ISSN 1941-7233 (Print), ISSN 2345-024X (Online)
http://dx.doi.org/10.7220/2345-024X.14.3

MOKSLO STRAIPSNIAI

source: https://doi.org/10.7892/boris.65577 | downloaded: 23.4.2024

TIME PRESSURE, SOCIAL WORK STRESSORS AND BLOOD PRESSURE IN A TEAM OF SEVEN IT-WORKERS DURING ONE WEEK OF INTENSE WORK

Maria Undine Kottwitz, Maurice Lachappelle, Achim Elfering [1]

University of Bern, Switzerland

Abstract. ***Background.*** In the field of information technology (IT) time pressure is common. Working with tight deadlines together on the same task increases the risk of social stressors referring to tensions and conflicts at work. ***Purpose.*** This field study tested both the association of time pressure and social stressors with blood pressure during work. ***Method.*** Seven employees – staff of a small IT enterprise – participated in repeated ambulatory blood pressure measurements over the course of one week. Time pressure and social stressors at work were assessed by questionnaire at the beginning of the study. ***Results.*** Multilevel regression analyses of 138 samples revealed higher levels of time pressure to be related to marginally significant increases in mean arterial blood pressure at noon and in the afternoon. In addition, higher levels of social stressors at work were significantly associated to elevated mean arterial pressure in the afternoon. ***Conclusion.*** Findings support the view that threats to the social self play an important role in occupational health.

Keywords: work stress, IT-work, blood pressure.

INTRODUCTION

In IT work working with tight deadlines – is common for many employees. The time pressure that results from the need to meet a specific deadline seems to be one of the most important factors associated with IT-work stress (Sethi, King, & Quick, 2004). In addition, in IT-work and other service occupations time pressure at work seems to have increased in the EU (Kompier, 2006; Paoli & Merllié, 2005) and in Switzerland (Grebner, Berlowitz, Alvarado, & Cassina, 2011). In Switzerland, the percentage

[1] Address for correspondence: Institute of Psychology, University of Bern, Fabrikstrasse 8, CH-3012 Bern, Switzerland., e-mail achim.elfering@psy.unibe.ch.

of workers who reported having to work regularly (at least 25% of their working time) at *high speed* increased from 72% in 2005 (Graf et al., 2007) to 85% in 2011 (Grebner et al., 2011). There is now consensus for time pressure and other adverse working conditions to affect physiological as well as psychological health (for review see De Lange, Taris, Kompier, Houtman, & Bongers, 2003; Nixon, Mazzola, Bauer, Krueger, & Spector, 2011; Semmer, McGrath, & Beehr, 2005). Thereby, stress often precedes health impairment and refers to an imbalance of goals or needs, and possibilities of an exchange between person and the environment – in other words, it's a result of prolonged psychological strain (Semmer & Udris, 2007). Adverse work conditions like time pressure are called *work stressors* for they increase the likelihood of employees to experience stress (Beehr & Franz, 2008).

In occupational health psychology there are several ways to assess the impact of work stressors on stress (e.g., Semmer, Grebner, & Elfering, 2004). Assessing both stressors and stress by self-report implies the danger of inflated effects due to common method variance (Podsakoff, MacKenzie, Lee, & Podsakoff; but see also Semmer et al., 2004). To avoid common method variance the current study on work stress includes self-report assessment of stressors and measurement of blood pressure at work as indicator of the bio-physiological stress reaction.

Cardiovascular activation as bio-physiological stress reaction

In general, the bio-physiological stress reaction activates the organism. It covers a person's energy needs and thereby encourages the person to cope with daily demands. According to Allostatic Load Model (McEwen, 1998), the adaption of the organism (the so-called allostasis; Sterling & Eyer, 1988) is central within the scope stress reaction; Especially, this refers to the interaction of available and required energy for sustainment and coping with demands (McEwen & Wingfield, 2010). The activation of the physiological stress system contains a chain of physiological and psychological changes for the organism to adapt to the stressful situation. Amongst others, the following release of hormones and messengers results in an increased energy supply to deal with the situation. Thus, physiological stress reaction is functional unless it is long-lasting and not aligned to the stressful situation. However, in case of a long-term hyperactivity (e.g., according to prolonged strain) the organism could be damaged (e.g., Chrousos & Gold, 1992).

Work stressors, blood pressure and health

Previous research has shown work related stress to be a risk factor for cardiovascular morbidity and mortality (Backé, Seidler, Latza, Rossnagel, & Schumann, 2012; Kivimäki, et al., 2012). Specifically, stressors at work have been found to be positively associated with increased blood pressure during leisure time (at home and while sleeping), as well as at work (Clays, Leynen, De Bacquer, Kornitzer, Kittel, Karasek, et al., 2007; Van Egeren, 1992). Elevated blood pressure has been found to be associated with overtime at work (Hayashi, Kobayashi, Yamaoka, & Yano, 1996; Rau, 2006; but see also Dahlgren et al., 2006). Maina et al. (2011) found an unpleasant work schedule as well as an imbalance between a person's effort and the received reward to be associated with increased blood pressure. In the Pittsburg Healthy Heart Project investigation Kamarck et al. (2005) found daily fluctuations as well as between-person variability of work related stressors (among these social conflicts, task demands) to be significantly and independently associated with changes in blood pressure. Over and above, Ilies, Dimotakis, and De Pater (2010) found workload to be positively associated with blood pressure and low daily well-being. An important aspect regarding data on organizational health is the hierarchical data structure. Employees are nested within work groups – working together, sharing important aspects of their work life (like demands, goals, etc.). Furthermore, IT-work tends to be performed by groups rather than individual persons (Wilson & Sheetz, 2010). Group members are social beings, and the extent to which one feels accepted and esteemed by others is of great importance for well-being (Leary & Baumeister, 2000). Social stressors at work, in the sense of social animosities, conflicts, unfair behaviour, and a negative group climate may represent a threat to that drive (Dormann & Zapf, 2002; Spector & Jex, 1998). Thus, social stressors at work can be considered to be particularly strong, and stressful when workers who have to cooperate closely – as in IT-work.

The present study

This study aims to investigate prevalence of work related stressors (in terms of inter-individual differences) and the association with blood pressure across one week of intense work. Most of the previous research had to infer from samples within organizations but did not investigate whole units. Thus, results often suffered from sampling bias. This exploratory study relied on complete staff of a small IT company and the basic assumption was that work r lated stressors are positively associated with blood pressure, including mean arterial pressure (MAP) as a composite measure of systolic (SBP) and diastolic (DBP) blood pressure.

Hence, two different kinds of work-related stressors were investigated, time pressure and social stressors: as time pressure can be considered relevant on in IT-work we expect it to be positively associated with blood pressure levels at work (hypothesis 1). As the need for cooperation in IT-work is high and the group is working on the same task, social stressors that include tensions and conflict at work should be positively associated with blood pressure levels at work (hypothesis 2).

METHOD

Sample

The sample included seven employees (one woman and six men) – the complete staff – of a small IT enterprise. The average age was 25.4 years (*SD* = 3.0 years), ranging from 22 to 31 years. Three of them lived with a partner, all participants were unmarried, and none of them had children. Regarding education, two participants had a university degree (28.6%), three participants were still studying at university (42.8%), and two people had completed apprenticeship (28.6%). Altogether, all participants have worked for at least five years and at least two years in the current position. Participants were programmers, electronic engineers, clerks, and web designers. The employment ranged from 60% to full-time. During the data collection, all participants were full-time present and worked predominantly on the same project during the week of observation.

Design

General work related time pressure and social stressors were assessed by general questionnaire at the beginning of the study. Additionally, daily blood pressure was measured ambulatory across one week. To be confident that all individuals processed the same order, the field study took place within the same period of time. Blood pressure of six participants was assessed within the same week. Because of vacation planning, blood pressure of one person was assessed during a previous week. The investigation took place at the beginning of the year, which was reported to be particularly stressful.

Ambulatory blood pressure measurement

Participants were instructed to install the cuff of the blood pressure monitor on the dominant arm two inches above the elbow. To ensure the comparability between measurements, participants were told to sit and to hold the arm to the body so that the cuff is at the level of the heart during data recording. Daily blood pressure measures were aggregated to two averaged values. The measure included a lunch period from 11 am to 1 pm and the afternoon reading a period of 4 pm to 6 pm. Both periods were chosen because of circadian process (Larkin, 2005). Artefacts (defined for systolic blood pressure (SBP) and diastolic blood pressure (DBP) as any of the following: SBP < 50 mmHg, SBP > 250 mmHg, DBP > SBP, DBP < 30 mmHg, DBP > 150 mmHg; see Rau, 2006) were excluded. The number of aggregate measures varied from three to seven because of missing values due to artefacts.

Ambulatory blood pressure was automatically recorded (blood pressure monitor Spacelabs© model 90207; readings taken by the Korotkoff method). In ambulatory blood pressure monitoring, the Spacelabs 90207 often is referred to as the "gold standard" (e.g., Magometschnigg, Mair, & Hitzenberger, 2001). The blood pressure device was programmed to measure every 30 minutes. If a measurement failed it was automatically repeated five minutes later. The size of cuff was selected depending on arm circumference ranging from 24–32 cm. Mean arterial blood pressure (MAP) was calculated as mean of SBP and DBP.

Self-report questionnaire data

The participants completed a short questionnaire asking for their general time pressure at work and social stressors at work. *Time pressure* was assessed by a short self-report version of the Instrument for Stress Oriented Task Analysis (ISTA; Semmer, Zapf, & Dunckel, 1995). The scale contains four items (e.g., "How often do you have to work faster than normal in order to complete your work?"). Items have to be answered on a 5-point Likert scale that ranging from 1 (very seldom / never) to 5 (very often). Cronbach alphas usually ranged from 0.71 to 0.82 (Jacobshagen, 2006). We calculated test-retest reliability using a time lag of six months. Test-retest reliability of time pressure was 0.90. *Social stressors* were measured with an 8-item scale developed by Frese and Zapf (1987; e.g., "One has to pay for the mistakes of others"). The items refer to several aspects of relationships and social climate at work, (e.g., a negative group climate, conflicts with co-workers and supervisors, and social animosities). They had to be rated on a 5-point Likert scale ranging from "strongly disagree" to "strongly agree". Cronbach alphas reported ranged between 0.79 to 0.84 for different samples (e.g., age and tenure; Frese & Zapf, 1987). However, these states are known to show considerable fluctuations over time (Zuckerman, 1983) and thus the rather long 6-month time lag lowers the retest estimate in our sample to 0.56.

Statistical analyses

Blood pressure was assessed on daily level and nested within individuals. Therefore, more precisely analytical methods can be used, since the measurements are not independent of each other and are also available at different levels of analysis. To deal with this data structure, a multilevel approach was employed (Hox, 2002). Multilevel analysis is regarded as an extension of linear regression analysis (Gavin & Hofmann, 2002; Nezlek, Schroeder Abé & Schütz, 2006). It enables to separate the variance of each level. Regarding daily level (level 1), the dependent variable in the multilevel regression analysis is MAP as well as SBP and DBP, respectively. The individual level (level 2) analysis in the multilevel approach investigates the degree to which these intercepts and slopes can be predicted by time pressure (Model 1) and social stressors (Model 2) when controlling for rest day dummy coded at Level 1. Additionally, in Model 3 time pressure, social stressors, and rest day were included. All Level 2 predictors are centered at their grand mean. Data were analyzed using the MLwiN multilevel statistics program (Version 2.20, Rasbash, Steele, Browne, & Prosser, 2010). As all hypotheses were directional, Alpha was set to 0.05, one-tailed.

RESULTS

Descriptive statistics are presented in table 1. Mean levels of mean arterial pressure at noon ranged between 72.67–114.00 mmHg and in the afternoon between 68.33–119.33 mmHg across the week. Table 2 presents the results of multilevel analyses at noon and table 3 presents results within the afternoon. To analyze whether participants' mean arterial pressure differed between persons and across the week, we calculated a null model (variance components model), which yielded estimates of 0.88 for level 2 variance and 0.22 for level 1 variance at noon

Table 1. *Mean values, standard deviations and correlations between study variables*

	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) SBP[1]	130.24	11.67		.84**	.89**	.86**	.78**	.79**		
(2) DBP[1]	78.31	11.71	.94**		.97**	.85**	.91**	.89**		
(3) MAP[1]	95.38	11.31	.98**	.99**		.87**	.90**	.89**		
(4) SBP[2]	128.59	12.57	.97**	.90**	.93**		.92**	.95**		
(5) DBP[2]	76.78	13.36	.93**	.99**	.98**	.87**		.97**		
(6) MAP[2]	93.87	12.62	.95**	.99**	.99**	.91**	.99**			
(7) Time pressure	3.25	0.83	.50	.60	.56	.39	.60	.60		
(8) Social stressors	1.54	0.19	.58	.67*	.66*	.45	.66*	.64	.30	

Note. N = 138 blood pressure measurements of from 7 participants. * < .05, ** < .01, one-tailed. [1] blood pressure assessed at noon; [2] blood pressure assessed in the afternoon. Correlations below the diagonal reflect the between-person associations of the averaged level 2 variables. Correlations above the diagonal reflect the within-person associations of the level-1 variables.

Table 2. *Linear Multilevel Models Predicting Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), and Mean Arterial Pressure (MAP) at noon*

		SBP			DPB			MAP		
		Estimate	SE	t	Estimate	SE	t	Estimate	SE	t
Model 1	intercept	129.91	4.19	31.00*	78.50	3.81	20.57*	95.52	3.66	26.13*
	rest day [a]	1.13	2.80	0.41	-1.43	2.02	-0.71	-1.50	2.21	-0.68
	time pressure	5.15	5.45	0.95	8.13	4.97	1.64†	7.77	4.75	1.64†
Model 2	intercept	129.90	4.07	31.89*	78.50	3.55	22.12*	95.51	3.48	27.46*
	rest day [a]	1.03	2.79	0.37	-1.53	2.02	-0.76	-1.63	2.21	-0.74
	social stressors	26.21	23.45	1.12	40.41	20.45	1.98*	37.43	20.03	1.87†
Model 3	intercept	129.90	4.34	29.91*	78.50	3.32	23.62*	95.51	3.27	29.20*
	rest day [a]	1.08	2.80	0.39	-1.47	2.02	-0.73	-1.55	2.21	-0.70
	time pressure	3.69	5.93	0.62	5.91	4.54	1.30	5.74	4.46	1.29
	social stressors	21.24	26.26	0.81	32.45	20.10	1.62†	29.70	19.78	1.50

Notes. N = 38 blood pressure measurements from 7 participants; Estimate = fixed unstandardized regression parameter estimate; *SE* = standard error; t = t-value; * ≤ .05, † < .10, one-tailed. [a] controlled for rest day dummy coded on Level 1.

Table 3. *Linear Multilevel Models Predicting Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), and Mean Arterial Pressure (MAP) in the afternoon*

		SBP			DBP			MAP		
		Estimate	SE	t	Estimate	SE	t	Estimate	SE	t
Model 1	intercept	127.81	4.31	29.65*	76.78	4.23	18.15*	93.88	4.13	22.74*
	rest day [a]	1.58	1.73	0.91	0.19	1.76	0.11	-0.99	1.78	-0.56
	time pressure	7.13	5.59	1.28	9.24	5.48	1.69†	8.06	5.35	1.51†
Model 2	intercept	127.79	4.07	31.42*	76.76	3.92	19.57*	93.86	3.76	24.99*
	rest day [a]	1.59	1.73	0.92	0.20	1.76	0.11	-0.98	1.78	-0.55
	social stressors	36.64	23.37	1.57†	45.86	22.53	2.04*	42.09	21.56	1.95*
Model 3	intercept	127.80	4.14	30.86*	76.77	3.62	21.20*	93.87	3.64	25.81*
	rest day [a]	1.57	1.73	0.91	0.16	1.76	0.93	-1.00	1.78	-0.56
	time pressure	5.09	5.63	0.90	6.73	4.92	1.37	5.71	4.94	1.16
	social stressors	29.78	24.99	1.19	36.80	21.81	1.69†	34.39	21.90	1.57†

Notes. $N = 43$ blood pressure measurements from 7 participants. Estimate = fixed unstandardized regression parameter estimate; *SE* = standard error; t = t-value; * ≤ .05, † < .10, one-tailed. [a] controlled for rest day dummy coded on Level 1.

and 0.86 level 2 and 0.24 level 1 variance in the afternoon. Thus, 22% to 24% of the variance was attributable to within-person and 86% to 88% of the variance in blood pressure was attributable between persons, indicating multilevel modelling to be appropriate.

Time pressure is positively associated with MAP (hypothesis 1).

Zero-order correlations between time pressure and any measure of blood pressure at noon or in the afternoon were not significant (see table 1). In multilevel analysis, with control of rest day levels, higher levels of time pressure were marginally significant related to higher levels of MAP at noon (B = 7.77, SE = 4.75, $p < 0.10$, Table 2) and in the afternoon (B = 8.06, SE = 5.35, $p < 0.10$, Table 3).

Social stressors are positively associated with MAP (hypothesis 2).

Zero-order correlations reveal social stressors to be positively related to DBP at noon and in the afternoon, as well as to MAP at noon (table 1). In multilevel analysis, controlled for rest day levels, higher levels of social stressors were marginally significant related to higher levels of MAP (B = 37.43, SE = 20.03, $p < 0.10$, Table 2) and significantly positively related to DBP (B = 40.41, SE = 20.45, $p < 0.05$, Table 2) at noon. Additionally, social stressors were positively related to MAP (B = 42.09, SE = 21.56, $p < 0.05$, Table 3) and to DBP in the afternoon (B = 45.86, SE = 22.53, $p < 0.05$, Table 3). Furthermore, the effect of social stressors on MAP in the afternoon remained marginally significant when additionally controlling for time pressure (B = 34.39, SE = 21.90, $p < 0.10$, Table 3).

Discussion

Seven employees – the workforce of a small IT enterprise – who worked on the same project were studied during an intense working week at the beginning of the year. To our knowledge this the first ambulatory field study in occupational health psychology that holistically addresses work stress in a small IT company. The study confirms the view that social stressors as well as time pressure contribute to work stress that manifests in raised cardiovascular activation at work. According to team perspective, employees who share the same team and work on the same task should share a considerable amount of job strain too (see Semmer, Grebner, & Elfering, 2004). However, beside team level that reflects a shared strain because of the common task and work goal, individual level might also be of particular importance when social relations and leadership are concerned (e.g., Hunziker et al., 2011).

Employees with higher levels of time pressure as well as higher levels of social stressors showed a tendency to enhanced cardiovascular activation throughout. The zero-order correlations between stressors at work and blood pressure levels are impressive and may – in part – be due to reliable and work-representative blood pressure measurement, i.e. continuous blood pressure assessment across several working days using the most reliable ambulatory equipment. In fact, ambulatory assessment of blood pressure across days yields more reliable estimates of blood pressure levels than few point measurements (Pickering, Shimbo, & Haas, 2006). The association found between work stressors and blood pressure levels was in line with previous findings. Facing high work demands, a higher – but not too high – level of cardiovascular activation may reflect a challenge appraisal and activation of resources that promoted successful coping with work demands (Elfering & Grebner, 2012). Especially with respect to social stressors, increased blood pressure might be functional to keep attention to the task at hand and to prevent social stressors to capture attention that is needed to adequately perform work tasks in time. The arterial baroreflex is seen as homeostatic control of blood pressure (Gianaros, Onyewuenyi, Sheu, Christie, & Critchley, 2012). According to the baroreceptor hypothesis sensory information is recorded as a function of the prevailing blood pressure. The activity of the baroreceptors due to increased blood pressure is accompanied by a variety of cognitive changes that mitigate the effects of aversive stimulation (Ehlert, 2003) and permits attention to be kept focused on the work task at hand. This activation may be effective in the short-term but includes risks in the long-term. In the end the costs of work including may accumulate when recovery processes are incomplete and precede a loss of efficiency (Berset, Semmer, Elfering, Amstad, & Jacobshagen, 2009; Pereira, Meier, & Elfering, 2013; Semmer, Grebner, & Elfering, 2010). Moreover, on the background on rising levels of time pressure one has to ask whether time stressors have become chronic, yet. Although the association found between time pressure and blood pressure is meaningful, our results are clearer for social stressors at work than for time pressure. This is in line to previous research evaluative threat and ambulatory blood pressure (e.g., Smith, Birmingham, & Uchino, 2012).

In addition both stressors are usually interrelated. This is a common finding because time pressure may impede communication and information policies and increase the probability of role conflict (Hacker, 2003). Thus, along with expectation in our regression analysis control for time pressure did weaken the association between social stressors and blood pressure. The staff of the IT enterprise was young, healthy, well-educated and without children and the association between work stressors and health indicators might have been underestimated given that recent findings indicate a closer association between work stressors and health for those who already experience a loss of health resources (Kottwitz, Meier, Jacobshagen, Kälin, Elfering, & Semmer, 2012).

Our results – although some are only marginally significant – still refer to practical implications. Meanwhile, due to a systematic intensification of work, psychosocial workload has increased, and as a consequence, recovery time and recovery opportunities presumably have shortened (Härmä, 2006; Kompier, 2006). Thus, to stop this trend work design should reduce time pressure and breaks should be rigorously protected also in order to reduce safety threats (Elfering, Grebner, & de Tribolet-Hardy, 2013). With respect to person-oriented intervention the usefulness of time management training to reduce time pressure at work is under debate (Sallinen, 2003). According to Sonnentag and Bayer (2005) the most important starting point, is to reduce psychosocial work stress that arises not only from time pressure but also from social stressors, a second point is to improve resources, e.g., job control (Elfering, Grebner, Gerber, & Semmer, 2008; Kottwitz, Grebner, Semmer, Tschan, & Elfering, 2014) and a third one is to improve recovery from work (Berset et al., 2009).

Based on their effort-recovery theory model (Meijman & Mulder, 1998) one would suggest associations between work stressors and indicators of strain to be closer in the second half of working time when – under conditions of time pressure – supplemental resources must be activated to meet work demands. Accordingly the main effect of social stressors and time pressure on MAP at noon was only marginally significant, but social stressors were significantly associated with increased MAP in the afternoon. This reflects a delay in the cardiovascular activation to the end of the work day. In the long run, this might affect recovery after work is done (e.g., by affecting psychological detachment, fatigue, and sleep; Dahlgren, Kecklund, & Åkerstedt, 2005; Sonnentag, Kuttler, & Fritz, 2010).

Limitations

Our study has some advantages worth to be reported. One major advantage is the use of a complete staff of a small It-enterprise, excluding sampling bias. A second advantage is the combination of data of different sources, i.e. questionnaire self-report data and physiological data. By combining data of different sources we avoided the problem of common method variance in assessment (Semmer et al., 2004). Prediction of intra-individual change in blood pressure controlled for person characteristics that influence the cardiovascular activation when differences between persons are analysed (e.g., BMI or demographic characteristics like gender and age).

However, there are also several limitations to our study. First, our sample size was rather small, which implies limited power and therefore an extended risk to miss a significant effect. There is need for replication of this pilot study. Within the scope of field studies, the natural setting accounts for the small sample size; however, Blascovich and Tomaka (1996) claimed physiological assessment of arousal to take place within appropriate but arbitrary situations. Thus, the natural setting is an advantage too. Second, assessing work related stressors on a general level represents a limitation in that more specific assessment of work related stressors may yield stronger results.

Note that this study investigated social stressors at work, which constitutes only a subset of social stressors people experience in life. Private social stressors may impact well-being also at work when employees are easily involved in their private problems by interrupting phone calls, mails, etc. Hence, future research should include social stressors in private life in addition to social stressors at work to evaluate the total and specifically work-related contribution of social stressors on blood pressure at work (Grebner, Elfering, Semmer, Kaiser-Probst, & Schlapbach, 2004). Work stressors like social stressors and time pressure have daily and weekly variations (e.g., Schwartz & Stone, 1993; Sonnentag, 2001; Totterdell, Wood, & Wall, 2006) that should be considered. Future field studies of work related stressors and cardiovascular reactivity should also investigate the impact of daily work hassles like barriers and failure in programming, etc. (Klumb, Elfering, & Herre, 2009).

CONCLUSION

The present study highlighted the importance of social work relations and the perception of social stressors within the same IT organization. Persons who perceived comparatively more social stressors tend to reveal higher levels of blood pressure – in part independently from time pressure. Given associations between ambulatory blood pressure and risk of cardiovascular disease, the findings support elaborated conceptual models of threats to the social self – or stress as offence to self (e.g. Semmer, Jacobshagen, Meier, & Elfering, 2007) – as a potentially important influence on physical health.

References

Backé, E.-M., Seidler, A., Latza, U., Rossnagel, K., & Schumann, B. (2012). The role of psychosocial stress at work for the development of cardiovascular diseases: a systematic review. *International Archives of Occupational and Environmental Health, 85*, 67–79. Doi: 10.1007/s00420-011-0643-6.

Beehr, T. A., & Franz, T. M. (2008). The Current Debate About the Meaning of Job Stress. *Journal of Organizational Behavior Management, 8*, 5–18. Doi: org/10.1300/J075v08n02_02.

Berset, M., Semmer, N. K., Elfering, A., Amstad, F., Jacobshagen, N. (2009). Work characteristics as predictors of physiological recovery on weekends. *Scandinavian Journal of Work, Environment and Health, 35,* 188–192.
Doi: 10.5271/sjweh.1320.

Blascovich, J., & Tomaka, J. (1996). The biopsychosocial model of arousal regulation. In M. P. Zanna (Ed.), *Advances in experimental social psychology*, *29*, 1–51. New York: Academic.

Chrousos, G. P., & Gold, P. W. (1992). The Concepts of Stress and Stress System Disorders. *JAMA: The Journal of the American Medical Association, 267*, 1244–1252. Doi: 10.1001/jama.1992.03480090092034.

Clays, E., Leynen, F., De Bacquer, D., Kornitzer, M., Kittel, F., Karasek, R., & De Backer, G. (2007). High job strain and ambulatory blood pressure in middle-aged men and women from the belgian job stress study. *Journal of Occupational and Environmental Medicine, 49*, 360–367. Doi: 10.1097/JOM.0b013e31803b94e2.

Dahlgren, A., Kecklund, G., & Åkerstedt, T. (2005). Different levels of work-related stress and the effects on sleep, fatigue and cortisol. *Scandinavian Journal of Work Environment & Health, 31*, 277–285. Doi: 10.5271/sjweh.883.

Dahlgren, A., Kecklund, G., & Akerstedt, T. (2006). Overtime work and its effects on sleep, sleepiness, cortisol and blood pressure in an experimental field study. *Scandinavian Journal of Work, Environment & Health, 32*, 318–327. Doi: 10.5271/sjweh.1016.

De Lange, A. H., Taris, T. W., Kompier, M. A. J., Houtman, I. L. D., & Bongers, P. M. (2003). "The very best of the millenium": Longitudinal research and the demandcontrol-(support) model. *Journal of Occupational Health Psychology, 8*, 282–305. Doi: 10.1037/1076-8998.8.4.282.

Dormann, C., & Zapf, D. (2002). Social stressors at work, irritation, and depressive symptoms. Accounting for unmeasured third variables in a multi-wave study. *Journal of Occupational and Organizational Psychology, 75*, 33–58.
Doi: 10.1348/096317902167630.

Ehlert, U. (2003). Verhaltensmedizin [Behavioral Medicine]. Berlin: Springer-Verlag.

Elfering, A., & Grebner, S. (2012). Getting used to academic public speaking: global self-steem predicts habituation in blood pressure response to repeated thesis presentations. *Applied Psychophysiology & Biofeedback, 37*, 109–120. Doi: 10.1007/s10484-012-9184-3.

Elfering, A., Grebner, S., & de Tribolet-Hardy, F. (2013). The long arm of time pressure at work: cognitive failure and nearby commuting accidents. *European Journal of Work and Organizational Psychology, 22*, 737–749.
Doi: 10.1080/1359432X.2012.704155.

Elfering, A., Grebner, S., Gerber, H., & Semmer, N. K (2008). Workplace observation of work stressors, catecholamine and musculoskeletal pain in male employees. *Scandinavian Journal of Work, Environment and Health*, *34*, 337–344. Doi: 10.5271/sjweh.1280.

Frese, M., & Zapf, D. (1987). Eine Skala zur Erfassung von sozialen Stressoren am Arbeitsplatz [Social Stressors at the Workplace Scale]. *Zeitschrift für Arbeitswissenschaft, 41*, 134–141.

Gavin, M. B., & Hofmann, D. A. (2002). Using hierarchical linear modeling to investigate the moderating influence of leadership climate. *The Leadership Quarterly, 13*, 15–33. Doi: 10.1016/s1048-9843(01)00102-3.

Gianaros, P. J., Onyewuenyi, I. C., Sheu, L. K., Christie, I. C., & Critchley, H. D. (2012). Brain systems for baroreflex suppression during stress in humans. *Human Brain Mapping, 33*, 1700–1716. Doi: 10.1002/hbm.21315.

Grebner, S., Berlowitz, I., Alvarado, V., & Cassina, M. (2011). *Stress-Studie 2010. Stress bei Schweizer erwerbstätigen. Zusammenhänge zwischen arbeitsbedingungen, personenmerkmalen, befinden und gesundheit* [Stress study 2011. Stress in Swiss employees. Associations between working conditions, person characteristics, well-being, and health]. Bern, Switzerland: Staatssekretariat für Wirtschaft (Seco).

Grebner, S., Elfering, A., Semmer, N. K., Kaiser-Probst, C., & Schlapbach, M. L. (2004). Stressful situations at work and in private life among young workers: An event sampling approach. *Social Indicators Research, 67*, 11–49. Doi: 10.1023/B:SOCI.0000007333.96382.3a.

Hacker, W. (2003). Action regulation theory: A practical tool for the design of modern work processes. *European Journal of Work and Organizational Psychology, 12*, 105–130. Doi: 10.1080/13594320344000075.

Härmä, M. (2006). Workhours in relation to work stress, recovery and health. *Scandinavian Journal of Work, Environment and Health, 32,* 502–514. Doi: 10.5271/sjweh.1055.

Hayashi, T., Kobayashi, Y., Yamaoka, K., & Yano, E. (1996). Effect of overtime work on 24-hour ambulatory blood pressure. *Journal of Occupational & Environmental Medicine, 38*, 1007–1011. Doi: 10.1097/00043764-199610000-00010.

Hox, J. J. (2002). *Multilevel analysis: techniques and applications*. Mahwah (NJ): Lawrence Erlbaum Associates.

Hunziker, S., Johansson, A. C., Tschan, F., Semmer, N. K., Rock, L., Howell, M. D., & Marsch, S. (2011). Teamwork and leadership in cardiopulmonary resuscitation. *Journal of the American College of Cardiology, 57*, 2381–2388. Doi: 10.1016/j.jacc.2011.03.017.

Ilies, R., Dimotakis, N., & De Pater, I. E. (2010). Psychological and physiological reactions to high workloads: Implications for well-being. *Personnel Psychology, 63*, 407–436. Doi: 10.1111/j.1744-6570.2010.01175.x.

Jacobshagen, N. (2006). Illegitimate Tasks, Illegitimate Stressors: Testing a new Stressor-Strain Concept. *Inaugural Dissertation*, Faculty of Human Sciences, University of Bern.

Kamarck, T. W., Schwartz, J. E., Shiffman, S., Muldoon, M. F., Sutton-Tyrrell, K., & Janicki, D. L. (2005). Psychosocial Stress and Cardiovascular Risk: What is the Role of Daily Experience? *Journal of Personality, 73*, 1749–1774. Doi: 10.1111/j.0022-3506.2005.00365.x.

Kivimäki, M., S. T. Nyberg, et al. (2012). Job strain as a risk factor for coronary heart disease: a collaborative meta-analysis of individual participant data. *The Lancet, 380*, 1491–1497. Doi: 10.1016/S0140-6736(12)60994-5.

Klumb, P., Elfering, A., & Herre, C. (2009). Ambulatory Assessment in Industrial/Organizational Psychology: Fruitful Examples and Methodological Issues. *European Psychologist, 14*, 120–131. Doi: 10.1027/1016-9040.14.2.120.

Kompier, M. (2006). New systems of work organization and workers' health. *Scandinavian Journal of Work Environment Health*, *32*, 421–430. Doi:10.5271/sjweh.1048.

Kottwitz, M. U., Meier, L. L., Jacobshagen, N., Kälin, W., Elfering, A., & Semmer, N. K. (2012). Illegitimate tasks associated with higher cortisol levels for men with poor subjective health – An intraindividual analysis. *Scandinavian Journal of Work, Environment and Health.* Online first. Doi: 10.5271/sjweh.3334.

Kottwitz, M. U., Grebner, S., Semmer, N. K., Tschan, F., & Elfering, A. (2014). Social stress at work and change in women's body weight. *Industrial Health, 52*. Doi: 10.2486/indhealth.2013-0155.

Larkin, K. T. (2005). *Stress and hypertension: Examining the relation between psychological stress and high blood pressure*. New Haven & London: Yale University Press.

Leary, M. R., & Baumeister, R. F (2000). The nature and function of self-esteem: Sociometer theory. In Zanna, M. P. (Ed). *Advances in experimental social psychology* (p. 1–62). San Diego: Academic Press.

Magometschnigg, D., Mair, N., & Hitzenberger, G. (2001). NAIS-284 blood pressure watch in comparison to SpaceLabs 90207 – precision and reliability. *Austrian Journal of Hypertension, 5*, 16–22.

Maina, G., Bovenzi, M., Palmas, A., Prodi, A., & Filon, F. (2011). Job strain, effort-reward imbalance and ambulatory blood pressure: results of a cross-sectional study in call handler operators. *International Archives of Occupational and Environmental Health, 84*, 383–391. Doi: 10.1007/s00420-010-0576-5.

McEwen, B. (1998). Protective and damaging effects of stress mediators. *New England Journal of Medicine, 338,* 171–179.
Doi: 10.1056 NEJM199801153380307.

McEwen, B. S., & Wingfield, J. C. (2010). What is in a name? Integrating homeostasis, allostasis and stress. *Hormones and Behavior, 57*, 105–111. Doi: 10.1016/j.yhbeh.2009.09.011.

Meijman, T. F., & Mulder, G. (1998). Psychological aspects of workload. In Drenth, P. J. D, Thierry, H., Wolff, C. J. D (Eds.), *Handbook of work and organizational psychology* (p. 5–33). East Sussex: Psychology Press Ltd.

Nezlek, J. B., Schröder-Abé, M., & Schütz, A. (2006). Mehrebenenanalysen in der psychologischen Forschung. Vorteile und Möglichkeiten der Mehrebe-nenmodellierung mit Zufallskoeffizienten. *Psychologische Rundschau, 57*, 213–223. Doi: 10.1026/0033-3042.57.4.213.

Nixon, A. E., Mazzola, J. J., Bauer, J., Krueger, J. R., & Spector, P. E. (2011). Can work make you sick? A meta-analysis of the relationships between job stressors and physical symptoms. *Work & Stress, 25*, 1–22.
Doi: 10.1080/02678373.2011.569175.

Paoli, P., & Merllié, D. (2005). Ten years of working conditions in the European Union (Summary). Report summary No ef00128. Retrieved at November 30 2012 from http://www.eurofound.europa.eu/publications/htmlfiles/ef00128.htm.

Pereira, D., Meier, L. L., & Elfering, A. (2013). Short-term effects of social exclusion at work and worries on sleep. *Stress & Health*, *29*, 240–252.
Doi: 10.1002/smi.2461.

Pickering, T. G., Shimbo, D., & Haas, D. (2006). Ambulatory blood-pressure monitoring. *New England Journal of Medicine, 354*, 2368–2374.
Doi: 10.1056/NEJMc061756.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*, 879–903.
Doi: 10.1037/0021-9010.88.5.879.

Rasbash, J., Steele, F., Browne, W., & Goldstein, H. (2010). *MLWin Version 2.20. Centre for multilevel modelling*. University of Bristol.

Rau, R. (2006). The association between blood pressure and work stress: The importance of measuring isolated systolic hypertension. *Work & Stress, 20*, 84–97. Doi: 10.1080/02678370600679447.

Sallinen, M. (2003). Can we cope with shortage of time at work? *Scandinavian Journal of Work, Environment and Health, 29*, 325–327. Doi:10.5271/sjweh.738.

Schwartz, J. E., & Stone, A. A. (1993). Coping with daily work problems. Contributions of problem content, appraisals, and person factors. *Work & Stress, 7*, 47–62. Doi: 10.1080/02678379308257049.

Semmer, N. K., Grebner, S., & Elfering, A. (2004). Beyond self-report: Using observational, physiological, and situation-based measures in research on occupational stress. In P. L. Perrewé & D. C. Ganster (Eds.), *Research in occupational stress and well-being 3* (p. 207–263). Amsterdam: JAI.

Semmer, N. K., Grebner, S., & Elfering, A. (2010). "Psychische Kosten" von Arbeit: Beanspruchung und Erholung, Leistung und Gesundheit. [The "psychological costs" of work: Workload, recovery, performance, and health.] In U. Kleinbeck & K.-H. Schmidt (Hrsg.), *Arbeitspsychologie*. (Enzyklopädie der Psychologie, Bd. D-III-1, S. 325–370). Göttingen: Hogrefe.

Semmer, N. K., Jacobshagen, N., Meier, L. L., & Elfering, A. (2007). Occupational stress research: The "stress-as-offense-to-self" perspective. In J. Houdmont & S. McIntyre (Eds.), *Occupational health psychology: European perspectives on research, education and practice 2* (p. 43–60). Castelo da Maia, Portugal: ISMAI Publishing.

Semmer, N. K., McGrath, J. E., & Beehr, T. A. (2005). Conceptual issues in research on stress and health. In C. L. Cooper (Ed.), *Handbook of Stress and Health* (2nd ed., p. 1–43). New York: CRC Press.

Semmer, N. K., & Udris, I. (2007). Bedeutung und Wirkung von Arbeit [Meaning and effects of work]. In H. Schuler (Ed.), *Lehrbuch Organisationspsychologie* (4th ed., p. 157–195). Bern: Huber.

Semmer, N., Zapf, D., & Dunckel, H. (1995). *Assessing stress at work: A framework and an instrument.* Luxembourg: Office for Official Publications of the European Communities.

Sethi, V., Barrier, T. A., & King, R. C. (2004). What causes stress in information system professionals? *Association for Computing Machinery, Communications of the ACM, 47*, 99–103. Doi: 10.1145/971617.971623.

Smith, T. W., Birmingham, W., & Uchino, B. N. (2012). Evaluative threat and ambulatory blood pressure: Cardiovascular effects of social stress in daily experience. *Health Psychology, 31*, 763–766. Doi: 10.1037/a0026947.

Sonnentag, S. (2001). Work, recovery activities, and individual well-being: A diary study. *Journal of Occupational Health Psychology, 6*, 196–210.
Doi: 10.1037/1076-8998.6.3.196.

Sonnentag, S., & Bayer, U. (2005). Switching off mentally: Predictors and consequences of psychological detachment from work during off-job time. *Journal of Occupational Health Psychology, 10*, 393–414.
Doi: 10.1037/1076-8998.10.4.393.

Sonnentag, S., Kuttler, I., & Fritz, C. (2010). Job stressors, emotional exhaustion, and need for recovery: A multi-source study on the benefits of psychological detachment. *Journal of Vocational Behavior, 76*, 355–365.
Doi: 10.1016/j.jvb.2009.06.005.

Spector, P. E., & Jex, S. M. (1998). Development of four self-report measures of job stressors and strain: Interpersonal conflict at work scale, organizational constraints scale, quantitative workload inventory, and physical symptoms inventory. *Journal of Occupational Health Psychology, 3*, 356–367. Doi: 10.1037/1076-8998.3.4.356.

Sterling, P., & Eyer, J. (1988). Allostasis: A new paradigm to explain arousal pathology. In S. Fisher & J. Reason (Eds.), *Handbook of Life Stress, Cognition and Health* (p. 629–649). New York: John Wiley & Sons.

Totterdell, P., Wood, S., & Wall, T. (2006). An intra-individual test of the demands-control model: A weekly diary study of psychological strain in portfolio workers. *Journal of Occupational and Organizational Psychology, 79*, 63–84. Doi: 10.1348/096317905X52616.

Van Egeren, L. (1992). The relationship between job strain and blood pressure at work, at home, and during sleep. *Psychosomatic Medicine, 54*, 337–343.

Wilson, E. V., & Sheetz, S. D. (2010). A demands-resources model of work pressure in IT student task groups. *Computers & Education, 55*, 415–426. Doi: 10.1016/j.compedu.2010.02.006.

Zuckerman, M. (1983). The distinction between trait and state scales is not arbitrary: Comment on Allen and Potkay's' on the arbitrary distinction between traits and states'. *Journal of Personality and Social Psychology, 44*, 1083–1086. Doi: 10.1037/0022-3514.44.5.1083.

LAIKO STOKA, SOCIALINIO DARBO STRESORIAI IR KRAUJO SPAUDIMAS SEPTYNIŲ IT DARBUOTOJŲ KOMANDOS INTENSYVAUS DARBO SAVAITĖS LAIKOTARPIU

Maria Undine Kottwitz, Maurice Lachappelle, Achim Elfering
Berno universitetas, Šveicarija

Santrauka. ***Įvadas.*** Informacinių technologijų (IT) srityje laiko stoka yra dažnas reiškinys. Atliekant terminuotas užduotis, kai darbą reikia atlikti griežtai per nustatytą trumpą laiką didėja socialinių stresorių rizika, tokia, kaip įtampa ir konfliktai darbe. ***Tikslas.*** Šiuo praktiniu tyrimu siekta nustatyti laiko stokos ir socialinių stresorių ryšį su kraujo spaudimu darbo metu. ***Metodas.*** Septyniems nedidelės IT įmonės darbuotojams savaitės laikotarpiu buvo matuojamas kraujo spaudimas. Laiko stoka ir socialiniai stresoriai buvo vertinami tyrimo pradžioje. ***Rezultatai.*** 138 atvejų daugialypė regresinė analizė atskleidė ryšį tarp aukštų laiko stokos rodiklių ir nežymiai padidėjusio kraujo spaudimo vidurdienį ir po pietų. Be to, aukšti socialinių stresorių darbe rodikliai siejosi su padidėjusiu kraujospūdžiu po pietų. ***Išvados.*** Tyrimo rezultatai patvirtina nuomonę, kad grėsmė socialiniam žmogaus aspektui vaidina svarbų vaidmenį profesinėje sveikatoje.

Pagrindiniai žodžiai: stresas darbe, informacinės technologijos (IT), kraujo spaudimas.

Received: 11-05-2013
Accepted: 07-04-2014