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DISCUSSION PAPER SERIES

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ABSTRACT

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We investigate whether job autonomy is associated with employees' sickness absence. We can make use of the representative German Study of Mental Health at Work data. In line with our theoretical considerations, we do find evidence for an inverse relation between employees' job autonomy and days of sickness absence. This relation is only weakly mediated by job satisfaction and particularly relevant for more senior employees.

JEL Classification: J81, M12

Keywords: job autonomy, sickness absence, age, job satisfaction

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The Role of Employees' Age for the Relation between Job Autonomy and Sickness Absence

1. Introduction

Work relations have changed dramatically in most industrialized countries since the early 1990s. Global competition and fast technological change demand high flexibility from establishments and employees alike (Shvartsman & Beckmann 2015). In this context, the employees' working environment issues are of great interest. A large proportion of employees in European countries report being exposed to psychosocial stressors at work, and the consequences in terms of mental disorders and stress are believed to be very significant for workers, workplaces, and society (Väänänen et al. 2003). In the European Working Conditions Survey 2010, over 26 % of the respondents from the EU countries report that they experience stress at work "always or most of the time", and an additional 40 % state that they do so at least "sometimes" (Eurofound 2010). According to a European Commission report, 50 % of the respondents who state that stress, depression, or anxiety are their major work-related health problem, had to go on sick leave in the last twelve months and over 20 % missed out on more than a month of work (Eurostat 2010). These results show that sickness absence implies a serious consequence for firms and organizations.

Sickness absence is a costly personnel problem that has attracted the attention of managers and researchers alike (Mowday et al. 1983). Sickness absence is defined as an individual's absence from work due to health problems like illness, health care, or medical examinations. As an example, the average number of days absent due to sickness rose from 8.1 per employee per year in 2007 to more than 10.6 in 2018 in Germany (DESTATIS 2019).

Sickness absence is increasing in employees' age. Due to this development, it is important to understand the determinants of employees' sickness absence. Sickness absence can imply considerable costs for firms (due to sickness benefits and necessary additional hiring processes, for instance (Mowday et al. 1983)) and represents a source of disruption to the organization.

Empirical research has already previously addressed the relation of HR related issues and employees' sickness absence. The literature includes contributions on the institutional environment of the firm, inter-personal relations, and the organization of work. With regard to the institutional environment, Arnold et al. (2018) find that the existence of a work council is positively correlated with the incidence and the annual duration of sickness absence and corresponding personnel problems. As for the role of social relations between employees, Pranjić et al. (2006) demonstrate that the experience of persistent mobbing is a significant predictor for employees' sick leave. Regarding the organization of work, job control can be understood as a more broad measure compared to job autonomy as we will explain below. Evidence for the U.K. (North et al. 1993) and Sweden (Blank and Diderichsen 1995) hint for an inverse relationship between job control and (repeated) sickness absence spells.

Exploring the concept of job autonomy as part of job control is relevant from the firm perspective primarily because it is positively related to productivity on the individual (Strain 1999) and organizational (Hirst et al. 2008) level. From an employees' perspective, the degree of job autonomy can play a significant role in terms of dealing with psychological stressors at work. Roelen et al. (2007), however, find no relation between job autonomy and short or long duration absence in two Dutch firms. Using data from the German Socio-Economic Panel, Beblo and Ortlieb (2012) show that a rather broad measure of job autonomy including personal development and decisions rights on rewards of others is negatively related to absent days from work.

We focus on job autonomy in a narrower sense and assume that less autonomy at work makes it much more difficult for employees to organize themselves and their work, which may lead to excessive demand on employees, possibly resulting in unhealthiness, and thus in sickness absence. We argue that this relation may be relevant for more senior employees in particular.

This leads to our two research questions: 1.) Is job autonomy related to employees' sickness absence?, and 2.) Is the relation between job autonomy and absence moderated by employees' age?

For our study, we make use of data from the Study of Mental Health at Work, which provides detailed information about our main variables (job autonomy, sickness absence) as well as individual and job characteristics. The Study of Mental Health at Work is a German-wide representative study focusing on the relationship between working conditions, mental health, and working ability. Thanks to comprehensive data, we are able to use a concreate measure for job autonomy. We generate this variable as a standardized index measured by four autonomy items, namely work in general, work content, amount of work, and cooperation with colleagues. Using a representative dataset, we further investigate whether the relation between job autonomy and sickness absence is particularly relevant for more senior employees.

This paper proceeds as follows. In section 2, we refer to theoretical approaches and empirical findings. Our dataset, variables, and empirical methodology are described in section 3. Our empirical results are presented in section 4. A discussion of the results follows in section 5.

2. Theoretical considerations and hypotheses

Job autonomy can be considered as an integral part of job control. The concept of individuals' *job control* refers to "job and organizational characteristics, such as the

employee's decision-making authority, opportunities to participate, and opportunities to use skills and knowledge" (Heponiemi et al. 2014). Job control is associated with many organizational and individual outcomes. Previous empirical studies have repeatedly demonstrated its importance for employees' health. For example, low job control has been associated with increased heart disease risk (Bosma et al. 1998) and with greater fibrinogen responses to stress (Steptoe et al. 2003). Moreover, it has been associated with an increased number of sick-leave spells (Arola et al. 2003).

A closely related construct to job control is *job autonomy*. Job autonomy is seen as a specific form of the more general concept of job control. It is defined as "the degree to which the job provides substantial freedom, independence, and discretion to the employee in scheduling the work and in determining the procedures to be used in carrying it out" (Hackman & Oldham 1975). Job autonomy refers to the extent to which an individual can determine his or her methods, pace, and effort to accomplish work tasks.

There might be job characteristics, which already come along with a certain scope for action and decision at work. These characteristics have to be differentiated from the constructs of job control and job autonomy. Examples are the hierarchical level or the occupational status of employees, which are again to individual characteristics such as years of schooling.

For explaining the expected relation between job autonomy and sickness absence, three theoretical approaches will be considered. First, the *Job Characteristics Model* by Hackman and Oldham (1976) specifies the conditions under which individuals will become intrinsically motivated to perform effectively on their jobs. The model focuses on the interaction among three classes of variables: (1) the psychological states of employees that must be present for intrinsically motivated work behavior to develop (critical psychological states), (2) the characteristics of jobs that can create these psychological states (core job

dimensions), and (3) the attributes of individuals that determine how positively a person will respond to a complex and challenging job (personal and work outcomes).

Second, the *Job Demand Control Model* by Karasek (1979) predicts that mental strain at work results from the interaction of job demands and job decision latitude. According to this model, one must distinguish between two important elements of the working environment at the individual level: (1) the job demands placed on the worker and (2) the degree of discretion permitted to the worker in deciding how to meet these demands. Job demands are the psychological stressors related to workload, unexpected tasks, and job-related personal conflicts. Job decision latitude is defined as the working individual's potential control over her tasks and her conduct during the working day. It comprises autonomy in task organization decisions (decision authority) and variety in skill use (intellectual discretion). The model postulates that psychological strain results from the joint effects of the demands of a work situation and the range of decision-making freedom (discretion) available to the worker facing those demands. These two aspects of the job situation represent, respectively, the instigators of action (workload demands, conflicts, or other stressors which place the individual in a motivated or energized state of "stress") and the constraints on the alternative resulting actions.

Third, the *Michigan Model* places much emphasis on an individual`s own subjective perceptions of stressors. Environmental stressors, such as role ambiguity, conflict, lack of participation, job security, workload, lack of challenge, are subjectively perceived, and personality variables, demographics, and social support moderate these perceptions, leading to health outcomes (Caplan et al. 1975).

According to the Job Characteristics Model, some job characteristics (or core job dimensions) can create psychological states for employees that must be present for motivated

work behavior to develop. Hackman and Oldham (1976) define job autonomy as one core job dimension that can lead to these psychological states and further to personal and work outcomes. Personal and work outcomes include high internal work motivation, high quality work performance, high satisfaction with work, low absenteeism, and turnover. These could also include low sickness absence, since high work motivation and job satisfaction can make a major contribution to well-being and health of employees (Hackman & Oldham 1976). Based on the Job Demand Control Model (Karasek 1979), mental strain at work results from the interaction of job demands and job decision latitude. Job decision latitude is an individual's potential control over her or his tasks during the workday. It comprises autonomy in task organization decisions and variety in skill use. Therefore, less job autonomy is related to low job control, which in turn may lead to mental strain and sickness absence. In line with the previous arguments, the Michigan Model (Caplan et al. 1975) states that subjectively perceived autonomy at work is beneficial for good health outcomes, and thus low sickness absence.

In the empirical literature, a number of studies investigate the relation between job autonomy and sickness absence. , The results of an early meta-analysis by Farrell and Stamm (1988) indicated that the provision of job (or task) autonomy can be effective for reducing absence duration. In a study in the private industrial sector by Väänänen et al. (2003), low job autonomy was found to be associated with long episodes of sickness absence for men and women. Based on the previous theoretical and empirical arguments, we conclude:

Hypothesis 1: The degree of job autonomy is negatively related to sickness absence.[1]

We further suppose that job autonomy is more relevant for older employees for at least two reasons. First, older employees might have more difficulties with workload peaks compared

[1] Negative relations in this context indicate that more job autonomy reduces the probability of being absent from work due to sickness.

to younger employees; thus, more autonomy at work would be of particular importance for them to be able to smoothing out peaks. Second, expected seniority privileges may play a role. According to Lazear (1979), the firm's optimal age-earnings strategy is to pay workers less than their marginal value product in their early years with the firm and more in their later years. Paying senior workers relatively high wages acts as an incentive to increase work effort among junior colleagues who are aspiring to their positions. In more general, older employees may, therefore, have higher expectations due to anticipated seniority privileges. In contrast, job autonomy may be less important for younger employees as long as they anticipate to achieve seniority privileges in the future for they own (see Clark et al. (2009) for this kind of tunnel effect with regard to compensation). These considerations lead to:

Hypothesis 2: The degree of job autonomy is negatively related to sickness absence for older employees in particular.

3. Data, variables, and methodology

3.1 Dataset

For this paper, data are used from the Study on Mental Health at Work. This is a German-wide representative study focusing on the relationship between working conditions, mental health, and working ability. The study considers employees from the birth cohort 1951 to 1980. A cluster sample was drawn within a two-stage sampling procedure with a stratified selection of regions at the first level followed by a random sample of participants within regions. In total, n=4,511 employees were assessed face-to-face in a computer-assisted personal interview and with standardized questionnaires in the year 2012. The survey addresses working conditions, indicators of mental health, work ability, as well as socio-economic status, household and family context, and personal characteristics.

For this paper, we restrict our data to individuals with a current employment contract and who work at least 15 hours per normal workweek. This leads to a cross-section sample of n=3,099 observations.

3.2 Variables

Sickness absence represents our dependent variable and is assessed by the question "How many days have you been absent from work during the last 12 months due to health problems such as sickness, health care, or health examinations?" Sickness absence is captured by an ordinal variable with the five categories (i) 0 days, (ii) 1 to 9 days, (iii) 10 to 24 days, (iv) 25 to 99 days and (v) at least 100 days. In our sample, most of the employees are absent from work due to illness for 1 to 9 days (see Table 1). It is important to distinguish sickness absence from employee absenteeism. Absenteeism, or voluntary absenteeism, involves an escape from, or even protest against, poor work circumstances (motivational reaction) (Chadwick-Jones et al. 1982). Voluntary absenteeism is usually operationalized as absence frequency, i.e. the number of spells or times an employee has been absent during a particular period, regardless of the length of each of those spells (Steel 2003). Another explanation for employee absenteeism is that absence behavior is a reaction to distress caused by job demands. This explanation stipulates that absenteeism may be used as a coping mechanism to deal with stressful job demands and that it is not merely a behavioral reaction to dissatisfaction (Kristensen 1991).[2]

[2] In this context, it would also be interesting to investigate whether job autonomy is related to presenteeism. Presenteeism refers to a person's attending work even if they are sick (Johns 2010). One would expect high levels of job autonomy to be positively related to presenteeism. Reasons for attending may vary from conscientiousness, commitment to the organization, and individual and/or cultural norms ("work ethic"). Employees may feel obliged to go to work even if they are sick when they are dealing with various areas of responsibilities. Some authors even suggest that presenteeism costs firms and companies much more than absenteeism does (Hemp 2004). Explicit data on presenteeism or absenteeism, however, are hard to measure. Both are likely to be relevant in all investigations on absence on survey data.

Our independent variable job autonomy is based on the Copenhagen Psychosocial Questionnaire by Kristensen et al. (2005). Job autonomy is computed as a standardized index measured by four items. The first item (work in general) is assessed by the question "How often do you have influence concerning your work?" The second item (work content) is requested by "How often do you have any influence on what you do at work?" The next item (amount of work) is queried by "How often can you influence the amount of work?" The fourth item (cooperation with colleagues) is assessed by the question "How often do you have a say in choosing who you work with?" Possible answers for these questions range from 1=never/nearly never to 5=always.[3]

Thanks to comprehensive data from the Study of Mental Health at Work and in line with previous empirical studies on sickness absence (e.g. Johansson & Lundberg 2004, Väänänen et al. 2003), we control for gender, age, marital status (married or not), children (having children or nor), level of education, occupational status, tenure (in years), type of employment contract (fixed-term contract or not), weekly working hours, and job requirements. We assume that sickness absence might also depend on the employees' gender and age and further on their private situation, such as being married or having children. Furthermore, we assume that the level of education, the occupational status, employees' tenure, and working on a fixed-term contract might be related to sickness absence. Employees who are only employed for a fixed period of time might feel under great pressure and therefore either become sick more often or show up even if being sick. We further include weekly working hours as a control variable in our analysis. Employees who work many hours might be more at risk of becoming sick. Employees' sickness absence might also depend on the (daily) job requirements at work. These job requirements include six

[3] In a first step, we generate a variable which is the average from the four items (work in general, work content, amount of work, and cooperation with colleagues). In a second step, we standardize this variable.

items, namely working very fast ("How often do you have to work very fast?"), work piling up ("How often is your work unevenly distributed so it piles up?"), having no time to complete work tasks ("How often do you not have time to complete all your work tasks?"), being behind schedule with work tasks ("How often are you behind with your work tasks?"), having enough time to complete tasks[4] ("How often is there enough time to complete all your work tasks?"), and working overtime ("How often do you have to do overtime/extra work?"). Possible answers for these questions range from 1 (=never) to 5 (=nearly always). Job requirements are computed as a standardized index measured by these six items.

The descriptive statistics of our variables are presented in Table 1. 46 % of the employees are female and two of three individuals in the sample are married. Most of the employees are white-collar workers and civil servants. They work around 40 hours per week and 5 % of them are employed on a fixed-term contract.

[4] For this question, the reversed version is used (having not enough time to complete tasks).

Table 1: Descriptive statistics (n=3,099)

Variable	Mean/ Share	Std. Dev.	Min.	Max.
Sickness absence				
0 days	0.351			
≤ 9 days	0.362			
10-24 days	0.168			
25-99 days	0.010			
≥ 100 days	0.019			
Job autonomy*	0	1	-1.686	2.346
Gender (1=female)	0.461			
Age				
31-35 years	0.098			
36-40 years	0.146			
41-45 years	0.200			
46-50 years	0.223			
51-55 years	0.189			
56-60 years	0.148			
Married (1=yes)	0.680			
Child(ren) (1=yes)	0.300			
Years of schooling	12.90			
Occupational status				
Blue-collar worker	0.258			
White-collar worker/Civil servant	0.742			
Tenure (in years)	16.12	11.08		
Fixed-term contract (1=yes)	0.048			
Weekly working hours	39.24	10.09		
Job requirements*	0	1	-2.345	2.599

Note: *Standardized index as described above.

3.3 Empirical methodology

For our analysis, we apply ordered probit, multinomial logit and binary probit estimations. The general estimation equation is described as:

$$Sickness\ absence = \beta\ * job\ autonomy + \gamma * controls + \epsilon.$$

Job autonomy is computed as a standardized index measured by four items (see section 3.2 for detailed description). We control for gender, age, marital status (married or not), child(ren), level of education, occupational status, tenure, type of employment contract (fixed-term contract or not), weekly working hours, and job requirements. We examine whether job autonomy is related to sickness absence. We want to investigate whether employees who score high on job autonomy are less likely to be absent from work due to sickness.

Based on the assumption that the relation between job autonomy and sickness absence might (partly) depend on the employees' age, we further apply an estimation including interaction terms for age. We suppose that a certain degree of job autonomy is particularly important for older employees.

4. Results

Table 2 presents the results of the ordered probit estimation on sickness absence. The results show that job autonomy is negatively related to the probability of being absent from work due to illness. Therefore, employees with a certain degree of job autonomy tend to become sick less often. This finding is in line with hypothesis 1.

Regarding the analysis of our control variables, we find that older employees (51-60 years of age) are more likely to be absent from work due to illness. On the other hand, married

employees as well as employees working on a fixed-term contract report less sickness absence. It might be the case that fixed-term workers want to make a good impression and thus work particularly hard for a possible contract extension. Therefore, these employees are less likely to be absent from work due to sickness. In line with our assumption, being exposed to high job requirements is positively related to sickness absence. Thus, employees who are often under great pressure and do not get their work done report higher sickness absence.

Table 2: Ordered probit estimation on sickness absence

Variables	Sickness absence
Job autonomy	-0.105***
	(0.022)
Gender (1=female)	0.045
	(0.048)
Age (base age: 31-35 years)	
36-40 years	0.051
	(0.073)
41-45 years	0.055
	(0.071)
46-50 years	0.084
	(0.072)
51-55 years	0.160**
	(0.080)
56-60 years	0.210**
	(0.087)
Married (1=yes)	-0.133***
	(0.044)
Child(ren) (1=yes)	0.036
	(0.050)
Years of schooling	0.003
	(0.008)
White-collar worker/civil servant (1=yes)	-0.137***
	(0.051)
Tenure (in years)	-0.003
	(0.002)
Fixed-term contract (1=yes)	-0.279***
	(0.097)
Weekly working hours	-0.0004
	(0.002)
Job requirements	0.058***
	(0.021)
# Observations	3,099

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Days of sickness absence are measured in four categories as described above. We therefore complement the ordered probit estimation by applying a multinomial logit model in order to reveal possible relevant thresholds for the relation of job autonomy and values of absent days. Corresponding results are presented in Table 3. No sickness absence (0 sick leave days) represents our base outcome. The results show that job autonomy is negatively related to sickness absence and that this negative relation is getting stronger for employees with more sick leave days up to 99 days (compared to the base outcome). The relation is only weak significant for the long-term sick (≥ 100 sick leave days) and the corresponding coefficient is not larger than that for the category 25-99 absent days. This result indicate that job autonomy has no (additional) effect for the chronically or seriously sick persons.[5]

[5] Accordingly, we recode our categorical dependent variable into binary variables with persons with no/few and many absent days using the four possible thresholds (see Table A1 in the Appendix). Again and in line with the multinomial approach, we reveal that job autonomy is inversely related to sickness absence up to the category with at most 99 absent days (Models 1 to 3), whereas there is no additional effect for chronically/seriously sick persons (Model 4).

Table 3: Multinomial logit estimation on sickness absence

Variables	**(1)** **Sickness absence** **0 days**	**(2)** **Sickness absence** **≤ 9 days**	**(3)** **Sickness absence** **10-24 days**	**(4)** **Sickness absence** **25-99 days**	**(5)** **Sickness absence** **≥ 100 days**
Job autonomy	*base outcome*	-0.091**	-0.191***	-0.310***	-0.307*
		(0.045)	(0.059)	(0.072)	(0.169)
Gender (1=female)		-0.026	0.090	0.197	-0.028
		(0.105)	(0.131)	(0.160)	(0.392)
Age dummies		*yes*	*yes*	*yes*	*yes*
Married (1=yes)		-0.064	-0.264**	-0.411***	-0.278
		(0.099)	(0.123)	(0.146)	(0.291)
Child(ren) (1=yes)		0.079	-0.036	0.304*	-0.384
		(0.112)	(0.145)	(0.180)	(0.387)
Years of schooling		-0.022	0.012	0.017	0.0003
		(0.019)	(0.024)	(0.029)	(0.065)
Dummies for occupational status		0.308***	-0.129	-0.368**	-0.941***
		(0.110)	(0.131)	(0.155)	(0.328)
Tenure (in years)		0.001	-0.011**	-0.003	-0.009
Fixed-term contract (1=yes=		-0.504**	-0.504**	-0.575*	-1.562
		(0.204)	(0.253)	(0.321)	(1.019)
Weekly working hours		-0.001	-0.003	0.003	-0.005
		(0.005)	(0.006)	(0.007)	(0.017)
Job requirements		0.047	0.099*	0.098	0.497***
		(0.047)	(0.059)	(0.072)	(0.158)
# Observations	3,099	3,099	3,099	3,099	3,099

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

We further investigate whether there are age-specific differences in terms of sickness absence. Table 4 presents the results of the ordered probit estimation on sickness absence including interaction terms for age. Employees between the ages 31 and 35 represent the reference group. The regression results show negative coefficients of the interaction terms which become larger with increasing age. These coefficients are significant from the age group 46-50 years onwards. The findings are in line with hypothesis 2. Corresponding separate estimations for each particular age group are presented in the Appendix (Table A2). These estimations confirm that the relation between job autonomy and sickness absence is relevant for the elderly in particular.

Regarding further group-specific differences, we investigate the relation between job autonomy and sickness absence including interaction terms for gender and children. We find no differences between men and women or having minor children for the relation between job autonomy and sickness absence. Individual and job characteristics such as a high level of education and the occupational status already come along with a certain scope for action and decision at work. We did not find relevant interaction effects of autonomy and years of schooling or occupational status, though (results available upon request).

Table 4: Ordered probit estimation on sickness absence including interaction terms for age

Variables	Sickness absence
Job autonomy	0.010
	(0.061)
Job autonomy*age (31-35 years)	-
Job autonomy*age (36-40 years)	-0.071
	(0.080)
Job autonomy*age (41-45 years)	-0.047
	(0.076)
Job autonomy*age (46-50 years)	-0.156**
	(0.075)
Job autonomy*age (51-55 years)	-0.173**
	(0.078)
Job autonomy*age (56-60 years)	-0.174**
	(0.0769)
Gender (1=female)	0.045
	(0.048)
Age (base age: 31-35 years)	
36-40 years	0.045
	(0.073)
41-45 years	0.056
	(0.071)
46-50 years	0.075
	(0.072)
51-55 years	0.148*
	(0.080)
56-60 years	0.199**
	(0.087)
Married (1=yes)	-0.136***
	(0.045)
Child(ren) (1=yes)	0.039
	(0.050)
Years of schooling	0.003
	(0.008)
Occupational status (base status: blue-collar worker)	
White-collar worker/civil servant	-0.133***
	(0.051)
Tenure (in years)	-0.003
	(0.002)
Fixed-term contract (1=yes)	-0.267***
	(0.097)
Weekly working hours	-0.0002
	(0.002)
Job requirements	0.057***
	(0.021)
# Observations	3,099

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Furthermore, we suppose that job autonomy is not only directly related to sickness absence, but that job satisfaction might be one relevant channel of transmission. We assume that the extent of autonomy at work might be related to job satisfaction, which in turn might be associated with employees' sickness absence. Employees who have more discretion to organize themselves and their work are more satisfied with their job and thus, tend to be sick less often. Previous empirical studies indicate both a positive relation between autonomy and job satisfaction (Taylor et al. 2003, Chung-Yan 2010) and an inverse association of job satisfaction und sickness absence (Hoogendoorn et al. 2002, Roelen et al. 2008).

Table 5 shows the results of the mediator analysis. First, we examine whether job autonomy is related to sickness absence, which repeats our general analysis of Table 2. Second, we investigate the relation between job autonomy and job satisfaction. Third, we include the variable job satisfaction in our first regression to check whether it acts a (partial) mediator between job autonomy and sickness absence. In line with our assumption, the results show that job satisfaction is negatively related to sickness absence. Thus, employees who are more satisfied with their job report less sickness absence. Furthermore, the coefficient of job autonomy in the third estimation (when job satisfaction is included) is higher (less negative) than in the first estimation, which indicates a slight mediation effect. However, the relation between autonomy and absence days is still highly significant.

Table 5: Ordered probit estimations (Mediator analysis)

Variables	(1) Sickness absence	(2) Job satisfaction	(3) Sickness absence
Job autonomy	-0.105***	0.256***	-0.075***
	(0.022)	(0.024)	(0.022)
Job satisfaction			-0.249***
			(0.035)
Gender (1=female)	0.045	0.144***	0.060
	(0.048)	(0.051)	(0.048)
Age dummies	*yes*	*yes*	*yes*
Married (1=yes)	-0.133***	0.102**	-0.120***
	(0.044)	(0.048)	(0.045)
Child(ren) (1=yes)	0.036	0.138**	0.051
	(0.050)	(0.057)	(0.050)
Years of schooling	0.003	-0.006	0.003
	(0.008)	(0.009)	(0.008)
Dummies for occupational status	*yes*	*yes*	*yes*
Tenure (in years)	-0.003	0.001	-0.003
	(0.002)	(0.002)	(0.002)
Fixed-term contract (1=yes)	-0.279***	0.038	-0.281***
	(0.097)	(0.110)	(0.097)
Weekly working hours	-0.0004	0.007***	0.0004
	(0.002)	(0.003)	(0.002)
Job requirements	0.058***	-0.314***	0.018
	(0.021)	(0.025)	(0.022)
# Observations	3,099	3,099	3,099

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

There are some limitations to our study. First, the Study of Mental Health at Work only provides cross-sectional data of the year 2011. Therefore, we do not claim at all to provide clear causal effects between our dependent and independent variables. Second, the dependent variable is defined as total days of absence from work due to health problems. This variable comprises sick leave days actually taken by employees. Nevertheless, we cannot observe how sick employees actually are and whether they are just feigning sickness or even work while being sick. This is a general problem of subjective data analysis, though. Third, our data lack information about the structure of the disease progression. We cannot observe if employees are regularly sick for a couple of days or if sick leave days have to be traced back to a long-term illness (especially for at least 100 sick leave days per year).

5. Discussion

Using data from the German Study of Mental Health at Work, we investigate whether job autonomy is related to sickness absence. Sickness absence implies (involuntary) absence from work due to health problems such as sickness or health care. In this paper, we consider sickness absence as total days of absence from work due to health problems during the past 12 months.

The results show that employees' job autonomy is negatively related to sickness absence in general. This finding is in line with hypothesis 1 and complements previous studies showing that employees need a certain degree of control at work for being productive, satisfied and healthy. We further take a closer look at the different categories of our dependent variable by applying multinomial logit and binary probit estimations. The results show that the negative relation between job autonomy and sickness absence is becoming stronger for employees with more sick leave days to a certain level. There is no additional link to individuals which report excessive (100+) absent days, which include very severe or chronical sickness.

We further examine whether there are age-specific differences. In line with our expectation, we find that the relation between job autonomy and sickness absence becomes stronger with age. The results of a mediator analysis show that job satisfaction acts as a partial mediator between job autonomy and sickness absence. Employees are generally more satisfied with their job when acting autonomously at work, and thus tend to be sick less often. Future research may address the question, whether the role of age for the link between job autonomy and sickness absence is driven by certain age specific aspirations, needs or capabilities.

We can derive some management implications from our findings. We find hints for the effectiveness of autonomy at work (for example via self-managed working time

arrangements, group work, self-determined amount of work, and work content) with regard to actual presence at work. Even if job demands are high due to global competition and fast technological change for instance, policies of increasing job autonomy can help to facilitate the organization of work. Attention should be paid to job characteristics which restrict the scope for action and decision-making of employees before these lead to deteriorated health for the elderly in particular.

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Appendix

Table A1: Binary probit estimations on sickness absence (marginal effects)

Variables	**(1)** **Dummy=0 if sick leave days=0** **Dummy=1 if sick leave days ≥ 1**	**(2)** **Dummy=0 if sick leave days≤9** **Dummy=1 if sick leave days≥ 10**	**(3)** **Dummy=0 if sick leave days ≤24** **Dummy=1 if sick leave days≥ 25**	**(4)** **Dummy=0 if sick leave days ≤99** **Dummy=1 if sick leave days≥ 100**
Job autonomy	-0.097***	-0.114***	-0.117***	-0.080
	(0.025)	(0.026)	(0.033)	(0.065)
Gender (1=female)	0.024	0.077	0.084	-0.029
	(0.057)	(0.060)	(0.074)	(0.145)
Dummies for age	*yes*	*yes*	*yes*	*yes*
Married (1=yes)	-0.109**	-0.169***	-0.160**	-0.075
	(0.053)	(0.055)	(0.067)	(0.118)
Child(ren) (1=yes)	0.049	0.010	0.088	-0.176
	(0.062)	(0.065)	(0.081)	(0.152)
Years of schooling	-0.004	0.015	0.013	0.006
	(0.010)	(0.011)	(0.013)	(0.025)
Dummies for occup. status	*yes*	*yes*	*yes*	*yes*
Tenure (in years)	-0.002	-0.005**	-0.001	-0.003
	(0.002)	(0.002)	(0.003)	(0.005)
Fixed-term contract	-0.329***	-0.203*	-0.203	-0.540
(1=yes)	(0.109)	(0.118)	(0.153)	(0.364)
Weekly working hours	-0.001	-0.001	0.001	-0.003
	(0.003)	(0.003)	(0.003)	(0.006)
Job requirements	0.049*	0.057**	0.062*	0.195***
	(0.025)	(0.027)	(0.033)	(0.062)
# Observations	3,099	3,099	3,099	3,099

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Table A2: Ordered probit estimations on sickness absence (separated by age groups)

Variables	**(1)** **Sickness absence** **Age = 31-35 years**	**(2)** **Sickness absence** **Age = 36-40 years**	**(3)** **Sickness absence** **Age = 41-45 years**	**(4)** **Sickness absence** **Age = 46-50 years**	**(5)** **Sickness absence** **Age = 51-55 years**	**(6)** **Sickness absence** **Age = 56-60 years**
Job autonomy	0.032	-0.091	-0.048	-0.145***	-0.135***	-0.142***
	(0.075)	(0.061)	(0.047)	(0.049)	(0.052)	(0.047)
Gender (1=female)	0.116	-0.238*	0.046	0.112	0.152	-0.053
	(0.139)	(0.124)	(0.116)	(0.107)	(0.112)	(0.125)
Married (1=yes)	0.056	-0.015	-0.129	-0.176*	-0.137	-0.207*
	(0.154)	(0.127)	(0.110)	(0.093)	(0.096)	(0.119)
Child(ren) (1=yes)	-0.084	-0.034	-0.007	0.081	0.122	0.546
	(0.158)	(0.127)	(0.100)	(0.102)	(0.157)	(0.348)
Years of schooling	0.028	0.015	0.006	-0.006	-0.019	0.020
	(0.026)	(0.021)	(0.019)	(0.018)	(0.020)	(0.027)
Dummies for occupational status	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
Tenure (in years)	-0.017	0.002	0.001	0.002	-0.008**	-0.002
	(0.013)	(0.008)	(0.005)	(0.004)	(0.004)	(0.004)
Fixed-term contract (1=yes)	-0.110	0.260	-0.485**	-0.410*	-0.374	-0.419
	(0.227)	(0.249)	(0.231)	(0.216)	(0.239)	(0.303)
Weekly working hours	-0.004	-0.004	0.009	0.002	-0.002	-0.010
	(0.007)	(0.006)	(0.006)	(0.005)	(0.005)	(0.006)
Job requirements	0.028	0.101	0.024	0.134***	-0.027	0.071
	(0.070)	(0.062)	(0.050)	(0.044)	(0.048)	(0.054)
# Observations	305	453	606	691	586	458

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.