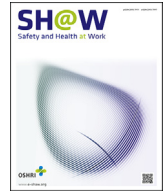




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Original Article

# Time Pressure, Time Autonomy, and Sickness Absenteeism in Hospital Employees: A Longitudinal Study on Organizational Absenteeism Records



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## ABSTRACT

**Background:** Although work absenteeism is in the focus of occupational health, longitudinal studies on organizational absenteeism records in hospital work are lacking. This longitudinal study tests time pressure and lack of time autonomy to be related to higher sickness absenteeism.

**Methods:** Data was collected for 180 employees (45% nurses) of a Swiss hospital at baseline and at follow-up after 1 year. Absent times (hours per month) were received from the human resources department of the hospital. One-year follow-up of organizational absenteeism records were regressed on self-reported job satisfaction, time pressure, and time autonomy (i.e., control) at baseline.

**Results:** A multivariate regression showed significant prediction of absenteeism by time pressure at baseline and time autonomy, indicating that a stress process is involved in some sickness absenteeism behavior. Job satisfaction and the interaction of time pressure and time autonomy did not predict sickness absenteeism.

**Conclusion:** Results confirmed time pressure and time autonomy as limiting factors in healthcare and a key target in work redesign.

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## 1. Introduction

Average rates of absence across Europe are estimated to be between 3% and 6% of working time [1]. A recent estimate of the cost was about 2.5% of gross domestic product [2]. Although presenteeism seems to be more common among healthcare workers and have a significant economic value, a recent study on Finnish healthcare workers showed hours of sickness absence to even exceed this monetary value [2]. For most occupations, censure pressure (fearing negative reactions from colleagues and management) might force presenteeism and hinder absenteeism [3]. In healthcare workers, the threshold for staying at home when one feels sick might be lower and more accepted. Moreover, presenteeism increases the risk of future sickness absence [4].

Unfavorable work conditions are also related to higher sickness absenteeism [5,6].

According to the *withdrawal hypothesis*, unfavorable working conditions cause low job satisfaction and low commitment, and individuals who are not satisfied with their work are expected to avoid unfavorable working conditions by increasing their sickness absenteeism [7]. Another hypothesis on work conditions and sickness absenteeism refers to *occupational stress* [8]. Unfavorable work conditions include task stressors like time pressure with which individuals are forced to cope in order to reach their work-related goals [9]. When work stressors permanently exceed the individual's ability to cope with prolonged stress, this may become a risk for health and health-related absence from work [6]. For instance, time pressure increases catecholamines that cause higher

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muscle tension and often precedes pain in the lower back [10]. Occupational low back pain is one of the common causes of sickness absenteeism [11].

With respect to working conditions and sickness absenteeism, we test the “Job Demand-Control” (DC) model [12,13], with time pressure and time autonomy (as a time-specific part of control) as working conditions and sickness absenteeism as the dependent variable. The DC model postulates that high demands and low job control have a detrimental effect on well-being (“*strain hypothesis*”). The exact nature of the joint effect of job control and job demands in the DC model has been criticized for ambiguity [14]. Van der Doef and Maes [15] made the pragmatic argument toward a distinction between an additive type of DC-model hypothesis (“*strain hypothesis*”) and the hypothesis of a specific ordinal interaction, showing a buffer effect of job control; i.e., the DC model postulates that high demands (stressors) have a detrimental effect on well-being only if control is low (“*buffer hypothesis*”). Evidence from reviews shows that time pressure and time autonomy (referring to having control within the scope of time) are both related to absenteeism [16].

Time pressure and time autonomy are known to be related to health [15,17] and sickness absence [16] and seem to be highly relevant within the scope of healthcare [18]. A review on work conditions and sickness absenteeism in healthcare work showed work demands and resources to be associated with sickness absenteeism [6]. In Switzerland, a 10-year longitudinal study with five measurement points recently showed consistently highest work stressors and lowest job autonomy in nurses compared with salespeople, electronic technicians, bank clerks, and cooks [19]. Therefore, we conceptualized both time pressure and time autonomy to predict sickness absence.

Previous research on work conditions in healthcare and sickness absenteeism has been criticized to be merely cross-sectional and thus did not show individual work-related factors to precede increased sickness absence [20]. Another critical point was that studies often do not control for absenteeism at baseline, although baseline absenteeism is a strong predictor of future absenteeism [21]. Finally, measurement of work conditions and sickness absence is often used by self-reports overestimating correlations because of common method variance [22]. Moreover, a recent meta-analysis showed that employees underreport absenteeism in self-reports [23]. Thus, analysis of organizational absenteeism records is preferable. To address the common critics, the present study is longitudinal, controls for absenteeism at baseline, and includes organizational absenteeism records as a dependent variable.

Our hypotheses is that we expect lower job satisfaction to predict higher sickness absenteeism (*withdrawal hypothesis*, H1). In accordance with the *strain hypothesis* of the DC model, we expect higher time pressure to be related to more sickness absenteeism (H2) and time autonomy to be related to less sickness absenteeism (H3). In accordance with the *buffer hypothesis* of the DC model, we expect time autonomy to be a moderator of the link between time pressure and sickness absenteeism. The association is expected to be smaller or absent (“*buffered*”) when time autonomy is high compared to low time control (H4).

## 2. Methods

### 2.1. Sample

The participants were aged 18–63 years [mean, 43.1 years; standard deviation (SD), 11.2], and the majority were women (88%). Most of them worked as nurses (45%), whereas others were laboratory technicians (18%), administrative staff (18%), physicians (3%), tradespeople and technical staff (2%), and from other fields (14%),

such as psychologists; 38% were full-time employees (~42 h/wk), 3% worked less than half-time. They have been working in the actual job position for 7.4 years (SD = 7.2).

### 2.2. Study setting

The background of the current study was a randomized trial on the effects of stochastic, whole-body resonance vibration training (SWBV) on musculoskeletal health and body balance [24] in a large Swiss hospital. All participants did an 8-week SWBV training during the study period. In December 2009, the hospital employed 7,255 persons, 75% women and 25% men. Every employee was informed about the study by a notice that they received with their monthly pay check, and 237 employees volunteered to participate in the study, from which followed a participation rate of 3.3%. The dropout rate was 24% in total, with similar rates for the experimental (21%) and control groups (27%), with 180 participants remaining in the final sample. For a more detailed description of the sample selection process, see Elfering et al. [24].

### 2.3. Measures

#### 2.3.1. Sickness absenteeism

The human resource management department of the organization provided monthly hours of sickness absenteeism. Researchers pseudonymously filed data for each participant by code. Baseline absenteeism included the sum of lost work hours due to sickness across 11 months that preceded the month when the study questionnaire was filled out. Follow-up absenteeism included the sum of lost work hours due to sickness in the month when the study questionnaire was filled out and in the following 11 months.

#### 2.3.2. Job satisfaction

The Kunin Faces Scale (KFS) asks: “How satisfied do you currently feel with your work?” [25], with seven faces as response options and verbal labels placed under the faces (1 indicating very unsatisfied and 7 indicating very satisfied). Wanous et al. [26] confirmed the reliability and validity of KFS.

#### 2.3.3. Time pressure and time autonomy

Time pressure at work and time autonomy were measured by a shortened version of the Instrument for Stress-Oriented Task Analysis (ISTA, version 5.1) by the subscales time pressure and time control [27]. The answering format ranged from 1 (very rarely/never) to 5 (very often/constantly). Time pressure included three items (e.g., “How often are you pressed for time?”). The answering format of the 5-point Likert scale ranged from 1 (very rarely/never) to 5 (very often/constantly). Reliability of the scale was satisfactory (Cronbach  $\alpha = 0.78$ ). Time control (influence on work pace and schedule) was assessed with three items (e.g., “To what degree are you able to decide on the amount of time you will be working on a certain task?”). Reliability of the scale was satisfactory (Cronbach  $\alpha = 0.85$ ).

#### 2.3.4. Control variables

Previous research has shown age to increase the risk for absences for both men and women [28], although there might be no clear pattern [29,30]. Sickness absence seems to be higher for women than men [30,31]. Although there are no clear differences between full- or part-time workers in sickness absences [32], working hours affect the duration that one is exposed to a stressful working situation. Moreover, working conditions are to some extent bound to one’s profession. Therefore, we controlled for age, sex, and employment factor and profession. As the study was

**Table 1**  
Mean (M), standard deviation (SD), and Pearson correlation between study variables\*

	M (SD)	Absent. Follow-up	Absent. Baseline	Job satisfaction baseline	Time autonomy baseline	Time pressure baseline	Age	Sex	RCT-group
Absent. Follow-up (h)	23.69 (57.61)	1							
Absent. Baseline (h)	30.12 (71.38)	0.06 ( $p = 0.439$ )	1						
Job satisfaction baseline	5.40 (0.94)	-0.05 <sup>f</sup> ( $p = 0.533$ )	0.05 ( $p = 0.576$ )	1					
Time autonomy baseline	3.21 (0.73)	-0.22 <sup>f</sup> ( $p = 0.004$ )	0.04 ( $p = 0.630$ )	0.14 ( $p = 0.079$ )	1				
Time pressure baseline	2.97 (1.09)	0.16 <sup>f</sup> ( $p = 0.027$ )	-0.02 ( $p = 0.813$ )	-0.07 ( $p = 0.367$ )	0.07 ( $p = 0.371$ )	1			
Age (y)	43.13 (11.17)	0.11 ( $p = 0.170$ )	0.01 ( $p = 0.895$ )	-0.02 ( $p = 0.823$ )	0.06 ( $p = 0.488$ )	-0.07 ( $p = 0.441$ )	1		
Sex (f = 1, m = 2)		-0.09 ( $p = 0.229$ )	-0.06 ( $p = 0.423$ )	-0.13 ( $p = 0.123$ )	0.08 ( $p = 0.294$ )	0.06 ( $p = 0.425$ )	0.06 ( $p = 0.480$ )	1	
RCT-group		-0.02 ( $p = 0.788$ )	0.04 ( $p = 0.593$ )	-0.04 ( $p = 0.579$ )	0.02 ( $p = 0.769$ )	0.07 ( $p = 0.361$ )	-0.13 ( $p = 0.121$ )	0.05 ( $p = 0.538$ )	1
Employment factor	83.89 (17.03)	0.07 ( $p = 0.410$ )	0.19 ( $p = 0.016$ )	0.07 ( $p = 0.351$ )	0.03 ( $p = 0.681$ )	0.09 ( $p = 0.251$ )	-0.24 ( $p = 0.005$ )	0.12 ( $p = 0.152$ )	0.04 ( $p = 0.584$ )

\* $138 \leq N \leq 180$ .

<sup>f</sup> $p$  values of hypothesized correlations are one-tailed, all other  $p$  values are two-tailed.  
f, female; m, male; RCT, randomized comparative trial; SD, standard deviation.

conducted as a randomized comparative trial (RCT) on SWBV training at worksites, we additionally controlled for RCT-group.

#### 2.4. Statistical analysis

To test the hypotheses, we used multivariate linear regression analyses (one-tailed). The first model included absenteeism at baseline and control variables. The second model added job satisfaction. Time pressure and time autonomy were added to the third regression model in the third step. The interaction term of time autonomy and time pressure was added in the fourth step in order to test H4 referring to the high strain condition of the DC model.

### 3. Results

Descriptive statistics are presented in Table 1. Correlations between study variables show an insignificant association of absenteeism at baseline and absenteeism at follow-up. Job satisfaction was not related to absenteeism at baseline and absenteeism at follow-up. Time autonomy at baseline was negatively associated with absenteeism at follow-up [ $r(180) = -0.22, p = 0.004$ ], and time pressure at baseline was positively associated with absenteeism at follow-up [ $r(180) = 0.16, p = 0.027$ ].

Multivariate linear regression analysis regressed absenteeism at follow-up on job satisfaction, time pressure, and time autonomy (Table 2). Job satisfaction was not a significant predictor (H1). Time pressure and time autonomy significantly predicted sickness absenteeism (H2, time pressure:  $\beta = 0.19, p = 0.020$ ; H3, time autonomy:  $\beta = -0.23, p = 0.006$ ). The interaction of time pressure and time autonomy did not predict sickness absenteeism.

### 4. Discussion

The current study tested absenteeism as a result of withdrawal versus occupational stressors and resources. Results do not support the withdrawal model of work absenteeism that postulates individuals with low job satisfaction to avoid unfavorable working conditions by increasing their sickness absenteeism [33]. In other words, we did not find job satisfaction to be associated with motivational and attitudinal sickness absence.

Yet, there might be differences in the association between job satisfaction and sickness absence due to their conceptualization. We assessed job satisfaction as a global measure but not in a specific way, as job facet satisfaction. Notenbomer et al. [34] found educational level, job autonomy, and physical demands, but not global satisfaction, to be related to the duration of short-term sickness absence. However, satisfaction with colleagues, as a specific facet of job satisfaction, was associated with longer duration of sickness spells. In line with research on occupations censure pressure that might force presenteeism and hinder absenteeism [3], employees who are satisfied with their colleagues might be motivated into sick presence unless they become severely ill, explaining the longer duration of absence. One might speculate that due to the high relevance of physical fitness within the scope of healthcare work, there might be differences with respect to sick presence pointing to a lower threshold for being absent when feeling sick among healthcare workers. When focusing on general satisfaction with working conditions, satisfaction with the psychosocial environment might be a better predictor of sickness absence than of working conditions [35]. However, this measure of satisfaction rather reflects a globalized measure of strain ("How satisfied are you, all in all, with the psychosocial work conditions at your workplace?") and should be interpreted with caution due to conceptual overlap with psychosocial working conditions. This absence of association between job satisfaction and sickness absenteeism that was found in the

**Table 2**  
Results of a multivariate linear regression of absenteeism during follow-up on control variables, baseline absenteeism, job satisfaction, time pressure, and time autonomy\*

Model		B	SE	$\beta$	t	p	R <sup>2</sup>	$\Delta R^2$ (p)
1	Constant	11.99	43.81		0.27	0.785		
	Absenteeism baseline (h)	0.06	0.07	0.09	0.85	0.397		
	Age (y)	0.52	0.44	0.11	1.18	0.242		
	Sex (f = 1, m = 2)	-17.78	15.30	-0.11	-1.16	0.247		
	RCT-group	-4.50	9.57	-0.04	-0.47	0.639		
	Employment factor	0.17	0.30	0.05	0.55	0.583	0.053	
	Physicians	-13.88	30.33	-0.05	-0.46	0.648		
	Nurses	-3.69	13.95	-0.04	-0.27	0.792		
	Administrative staff	-9.89	16.37	-0.07	-0.61	0.547		
	Laboratory technicians	15.18	15.52	0.12	0.98	0.330		
2	Constant	2.91	52.67		0.06	0.956		
	Absenteeism baseline (h)	0.06	0.07	0.08	0.86	0.394		
	Age (y)	0.52	0.44	0.11	1.17	0.243		
	Sex (f = 1, m = 2)	-17.04	15.54	-0.10	-1.10	0.275		
	RCT-Group	-4.16	9.66	-0.04	-0.43	0.667		
	Employment factor	0.15	0.31	0.05	0.49	0.625		
	Physicians (0 = n, 1 = y)	-13.58	30.46	-0.04	-0.45	0.657		
	Nurses (0 = n, 1 = y)	-3.91	14.02	-0.04	-0.28	0.781		
	Administrative staff (0 = n, 1 = y)	-10.53	16.55	-0.08	-0.64	0.526		
	Laboratory technicians (0 = n, 1 = y)	15.48	15.61	0.12	0.99	0.323		
Job satisfaction baseline	1.69	5.41	0.03	0.31	0.378 <sup>†</sup>	0.054	0.001 (p = 0.755)	
3	Constant	-19.68	54.86		-0.36	0.781		
	Absenteeism baseline (h)	0.08	0.07	0.10	1.06	0.292		
	Age (y)	0.56	0.43	0.12	1.31	0.192		
	Sex (f = 1, m = 2)	-17.02	15.13	-0.10	-1.13	0.263		
	RCT-group	-3.75	9.38	-0.04	-0.40	0.690		
	Employment factor	0.05	0.30	0.02	0.17	0.863		
	Physicians (0 = n, 1 = y)	-29.68	30.46	-0.10	-0.97	0.332		
	Nurses (0 = n, 1 = y)	-7.76	13.73	-0.07	-0.57	0.573		
	Administrative staff (0 = n, 1 = y)	-1.70	16.42	-0.01	-0.10	0.918		
	Laboratory technicians (0 = n, 1 = y)	13.60	15.15	0.10	0.90	0.371		
	Job satisfaction baseline	4.48	5.35	0.08	0.84	0.202 <sup>†</sup>		
	Time autonomy baseline	-11.04	4.31	-0.23	-2.56	0.006 <sup>†</sup>		
	Time pressure baseline	14.70	7.10	0.19	2.07	0.020 <sup>†</sup>	0.125	0.071 (p = 0.009)
4	Constant	-65.09	79.85		-0.82	0.417		
	Absenteeism baseline (h)	0.08	0.07	0.10	1.10	0.274		
	Age (y)	0.59	0.43	0.12	1.36	0.177		
	Sex (f = 1, m = 2)	-15.95	14.66	-0.06	-0.65	0.515		
	RCT-group	-5.06	9.55	-0.05	-0.53	0.597		
	Employment factor	0.07	0.30	0.02	0.22	0.824		
	Physicians (0 = n, 1 = y)	-28.53	30.54	-0.09	-0.93	0.352		
	Nurses (0 = n, 1 = y)	-8.00	13.75	-0.08	-0.58	0.562		
	Administrative staff (0 = n, 1 = y)	-1.66	16.45	-0.01	-0.10	0.920		
	Laboratory technicians (0 = n, 1 = y)	13.93	15.18	0.11	0.92	0.361		
	Job satisfaction baseline	4.86	5.38	0.08	0.90	0.369		
	Time autonomy baseline	3.66	19.30	0.08	0.19	0.850		
	Time pressure baseline	28.10	18.56	0.37	1.51	0.133		
Time autonomy baseline X Time pressure baseline	-4.71	6.03	-0.37	-0.78	0.218 <sup>†</sup>	0.130	0.004 (p = 0.436)	

\*N = 134.

<sup>†</sup>p values of hypothesized regression coefficients are one-tailed, all other p values are two-tailed.

Dependent variable = Absenteeism during follow-up (h). In Model 1, control variables and baseline absenteeism entered the model regardless of their significance. In Model 2, job satisfaction entered the model. In Model 3, time autonomy and time pressure entered the model. In Model 4, the interaction of time autonomy and time pressure was added.

B, unstandardized regression coefficient; R<sup>2</sup>, explained variance of cognitive stress symptoms; RCT, randomized comparative trial; SE, error in estimation of B; t, test of significance for B;  $\beta$ , standardized regression coefficient;  $\Delta R^2$ , increase of explained variance by the current regression model compared to the previous regression model.

current study was observed before in healthcare work [36]. Noteworthy, evidence from meta-analyses for the withdrawal model is also modest (e.g.,  $\rho = -0.09$ ) [37] or restricted to voluntary absenteeism [38]. The withdrawal model seems to depend on social context, as was recently shown [39]. The negative association of satisfaction with job conditions and absenteeism was strongest when mean or dispersion levels of work-unit absenteeism were high. According to this finding, reducing work-unit absenteeism is adequate to reduce individual absenteeism. In the current study, mean or dispersion levels of work-unit absenteeism are estimated to be comparably low and, thus, social context does not fit with the withdrawal model.

In contrast to the withdrawal model, the occupational stressors and resources model of absenteeism received some support in the current study. In line with previous research [5], we found absenteeism to be related to work strain. Specifically, the present longitudinal study adds knowledge on the DC model [12] by

identifying time pressure and time autonomy, explaining a variance in sickness absenteeism beyond that which was explained by previous sickness absenteeism and job satisfaction. A study by Hansen and Andersen [40] also found work-related factors to be more important for presenteeism and absenteeism rates than personal circumstances or attitudes, although the effects were low.

In general, while autonomy was more or less consistently found to predict absenteeism rates, the associations with demands are rather weak and inconsistent [20,41]. This might be due to the wide variety of conceptualizations of job demands [42]. Within the scope of research on DC model, demands most often included time pressure or role conflict [15,43]. Moreover, job-related demands and resources have to meet the relevance within the particular sample [44]. Time pressure can be supposed to be a highly relevant stressor in healthcare and is also relevant with respect to recent findings that point to work-family conflict

and exhaustion as mediating processes between job demands and absenteeism [45].

Time autonomy did not buffer the association between time pressure and sickness absence. In general, findings confirm previous research on the DC model; reviews provide solid evidence with respect to the main effects of job demands and control but rather sparsely for their interaction [46,47]. This is also true with respect to absenteeism, although effects are rather small [32]. In the current data, time pressure, time autonomy, and hours of sickness absenteeism can be viewed to have the working time aspect in common, thus the “triple-match-principle” should apply and make the buffer effect more likely [47–49]. The interaction in the current study did not appear; however, in accordance with the “triple-match-principle”, the specific nature of demands, control, and strain is similar in terms of their cognitive, emotional, or physical quality [47–49].

Our results are in line with previous research on sickness absence indicating low autonomy to increase absenteeism, specifically with respect to decision authority [20,40,50,51]. High levels of autonomy may help prevent employees from sickness absenteeism. As Bakker et al. [52] showed in accordance with their Job Demands-Resources (JD-R) model, job demands may be more closely related to sickness duration, while job autonomy as a resource that influences job motivation is more closely related to the frequency of sickness spells. Not every kind of intervention that is known to improve employees' health induces lasting improvements on absenteeism or presenteeism [53]. As presenteeism and absenteeism might be inter-related [54], one should be careful for attempts to reduce absenteeism may sometimes occur at the cost of sick presence [55]. Thus, it is important to encourage employees to use influences and personal degrees of freedom in a healthy way, reducing sick presence too. Job satisfaction is known to be affected by an increase in job pressure especially when this is not accompanied by increased work autonomy [56]. Yet, employees should have an influence on time schedules and the planning of tasks, not only to maintain performance levels and work satisfaction but also to prevent sickness absenteeism. Against the background of decreasing time autonomy for many nurses [19], this study highlights the role of autonomy in healthcare as a way of increasing resilience and preventing sickness absence [57,58]. The decreasing time autonomy in nursing during the past decades was also described to be a consequence of a Tayloristic “scientific management” approach in healthcare [59], which is experienced as “conveyor-belt care” by nurses [60] and conflicts with the nurses aim to address each patient individually and holistically [59].

#### 4.1. Strength and limitations

Because the background of the current study was an RCT on SWBV training at worksites, the sample might be more interested in physical training and potentially better health than the employees of the hospital who were not interested in participation. SWBV training was not associated with absenteeism at baseline and follow-up. As some employees might continue work when feeling sick, absenteeism rates might be poor indicators of health and productivity. Moreover, people who are sick present do not suffer from different or more severe health problems than those who are sickness absent [61]. Thus, future research should include both measures of presenteeism and absenteeism for a better understanding of employees' health [62].

The strength of our study can be seen in using several types of measurement (self-reported job satisfaction and working conditions, and organizational documented absenteeism), thus avoiding the problem of common method bias [22]. Additionally, there are several reasons (e.g., the abundance of potential influences or

causes related to timing) for empirical research to rarely find effects of work-related stressors on health-related outcomes explaining more than 5–10% of the variance [63]. Although the effects are not large, the size is in line with previous research. Yet, taking into account the rather small sample size, the power to detect an interaction of time pressure and time autonomy in regression is low [64].

The longitudinal design (i.e., included the sum of lost work hours due to sickness within the following year after the assessment of working conditions) and autonomy of baseline absenteeism is the strength. However, a cross-lagged panel design would allow examining the hypothesized direction of the associations and simultaneously control for the reversed effect as being absent might deteriorate working conditions and satisfaction. Moreover, if people feel less healthy, they might appraise situations as more stressful [65]. Future research should take into account a full panel design including job satisfaction and working condition 1 year later. However, cross-lagged designs have also limitations in terms of inferring cause and effect [66].

## 5. Conclusion

Absenteeism was predicted by time pressure and time autonomy, showing that a stress process is involved in sickness absenteeism behavior, while the withdrawal approach with less satisfied employees who are less committed to work was no valid predictor of absenteeism. Work redesign with increase of time autonomy and reduction of time pressure should reduce absenteeism in hospital employees.

## Conflicts of interest

The authors declare that they have no conflicts of interest.

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