



# Coping with work-related stressors: does education reduce work-related stress?

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Received: 10 March 2023 / Accepted: 9 August 2023  
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## Abstract

**Aim** Work is a central area of human life, and work-associated stress can affect health over a long period of time. From a health sociological perspective, it was assumed in this paper that education as a resource is able to support the management of stress(ors) and thus has a positive impact on health.

**Subject and methods** This contribution deals with the research question of whether more highly educated people cope better with work-related stressors than those people who are less highly educated. Previous research has already proved the relationship between education and health but not the role that education plays in the coping process. Data from the National Educational Panel Study (NEPS): Starting Cohort 6 – Adults, was used and a cross-sectional analysis was performed. Linear regression models were estimated to analyse the effect of stressors at the workplace on work-related stress.

**Results** The results show that more well-educated people show a lower level of stress, net of stressors and additional controls. Regarding the moderating effect of education, highly qualified workers are better able to cope with a high level of routine in the workplace. However, more highly educated employees report higher stress levels related to the threat of job loss or lack of occupational advancement compared with less well-educated employees.

**Conclusion** The general goal of providing healthy work environments can be reached by helping people to recognize and cope with work-related stressors, and by motivating organizations to prevent their members from harmful stressors. Future research should address the ambivalent role of education in moderating the effect of work-related stressors on stress.

**Keywords** Work-related stressors · Coping · Stress · Health · Education

## Introduction

Stress is one of the main determinants of health in modern societies (Backé et al. 2012; Steptoe 1991). Stress-related illness may cause damage in multiple dimensions. Stress is not only a threat to individual well-being, it damages the economy through people being absent from work, and is a threat to the social security system when people receive payments for early retirement or sick pay. Work is a central area of human life and work-related stress can affect a person's health over a long period of time, for example, in terms of working conditions or employment status (Siegrist 1996;

Voßemer et al. 2018). Educational returns are often only viewed from an economic perspective, such as with regard to professional success or income. In this contribution, the focus is on less work-related stress as a non-monetary return on education. Education is considered as a resource and the focus is on the question of whether education helps people to cope with work-related stressors. The assumption is that higher-educated employees are better able to cope with work-related stressors and, as a result, feel less stressed. Previous research has already proved the relationship between education and health (Lunau et al. 2015), but not the role that education plays in the coping process.

Selye (1964) was the first to use the term 'stress' to describe a set of physical and psychological responses to stressors in the environment. He differentiates between a 'stressor', which is an external force, and 'stress' as the resulting reaction (Le Fevre et al. 2003). Stressors can be stressful life events as well as chronic strain, such as of a familial or work nature. Chronic strain in particular is a

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threat to health due to the long time during which stress levels are present.

Every stress reaction uses a substantial amount of energy on adaptation. If this cannot be replenished during periods of rest due to ongoing stress and threats, the negative effects of the stressors set in (Hurrelmann 2010). Consequently, work-related stressors can lead to strains that affect health in both the short and long-term. Short-term effects of stress are reactions that occur in an acute or ongoing stressful situation and are usually completely eliminated during non-working time through rest (Le Fevre et al. 2003; Nerdinger et al. 2008). In the long-term, stress can result in physical symptoms like high blood pressure. Stress can also lead to behavioural changes and changes on the social side, such as social withdrawal (Hurrelmann 2010). This can in turn result in absenteeism (Murphy and Sorenson 1988) and the use of health care services (Code and Langan-Fox 2001). The International Labour Organization (ILO 2016) reported that ‘50–60% of all lost working days are attributed to work-related stress and the number of people suffering from stress-related conditions caused or made worse by work is likely to increase’. In sum, the consequences of work-related stress are manifold. It constitutes a real threat to employees’ quality of life and health (Nerdinger et al. 2008), which, if not managed, increases the risk of morbidity and mortality (Siegrist 1998). This also has an effect on the employers, since where work-related stress is prevalent, a potential loss of talent may occur (Cartwright and Boyes 2000). In addition, the incapacity to work due to illness generates days of absence and thus causes costs for both the employer and the economy (Schoger and Gross 2018). The assumption in this paper is that education as a resource can help people to cope better with work-related stressors and thus alleviate the negative consequences of stressors on health.

### Theoretical models of psychosocial work stress

The individual perception of stressors plays a significant role in the development of stress (Zapf and Semmer 2004). Whether a person perceives a stressor as a threat or a challenge is connected to the person’s resources and the perceived control over the stressor.

*The Job-Demand Control Model* by Karasek and Theorell (1990) assumes ‘a high risk of psychological strain and physical illness’ when the demands, such as high productivity or time pressure and understaffing are high and control over working conditions, known as decision latitude, is low. *The Job Demands-Resources Model (JD-R model)* by Bakker and Demerouti (2007) defines possible stressors and resources more broadly since specific risk factors and resources exist depending on the company. Moreover, this model implies that resources can protect a person from demanding work tasks (Bakker et al. 2010) and can provide

a coping strategy (Siegrist 2010). According to *the Person-Environment Fit theory (PE Fit)*, which is based on Caplan (1983), a balance between the environment (demands) and the individual (resources) is important in the workplace. A person’s resources must meet the job requirements, role and group norms. Conversely, the characteristics of the work activity should also match the person’s needs. When there is a mismatch between the person and their environment, stressors do exist and stress may occur (Herzberg and Mausner 1959). *Effort-Reward Imbalance (ERI)* by Siegrist (1996) is a theoretical model based on the concept of reciprocity, according to which a person fulfils the demanded work tasks in exchange for desired rewards. It postulates the harmful effect of the combination of high efforts and low reward with regard to salary, social recognition, job security or career opportunities (Siegrist 1996; Siegrist et al. 2004). According to this model, high work efforts that are not rewarded adequately lead to negative responses, including long-term illness (Siegrist 2010). Following the *Lazarus’ Transactional Model of Stress* (1974), the reason for different stress reactions is the individual perception of the factors in the environment (Lazarus and Launier 1981). Demands at work are rated as positive, irrelevant or stressful (Hobfoll 2001; Kauffeld and Hoppe 2011). In the case of an irrelevant or positive stimulus, no harm to the individual is expected. Eustress, or positive stress, can even be inspiring and motivating. Further, some people draw something positive from a stress experience and become stronger (Glanz and Schwartz 2008). However, if the person perceives the situation as stressful, they will check for adequate skills, such as those learned through education, in order to cope with that stressor. If there are not enough resources, the person perceives the situation as threatening and stress will occur (Kauffeld and Hoppe 2011). Thus, depending on the person’s resources, the same working conditions may be bearable for one person and stressful for another (Nerdinger et al. 2008). The role that education plays in this context is examined in the following.

### Stress management and the role of education

Well-being is not just the absence of stressors or strains. Interventions and resources can help to cope with stressors. In order to cope with stressors in the workplace, organizations must be able to identify factors that are potential sources of stressors (Glazer and Liu 2017). Stress management focuses on the interaction between the employee and the work environment (Lazarus and Folkman 1991) and can, first, prevent stressors from emerging, second, help to cope with existing stressors, and third, repair harmful consequences of stressors. Interventions depend on when the

employee or the organization recognizes the need to implement a stress-reducing programme. In this paper, education is regarded primarily as a resource that helps an individual to cope with work-related stressors within the framework of secondary stress management. Additionally, an analysis is carried out to ascertain whether education reduces existing work-related stress in the context of tertiary stress management.

### Primary stress management

Primary stress management focuses on interventions that prevent stressors from emerging, for example, by clearly defining employees' roles or by providing resources, such as computers, printers, etc., which enable them to do their job. The goal is to minimize problems in the work environment and to strengthen those aspects that create a good and healthy working context (Glazer and Liu 2017). In addition, modifications to the working context aim to prevent employees from potential ill health or poor job performance. An important point in this context is the PE fit. On the one hand, it is important for a company to find the right employee for a job. On the other hand, it is equally important for an employee to find work that meets their needs and maintains their values because then they experience fewer strain-producing stressors (Kristof-Brown et al. 2005). Consequently, primary stress management can help to avoid stress (Firth-Cozens 2003).

### Secondary stress management

Secondary stress management is also referred to as *coping*. Interventions or coping strategies help employees to modify or sustain their ability to cope with stressors by helping them to alleviate the risk of work-related illness and workplace injury (Glazer and Liu 2017). Individual resources based on a personal, family, or economic level can be used to mitigate the severity of stressors or to reduce their impact (Zapf and Semmer 2004). Previous research has shown that such resources important for health are education, income and social support (Avendano et al. 2009; Uchino 2006). The emergence of stress depends on whether and how existing resources are used to manage stress. Being able to cope with stressors can empower people. According to the Yerkes-Dodson Law, with its inverted U-shaped function, increasing stress is beneficial up to a point, after which performance starts to decline (Benson and Allen 1980). When coping is not successful, strains may develop (Glazer and Liu 2017).

### Tertiary stress management

Since some stressors cannot be adequately coped with, tertiary stress management interventions try to treat and repair

the harmful consequences of such stressors (Lazarus and Folkman 1991). Stressors that have already led to strains need interventions to withdraw or slow down the effects. Tertiary stress management interventions should focus on both the person and the organization. The goal of such interventions is to eliminate strains by addressing the consequences themselves, such as diabetes management, or the source of the strain, such as reducing the workload.

### Analytical model

In this paper, the aim was to examine the relationship between work-related stressors and work-related stress and its moderation by education. It examined the questions of whether or not education helps to cope with stressors in the workplace, including high level of routine, high level of autonomy, poor working environment, threat of job loss, change in place of work, lack of occupational advancement and lack of salary increase, and whether education directly reduces work-related stress. Figure 1 illustrates the theoretical model.

### Work-related stressors

A job stressor is defined as 'a stimulus external to an employee and a result of an employee's work conditions' (Glazer and Liu 2017). If work requirements exceed a person's resources, work-related stress arises (Dewe and Kompier 2008). Examples of such work stressors are organizational constraints, workplace abuse, work-family conflicts and workload (Liu et al. 2007; Narayanan et al. 1999). Therefore, it was assumed:

*Hypothesis 1: Work-related stressors lead to work-related stress (H1).*

Jobs that are *routine*, with standardized work processes and little or no flexibility in the workplace, can be a stressor. Employees are not allowed to decide how, what and when work is done, and are not prepared to react to unforeseen

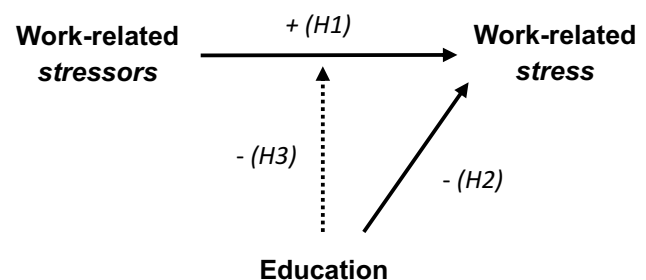


Fig. 1 Theoretical model

situations (Schieman et al. 2006). The work tasks rarely or never change and new processes are hardly ever established. Fried et al. (2013) showed that this kind of excessively monotonous job negatively affects health. Moreover, routine work often includes incomplete and/or partial tasks (Richter and Hacker 1998). There is a risk that a kind of drowsiness sets in among employees, which is accompanied by a reduction in their ability to perform and react (Pfeiffer 2007). Moreover, these kinds of jobs increase the experience of ‘psychological satiety’ or affective aversion to the activity, which in turn causes psychological stress (Peters and O’Connor 1980; Ulich and Wülser 2010). This leads to the assumption:

*Hypothesis 1a:* High levels of routine lead to work-related stress (*H1a*).

*Autonomy* is characteristic for higher-status occupations. On the one hand, autonomy is viewed as a resource that allows greater flexibility on the job, which can help manage work-related stressors (Bakker and Geurts 2004). On the other hand, work demands and work hours are positively related to work autonomy. Self-determined work entails more responsibility and commitments, which can lead to increased stress (Schieman et al. 2006). Jobs with higher status often involve greater personnel responsibility and accountability in the event of disruptions, including work errors, as well as incidents that cannot be planned for. Moreover, employees working in jobs with high autonomy have greater risk of working more than the agreed weekly working hours and outside the usual hours, such as at the weekend. This increases the risk of disrupting the work-life balance, which promotes stress (Sirgy and Lee 2018), and results in the hypothesis:

*Hypothesis 1b:* High levels of autonomy lead to work-related stress (*H1b*).

A *poor working environment* also has an impact on employees’ psychological and physical well-being. If individuals are not satisfied with their job or cannot identify with their organization, they will not be able to provide high-level job performance (Peters and O’Connor 1980), which results in psychological stress (Ulich and Wülser 2010). Impaired working environment features include interpersonal conflicts, bullying, disrespect and social exclusion (Hershcovis 2011; Tepper and Henle 2011). This manifests in the form of gossiping, rude comments, showing favouritism, yelling, lying and ignoring on the part of a supervisor or co-worker (Tepper and Henle 2011). Siegrist (2010) asserts that psychosocial stressors in the workplace, such as unfavourable relationships with others, play a part in developing cardiovascular disease. This implies the following assumption:

*Hypothesis 1c:* A poor working environment leads to work-related stress (*H1c*).

*Changeable job factors* including job insecurity are also potential stressors and associated with poor mental health (Law et al. 2020). The higher the perceived job insecurity, the greater the self-reported stress (Ferrie et al. 2005; Gross et al. 2017). Temporary contracts in connection with missing job protection make life and family planning difficult. In addition, life satisfaction varies greatly with concerns about the future. The feeling of security and predictability of life reduces such concerns (Garhammer 2004). Further stressors are career breaks and career changes. According to Rigotti et al. (2014), these also include transitions associated with occupational advancement. They are accompanied by a short-term increase in psychological stress because they require adaptation to new roles, time structures and social environments (Rigotti et al. 2014). The following assumptions can be made:

*Hypothesis 1d–g:* A threat of job loss (*H1d*), a lack of occupational advancement (*H1e*), a lack of salary increase (*H1f*), and a change in place of work (*H1g*) lead to work-related stress.

## Direct and indirect effects of education

The impact of stressors depends on people’s appraisal of the stressor and their psychological, social and cultural resources (Cohen 1984; Lazarus and Cohen 1977). From a health sociological perspective, it is expected that resources, such as education, have a direct and indirect impact on health. On the one hand, education directly improves health, by enabling meaningful use of medical care for instance. On the other hand, it indirectly promotes healthy habits and influences career choices (Leigh 1983).

Several studies have shown that a low level of education promotes the occurrence of mental and physical illnesses (Abel et al. 2007; Choi et al. 2011). A lack of health knowledge leads to dysfunctional behaviour which is not beneficial to one’s health (Schmidt et al. 2012). In comparison, people with a higher level of education show health-promoting behaviour (Jungbauer-Gans and Gross 2009) and have fewer health problems (Goldman and Smith 2011). This may be due to the fact that among other things, people with a higher level of education have better health insurance (Goldman and Smith 2011) and tend to follow the doctor’s treatment recommendations (Lampert et al. 2005).

In addition, depending on the level of education, people select professions with different health chances and risks. On the one hand, a higher level of education is associated with occupational stress and a lack of physical activity, as found in office workers (Beyer 2002). Highly remunerated jobs in particular, such as managers and professors, are associated with

managerial duties and a lot of responsibility and consequently with a high level of work stress. However, formal education is a central factor in the allocation of professional positions and related bonuses, such as income or recognition (Dragano and Wahrendorf 2014). According to the Effort-Reward Imbalance model, these rewards can help to handle the workload or stressors. However, although higher-status positions bring many rewards, stress can offset these rewards (Schieman et al. 2006). On the other hand, some professions that do not require a (high) qualification are associated with noise, pollution, accident risks and health-damaging shift work (Beyer 2002). Moreover, people with a low level of education often have fewer opportunities in the labour market and have to work in occupations that are often associated with psychosocial workloads (Dragano and Wahrendorf 2014).

Education is expressed in knowledge and competencies that can help if stressors cannot be prevented. These skills help to support the management of stress and health problems. Assuming that education has a direct effect on work-related stress, this leads to the hypothesis:

*Hypothesis 2: Education reduces work-related stress (H2).*

Moreover, knowledge and skills acquired through education encourage a health-promoting lifestyle and the management of stressors. Therefore, the assumption is that people with a higher level of education are better able to cope with work-related stressors since they have coping strategies in the sense of secondary stress management, and can thus alleviate the negative consequences of stressors on health. The longer a person remains in the education system or the higher their educational attainment, the more distinctive their knowledge and competencies, including for health (Lampert et al. 2016). Besides that, education has an additional influence on stress through subsequent career choice and monetary rewards. Education is therefore expected to act as a moderator that reduces the unhealthy effect of work-related stressors on stress:

*Hypothesis 3: More highly educated people cope better with work-related stressors (H3), such as high levels of routine (H3a), high levels of autonomy (H3b), poor working environment (H3c), threat of job loss (H3d), lack of occupational advancement (H3e), lack of salary increase (H3f), and change of workplace (H3g).*

## Method

### Sample

Data was used from the German National Educational Panel Study (NEPS). NEPS is a panel study that has been

conducted annually since 2007 and is representative of the population living in Germany in private households of the birth cohorts 1944 to 1986. The panel provides longitudinal data on educational processes and competence development (Blossfeld et al. 2011). For the analysis, the eighth wave of Starting Cohort 6 – Adults (SC6) was used, which includes the data collected for the years 2007/08–2015/16. The sample was limited to persons who were employed at the time of the survey and the eighth wave. The eighth wave was chosen because it includes detailed information on stress measured by the Standard Stress Scale (SSS) (Gross and Seebaß 2016). Since the data were used in a cross-sectional manner, it was not possible to detect any causal relationships. The ‘effects’ spoken of therefore rely on theoretical considerations rather than proper methodological design. The restriction of using the eighth wave and the deletion of cases with missing values resulted in a sample size of 13,007 persons.

### Measures

The dependent variable was *work-related stress*. A 4-item sub-scale for work-related stress was developed based on a factor analysis with the 11 items of the SSS (Gross and Seebaß 2016), which measures the general stress level and is based on the theoretical considerations of Effort-Reward Imbalance and the Job-Demand Control model. The sub-scale for work-related stress included the following four items: ‘I pursue useful activities.’, ‘My services are properly appreciated.’, ‘I worry about how my life might look like in three years.’ and ‘I look forward to the future.’ ranging from 1 (*not at all*) to 5 (*completely*) on a 5-point Likert scale (see Table 2 in the appendix for the results of the factor analysis). Three of the items were reverse-coded such that a higher score indicates more work-related stress.

*Years of education* measures the level of education as both a covariate and as a *moderator variable* in the model. It was assumed that knowledge and competencies are more distinct the longer an individual has been in the educational system or the higher the degree is (Schneider 2015). Education was defined in years (7–18), which are institutionally necessary for achieving the highest educational level of a person (CASMIN educational classification); 18 years stands for the attainment of tertiary education (university degree), 13 years for a high-school certificate and, due to some levels of education being compulsory in Germany, 7 years was assigned to people without any qualification (Hundertmark 2013).

The central independent variables were *work-related stressors*: high level of routine, high level of autonomy, poor working environment, probable job loss, lack of occupational advancement, lack of salary increase and change of workplace.



*Routine* was a factor variable created out of four variables: ‘How often does it happen that you get tasks at work which you first have to become familiar with?’, ‘How often do you have to react to situations at work which you had not been able to anticipate?’, ‘How often do you change the tasks which you have to carry out at work?’ and ‘How often do you have to do things at work which you have not done before?’. Responses were given on a 5-point rating scale from 1 (*always/very frequently*) to 5 (*very rarely/never*); therefore, a high value indicates a high level of routine.

*Autonomy* was also a factor variable, comprising four variables: ‘How often are you able to organize your work yourself?’, ‘How often do you have the opportunity in your work to constantly look out for new tasks?’, ‘How often are you able to determine your pace of work yourself?’, and ‘How often are you personally involved in important strategic decisions in your firm, for instance, concerning products manufactured and services performed, number of employees, or finances?’. These items were rated on a 5-point scale ranging from 1 (*always/very frequently*) to 5 (*very rarely/never*). The items were reverse-coded so that higher numbers represent more autonomy.

*Poor working environment* was an independent variable with an item asking for the respondent’s level of agreement with the following: ‘How often is the working atmosphere disturbed by, for example, conflicts with colleagues or with supervisors, or mobbing?’. Response choices were 1 (*often*) to 5 (*never*). The items were reverse-coded so that a high score indicated a poor working environment.

A question asking about potential *job loss* was: ‘How likely is it that you will lose your job within the next two years?’. Responses were recoded on a 6-point scale so that a high number indicated a probable job loss, from 1 (*very unlikely*) to 6 (*very likely*).

*Lack of occupational advancement* Career advancement was assessed by asking: ‘How likely is it that you will be promoted in your current place of work within the next two years?’. Response choices were from 1 (*very likely*) to 6 (*very unlikely*); therefore, a high value indicated a lack of occupational advancement.

*Lack of salary increase* The question about salary increase asked ‘How likely is it that you will receive an increase in your wage or salary above the general level of pay rises within the next two years?’ Response choices were 1 (*very likely*) to 6 (*very unlikely*); therefore, a high number indicated a salary increase was unlikely.

*Change of workplace* One item assessed change of work location: ‘How likely is it that you personally will move from your current place of work to another employer within the next two years?’. Response choices were recoded to 1 (*very unlikely*) and 6 (*very likely*).

*Control variables* were inserted into the model to include age, sex, birth in Germany, children in household, social

capital (factor variable created out of the two variables: satisfaction with family life and satisfaction with friends and acquaintances), occupational prestige (Standard International Occupational Prestige Scale (SIOPS-08)), individual net income, and the Big Five personality traits of extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience.

Since the aim was to explain the variation in work-related stress between the respondents, a cross-sectional analysis was performed. Linear regression models were estimated to analyse the effect of stressors at the workplace on work-related stress. Education was used as a moderator variable in the model to examine whether more highly educated people dealt better with work-related stressors than those who were less educated. Three different models were estimated, with the first model including the work-related stressors as independent variables and control variables. The second model additionally included education, and the third model incorporated the interactions of work-related stressors and education to test the moderating effect of education. All analyses were carried out with Stata 15.1.

## Results

All three models appear in Table 1. *Model 1* shows the association of all work-related stressors including controls. It can be seen that a high level of work-related stress was associated with a high level of autonomy, a poor working environment, a threat of job loss, a probable change in place of work, lack of occupational advancement and lack of salary increase. These findings were all in line with general *hypothesis 1: work-related stressors lead to work-related stress (H1)*. However, a high level of routine is also associated with a low stress level (against *hypothesis 1a*).

Including education in *model 2* did not lead to any significant changes of the stressors or controls. More highly educated people showed a lower level of work-related stress net of the stressors and controls (conforming to *hypothesis 2*).

The moderating effect of education was tested in *model 3* by including the interaction terms of each stressor with education. The assumption was that more highly educated people cope better with work-related stressors and are better able to deal with stress. Please note that the main effects of years of education and stressors cannot be interpreted straightforwardly, nor can they be compared to those in model 2 due to the interaction terms. In addition, the inclusion of the interaction terms is accompanied by a considerable loss of statistical power of the main variables included in the interaction terms. Therefore, the focus of

**Table 1** Linear regression models on work-related stress (based on NEPS data, SC6)

	Model 1 Stressors coef. ( <i>t</i> -value)	Model 2 + Education coef. ( <i>t</i> -value)	Model 3 + Interactions coef. ( <i>t</i> -value)
<b>Work-related stressors (<i>H1</i>)</b>			
High routine	-0.060*** (-7.02)	-0.071*** (-8.19)	0.135** (2.69)
High autonomy	0.132*** (16.68)	0.138*** (17.36)	0.100* (1.98)
Poor working environment	0.120*** (12.73)	0.118*** (12.56)	0.214*** (3.57)
Probable job loss	0.114*** (16.80)	0.111*** (16.42)	0.010 (0.24)
No career advancement	0.019** (2.90)	0.019** (2.88)	-0.066 (-1.57)
No salary increase	0.051*** (8.87)	0.054*** (9.42)	0.056 (1.58)
Change of workplace	0.052*** (7.92)	0.053*** (8.21)	0.096* (2.45)
<b>Years of education (<i>H2</i>)</b>			
		-0.035*** (-8.58)	-0.057*** (-3.36)
<b>Stressors x education (<i>H3</i>)</b>			
High routine x education			-0.015*** (-4.13)
High autonomy x education			0.003 (0.73)
Poor working environment x education			-0.007 (-1.59)
Probable job loss x education			0.007* (2.46)
No career advancement x education			0.006* (2.01)
No salary increase x education			-0.000 (-0.05)
Change of workplace x education			-0.003 (-1.11)
Constant	0.183 (0.89)	0.681** (3.18)	0.986** (3.05)
<i>N</i>	13,007	13,007	13,007
R <sup>2</sup>	0.246	0.250	0.251
R <sup>2</sup> adj.	0.244	0.249	0.250

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

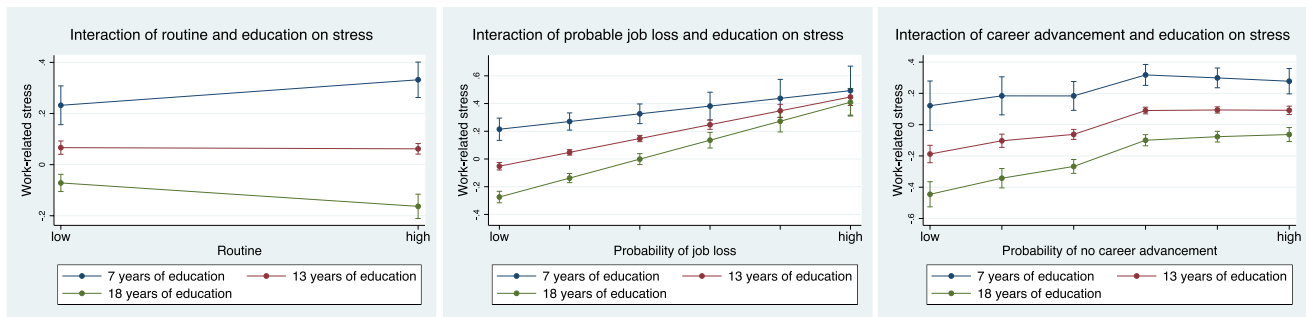
All models controlled for age, sex, birth in Germany, children in household, social capital, occupational prestige, individual net income, and Big Five personality traits.

coef., regression coefficients

R<sup>2</sup> adj., adjusted R<sup>2</sup>

the interpretation in model 3 is on the interaction terms only. Figure 2 illustrates the significant interaction terms. The gaps between the lines for 7, 13 and 18 years of education show the main effect of education. The deviation from fictive parallel slopes allows interpretation of the main effect of each stressor by the average slopes of the lines and the interaction effect of education and stressor on stress (*y*-axes).

It can be seen that highly educated people are significantly better able to cope with a high level of routine in the workplace regarding their stress level. A high probability of no occupational advancement, however, is more stressful for more highly educated people than for less well educated people. In addition, threat of job loss increases the stress level of highly educated people more than the stress level of poorly educated people.



**Fig. 2** Illustration of significant interaction terms of stressors and education on work-related stress

To sum up, educational level only moderates the stress-increasing effects of some stressors such as high level of routine, threat of job loss and no probable occupational advancement. It does not moderate the effects of high autonomy, poor working environment, lack of salary increase or change in place of work. However, highly educated people do not cope as well with stressors that indicate stagnation or risk their career, which could be due to their higher career ambitions.

## Discussion and outlook

In general, educational returns are often just seen from an economic perspective. The individual becomes more productive through education (Becker 1964), receives higher wages (Schneider 2015), has more opportunities in the labour market and a higher employability (Berntson et al. 2006). As a complement of these factors, less work-related stress as a non-monetary return on education was examined in this study.

Education was considered as a resource which has a decreasing direct effect on work-related stress and a mitigating effect on the stressors (Jacobshagen and Rigotti 2008). It was assumed that this mitigating effect results from coping strategies that help employees to modify or sustain their ability to cope with the experience of stressors. Coping strategies were introduced in the sense of secondary stress management, the assumption being that they mitigate the possible harm of work stressors (Cooper et al. 2001). Education can imply the gain or better use of information, both of which can lead to a healthier behaviour (Cutler and Lleras-Muney 2010). Education in the form of knowledge and competencies alleviates the negative consequences of stressors on health and therefore supports

the management of stress (Zapf and Semmer 2004). To sum up, it was assumed that work-related stressors have an impact on stress (*hypothesis 1*), that education directly reduces stress (*hypothesis 2*), and additionally that education moderates, or reduces, the unhealthy effect of work-related stressors on stress (*hypothesis 3*).

The findings of this paper show the main effects of work-related stressors on stress. High levels of autonomy are associated with a high level of stress, independent of people's educational level. Although autonomy goes hand in hand with a large degree of freedom in working life, it is also associated with great responsibility and discipline, which in turn has an impact on stress. A poor working environment is significantly associated with a high stress level, net of any controls and educational level, and does not differ by educational level. Therefore, it does not hold that more highly educated people can cope better with a poor working environment. In addition, it was found that several changeable job factors are also associated with stress. Whereas a high likelihood of job loss or a change in the workplace increases stress levels, a probable occupational advancement and salary increase reduces the stress level, net of any controls and educational level, which is in line with initial assumptions. Despite the ambiguous role of routine on stress, which is discussed below, *hypothesis 1: work-related stressors lead to work-related stress (H1)* can be confirmed.

In general, more highly educated people show a lower level of work-related stress than the less educated, net of work-related stressors and several controls. Although the direct effect of education is highly significant, the effect size is rather small and the share of explained variance ( $R^2$ ) of the outcome increases only by 0.4% when including years of education in the model. Therefore, *hypothesis 2: education reduces work-related stress (H2)* can also be confirmed.



It was also assumed that a high level of routine is associated with a high level of stress. Without any interactions, this assumption holds (see models 1 and 2 in Table 1). However, when modelling the moderating effect of education on the stressors by including the interaction terms of each stressor with education, the direction of the effect changes (see model 3 in Table 1). Thus, regarding the moderating role of education (*hypothesis 3: more highly educated people cope better with work-related stressors (H3)*), more highly educated people can deal better with a high number of *routine tasks*, maybe because they have more challenging jobs and are pleased to have at least some routine in their daily working life as their work tasks are generally more ambitious and manifold. However, more highly educated people are more stressed by a *threat of job loss*. They have invested a lot and therefore have more to lose. They probably have higher expectations and are more focused on work in general. Nevertheless, they should be better prepared to find a new job. The stress-enhancing effect of *no probable occupational advancement* is larger for highly educated people. This association could be driven by the (stressful) fear of the more highly educated that their career may stagnate. Highly educated people benefit more from an *occupational advancement* concerning stress reduction. Owing to their longer stay in the educational system, they aim for higher positions and have a stronger ambition to improve themselves job-wise. The findings show that educational level moderates several stressors, although the social mechanisms involved remain on a speculative basis.

Therefore, future research should shed more light on the role of education in decreasing the stress-enhancing effect of work-related stressors. Why do more highly educated people cope better, or less well, with specific stressors? Is it because of differences in knowledge, self-control, or something else? How can human resource development reduce potential stressors? The general goal of providing healthy work environments can be reached by helping people to recognize and cope with work-related stressors, and to motivate organizations to prevent their members from harmful stressors, such as by implementing policies and mechanisms to assist their employees to better deal with work-related stressors (Glazer and Liu 2017).

## Appendix

**Table 2** Exploratory factor analysis

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Uniqueness
Routine1 <sup>1</sup>	0.7767				0.3873
Routine2 <sup>2</sup>	0.7251				0.4698
Routine3 <sup>3</sup>	0.7632				0.4104
Routine4 <sup>4</sup>	0.7924				0.3657
Autonomy1 <sup>5</sup>		0.8269			0.3129
Autonomy2 <sup>6</sup>		0.6189			0.4695
Autonomy3 <sup>7</sup>		0.8061			0.3424
Autonomy4 <sup>8</sup>		0.5024			0.6170
Social_Capital1 <sup>9</sup>				0.8469	0.2606
Social_Capital2 <sup>10</sup>				0.8610	0.2517
Stress3 <sup>11</sup>			0.5569		0.6559
Stress5 <sup>12</sup>			0.5490		0.6406
Stress10 <sup>13</sup>			0.7120		0.4733
Stress11 <sup>14</sup>			0.7229		0.4260

blanks represent factor loading <.4

1. 'How often does it happen that you get tasks at work which you first have to become familiar with?'
2. 'How often do you have to react to situations at work which you had not been able to anticipate?'
3. 'How often do you change the tasks which you have to carry out at work?'
4. 'How often do you have to do things at work which you have not done before?'
5. 'How often are you able to organize your work yourself?'
6. 'How often do you have the opportunity in your work to constantly look out for new tasks?'
7. 'How often are you able to determine your pace of work yourself?'
8. 'How often are you personally involved in important strategic decisions in your firm, for instance concerning products manufactured and services performed, number of employees, or finances?'
9. 'How satisfied are you with your family life?'
10. 'How satisfied are you with your group of friends?'
11. 'I pursue useful activities.'
12. 'My services are properly appreciated.'
13. 'I worry about how my life might look like in three years.'
14. 'I look forward to the future.'

**Acknowledgments** I would like to sincerely thank Prof. Dr. Christiane Gross for her active and very helpful support in the realization of this paper.

**Authors' contributions** Not applicable.

**Funding** Open Access funding enabled and organized by Projekt DEAL. I thank the Federal Ministry of Education and Research (BMBF) for funding the project (Grant number: IBIGA3).

**Data availability** This paper uses data from the National Educational Panel Study (NEPS): Starting Cohort 6 – Adults, doi:10.5157/NEPS:SC6:8.0.0. From 2008 to 2013, NEPS data were collected as part of the Framework Programme for the Promotion of Empirical Educational Research funded by the German Federal Ministry of Education and Research (BMBF). As of 2014, the NEPS survey is carried out by the Leibniz Institute for Educational Trajectories (LIfBi) at the University of Bamberg in cooperation with a nationwide network.

**Code availability** Not applicable.

## Declarations

**Ethics approval** Not applicable.

**Consent to participate** Not applicable.

**Consent for publication** Not applicable.

**Conflict of interest** The author has no relevant financial or non-financial interests to disclose.

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