affect mental health outcomes through education. This assumption is referred to as exclusion restriction ([Angrist, Imbens and Rubin, 1996](#)). Such exogenous variation may be introduced by policy reforms, e.g. compulsory schooling law (CSL) reforms. For example, in Germany, a CSL prolonged compulsory schooling from eight to nine years and was implemented on the state level over a period extending from 1949 to 1969. In addition to the exclusion restriction, the causal effect of education is not allowed to be altered by a change in the schooling assignment of other students for such natural experiments to be valid. To put it differently, general equilibrium effects have to be ruled out. This is commonly referred to as the stable unit treatment value assignment (STUTVA) assumption ([Angrist, Imbens and Rubin, 1996](#)). Finally, under the assumption of effect heterogeneity, all of the reviewed studies but [Feinstein \(2002\)](#) and [Kamhöfer et al. \(2015\)](#) estimate the causal effect of more education on individuals who comply with the source of exogenous variation in education.

The exclusion restriction and STUTVA assumption impose restrictions on the interpretation of empirical studies. The former is usually not testable and has to be justified by institutional knowledge or theoretical considerations. It would be violated, for instance, if the CSL reforms altered the quality of schooling. Since CSL reforms required the employment of additional teachers, the institutions implementing these reforms could have faced a temporary shortage of teachers. Consequently, untrained teachers could have been hired or the teacher-to-student ratio could have been increased. Thus, school quality would have decreased in the short term as a consequence of the CSL reform. In addition, CSL reforms could have delayed tracking and therefore had a negative effect on peer composition in classes. These potential violations of the exclusion restriction in the case of CSL reforms would bias the respective estimates downwards. In addition, the STUTVA assumption is difficult to guarantee because a general increase in mandatory years of schooling may alter the labor market returns of the affected population. As a result, the increase in schooling could affect mental health outcomes indirectly via changed labor market conditions. Similar considerations apply to other sources of exogenous variation in schooling.

The body of empirical studies that are reviewed in the following can be grouped into two categories. One group uses exogenous variation in schooling caused by CSL reforms. The other group utilizes other sources of exogenous variation in schooling.

First we turn to studies that rely on CSL reforms as sources of exogenous variation in schooling and thus estimate the effects of education on individuals who would have finished formal education after compulsory schooling but who remained in school longer due to the reform. For instance, [Glymour et al. \(2008\)](#), [Nguyen et al. \(2016\)](#) and [Banks and Mazonna \(2012\)](#) utilize CSL reforms in the US and England, respectively, to identify the causal effects of education on mental health. [Schneeweis et al. \(2014\)](#) and [Crespo et al. \(2014\)](#) build on CSL reforms across European countries between 1950 and 1969. In addition, [Nguyen et al. \(2016\)](#), also use variation in education caused by a genetic risk score, whose underlying gene variations have been shown to be a significant predictor of educational attainment but are assumed to be unrelated to mental health. [Kamhöfer and Schmitz \(2016\)](#) exploit exogenous variation in schooling caused by an increased supply of schools, in addition to CSL reforms, across Germany. An increased supply of schools is theorized to decrease the competition for available places at schools and to decrease costs (e.g., commuting costs) of attending these schools.

We now turn to the remaining studies, which use a wide range of sources for exogenous variation in education, each estimating a different causal effect of education on mental health for a different subpopulation. For instance, [Chevalier and Feinstein \(2006\)](#) use smoking behavior at the age of 16 and the teacher's recommendation as to whether a child should pursue post-secondary education as a source of exogenous variation in education to evaluate the effect of education on mental health in England, Scotland, and Wales as well. Smoking is a proxy for time preferences that influences the propensity for schooling. In contrast, a teacher's positive recommendation is assumed to induce longer schooling of the respective individuals. [Johansson et al. \(2009\)](#) use the education of the individual's parents, which is predictive for the child's educational success, as exogenous variation in schooling. [Kamhöfer et al. \(2015\)](#) estimate the causal effect of obtaining a tertiary educational degree on mental health in Germany. They exploit increased regional college availability and financial aid eligibility (BAfoeG) as a source of exogenous variation in tertiary education to estimate the effect of tertiary education on mental health outcomes. Higher college availability is argued to decrease competition for available spots at colleges and to decrease the costs of college attendance. The BAfoeG eligibility increases the likelihood of university attendance for individuals whose parental and own financial resources are too low. Lastly, [Feinstein \(2002\)](#) relies on propensity score matching, which makes it possible to compare individuals who differ in their sociodemographic characteristics in order to estimate the causal effect of education on mental health in England, Scotland, and Wales.

### **Education is most beneficial to those at the lower end of the educational distribution**

Table 1 reviews the qualitative results of the aforementioned studies. At a first glance, the results appear rather inconclusive. But if we focus on those studies that exploit CSL reforms as a source of exogenous variation, which are shaded green, we can infer that education has a positive effect on cognitive functioning in all studies but one. More precisely, [Bank and Mazonna \(2012\)](#) confirm a positive effect of education on memory functioning and executive functioning in old age. [Glymour et al. \(2008\)](#) and [Nguyen et al. \(2016\)](#) confirm a positive effect of education in

increasing memory functioning and decreasing negative effect on the risk of dementia in old age. [Crespo et al. \(2014\)](#) report a positive effect of education on performance in word recall tests. Finally, [Schneeweis et al. \(2014\)](#) find that education has a positive impact on memory functioning and verbal fluency, both of which are indicators of cognitive decline. In contrast, Kamhöfer and Schmitz (2016) report no effect of education on cognitive functioning.

The remaining studies, which are depicted in Table 1, are relatively inconclusive: [Kamhöfer et al. \(2015\)](#) confirm a positive effect of tertiary education on cognitive functioning, assessed via mathematical literacy, reading skills, and reading speed. They find no effect on the mental health component summary score, which is a summary measure for mental health symptoms. [Feinstein \(2002\)](#) as well as [Chevalier and Feinstein \(2006\)](#) confirm that more education decreases the likelihood of depression, indicated by the malaise score, a summary measure for emotional disturbances and associated physical symptoms. Lastly, [Johansson et al. \(2009\)](#) find no positive effect of education on their summary measure of mental health symptoms.

Only the studies of [Banks and Mazonna \(2012\)](#), [Kamhöfer et al. \(2015\)](#), and [Kamhöfer and Schmitz \(2016\)](#) address potential channels by which education might affect mental health. [Banks and Mazonna \(2012\)](#) propose increased financial and social resources as well as the possibility that more education could result in more interesting jobs as potential mechanisms. This conclusion may be warranted in the case of the CSL reforms if they result in higher levels of formal qualifications, leading to better jobs and improved employment prospects. Since most of the CSL reforms reflect a mere change in the number of years of compulsory schooling, however, they did not result in higher formal qualifications. It is unlikely that these reforms brought about a significant change in employment prospects, and they are therefore likely to have operated through a different channel. Additionally, [Kamhöfer and Schmitz \(2016\)](#) argued that cognitive abilities are taught early in German schools. Since the CSL reform simply added an additional year of schooling, this did not alter cognitive ability later in life. In contrast, [Kamhöfer et al. \(2015\)](#) found suggestive evidence that tertiary education did indeed increase cognitive functioning in old age through access to cognitively more demanding jobs. Moreover, [Kamhöfer et al. \(2015\)](#) showed that individuals who benefited more from tertiary education actually selected themselves into tertiary education.

### **Further research exploiting more sources of exogenous variation in education and examining potential channels required**

The empirical studies exploiting the CSL reforms confirm a positive effect of one additional year of education on individuals at the lower end of the educational distribution. These are individuals with grades below the average and, on average, with lower socioeconomic status. Moreover, the epidemiological literature confirms a socioeconomic gradient in mental health outcomes ([WHO and Calouste Gulbenkian Foundation, 2014](#)). Thus, education can be considered a measure to alleviate this gradient in mental health outcomes.

All the remaining studies rely on different sources of exogenous variation in education. Consequently, they all estimate different effects for different subgroups of the population. Therefore, more research, building on a wider range of exogenous variation and cross-validating existing studies with different data, is warranted here.

Lastly, the findings on the channels of effects between education and mental health are still scarce. More research is needed to unveil the true channels through which education influences mental health.



Table 1: Overview of empirical studies on the causal effect of education on mental health

Study	Identification Strategy	Country	Cognitive Abilities	Mental Health
Glymour et al. (2008)	Instrumental variable (IV): CSL reform	US	positive	n/a
Bank & Mazonna (2012)	IV <sup>1</sup> : CSL reform	England	positive	n/a
Nguyen et al. (2016)	IV: CSL reform and genetic risk score	US	positive	none
Schneeweiß et al. (2014)	IV: CSL reform	Austria, Czech Republic, Denmark, France, Germany and Italy	positive	none
Crespo et al. (2014)	IV: CSL reform	Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Spain, Sweden and Switzerland	positive	positive
Kamhöfer & Schmitz (2016)	IV: CSL reform, increase in number of schools in intermediate and upper track	Germany	none	n/a
Kamhöfer et al. (2015)	IV <sup>2</sup> : increase in number of schools in upper track and BafoeG eligibility	Germany	positive	none
Feinstein (2002)	PSM	England, Scotland and Wales	n/a	positive
Chevalier & Feinstein (2006)	IV: smoking behavior at age of 16 and teacher's recommendation regarding post-secondary education	England, Scotland and Wales	n/a	positive
Johansson et al. (2009)	IV: parental education	Finland	n/a	none

<sup>1</sup> Banks and Mazonna (2012) employ a fuzzy regression discontinuity design, which is nested in common IV approaches.

<sup>2</sup> To be precise, Kamhöfer et al. (2015) estimated the marginal treatment effect (MTE). The MTE estimates the causal effect of individuals who are indifferent between taking up the treatment (e.g., more schooling) and not taking up the treatment. The MTE makes it possible to recover a wide range of treatment effects, e.g., the local average treatment effect commonly estimated with IV strategies.

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