



## Journal Article

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# Work, work–life conflict and health in an industrial work environment

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<b>Background</b>	Work–life conflict has been poorly studied as a cause of ill-health in occupational medicine.
<b>Aims</b>	To study associations between physical and psychosocial working conditions, including work–life conflict on the one hand and general, physical and mental health outcomes on the other.
<b>Methods</b>	Cross-sectional data were used from an employee survey among the workforces of four medium-sized and large companies in Switzerland. Physical work factors included five demands and exposures such as heavy loads, repetitive work and poor posture. Psychosocial factors included 14 demands and limited resources such as time pressure, overtime, monotonous work, job insecurity, low job autonomy, low social support and work–life conflict. Health outcomes studied were self-rated health, sickness absence, musculoskeletal disorders, sleep disorders, stress and burnout.
<b>Results</b>	There was a response rate of 49%; 2014 employees participated. All adverse working conditions were positively associated with several poor health outcomes in both men and women. After mutual adjustment for all work factors and additional covariates, only a few, mainly psychosocial work factors remained significant as risk factors for health. Work–life conflict, a largely neglected work-related psychosocial factor in occupational medicine, turned out to be the only factor that was significantly and strongly associated with all studied health outcomes and was consistently found to be the strongest or second strongest of all the studied risk factors.
<b>Conclusions</b>	Even in an industrial work environment, psychosocial work factors, and particularly work–life conflict, play a key role and need to be taken into consideration in research and workplace health promotion.
<b>Key words</b>	Burnout; musculoskeletal disorders; physical and psychosocial work factors; self-rated health; sickness absence; sleep disorders; stress; work–life conflict.

## Introduction

Numerous strenuous or stressful working conditions, adverse job characteristics and poor occupational exposures are known to be health risk factors. Physical factors and ergonomic exposures at work have been studied predominantly with regard to musculoskeletal disorders, mostly in blue-collar or industrial workers. Psychosocial work factors have mainly been studied with regard to cardiovascular diseases, stress-related disorders or mental health problems and/or general health outcomes, and among white-collar workers and public servants. Another important work- and stress-related psychosocial factor that has been explored with

regard to health is work–life conflict, originally conceptualized as an inter-role conflict between work and family resulting in three forms and two directions of negative spillover effects from one role or life domain to the other [1]. But while this multidimensional and bidirectional concept is widely used and well established in occupational health psychology [2], it has been little addressed in occupational medicine so far [3]. Only a few studies have examined both physical and psychosocial factors simultaneously [4,5] and no single study has ever considered work factors of both types, including work–life conflict as a proven work stressor and health risk factor [3]. The aim of this study, therefore, was to close this research gap.

**Table 1.** Prevalence rates of different health outcomes among industrial workers by various working conditions and stratified by sex ( $n = 2014$ )

		Poor self-rated health		Long sickness absence (6+ days/year)		Severe back/low back pain		Severe neck/shoulder pain		Severe sleep disorders		Strong stress feelings		Increased burnout symptoms (16–24)	
		%		%		%		%		%		%		%	
		M	F	M	F	M	F	M	F	M	F	M	F	M	F
Total study population		13	16	15	22	11	12	10	22	11	10	15	17	6	10
Physical working conditions <sup>a</sup>															
High work pace <sup>b</sup> (82% <sup>c</sup> )	No	15	16	15	24	8	12	9	20	9	4	11	4	2	9
	Yes	13	15	15	21	11	12	10	22	11	12	15	20	6	10
Uniform arm or hand movements <sup>b</sup> (50% <sup>c</sup> )	No	11	11	12	19	9	7	7	14	9	9	13	20	4	13
	Yes	16	18	18	23	13	15	13	25	13	11	17	16	7	9
Repetitive work <sup>b</sup> (49% <sup>c</sup> )	No	11	7	12	19	8	14	7	20	9	7	13	21	4	10
	Yes	16	21	18	23	14	12	13	23	13	13	16	15	7	10
Painful or tiring posture <sup>b</sup> (45% <sup>c</sup> )	No	9	6	12	19	6	5	4	14	7	8	12	14	3	6
	Yes	19	24	18	23	18	19	17	28	16	12	18	20	9	13
Carrying heavy loads <sup>b</sup> (35% <sup>c</sup> )	No	12	14	12	22	9	12	9	21	10	8	14	16	5	10
	Yes	17	19	19	20	14	14	11	22	13	16	16	20	8	10
Psychosocial working conditions <sup>a</sup>															
High time pressure (72% <sup>c</sup> )	No	10	9	18	14	10	8	7	17	8	5	8	12	2	5
	Yes	15	19	14	24	11	15	11	24	12	13	17	21	7	17
Frequent interruptions (58% <sup>c</sup> )	No	13	18	18	21	9	10	8	18	8	10	9	13	2	6
	Yes	14	14	13	22	12	13	11	24	13	11	19	21	8	13
Steadily growing workload (57% <sup>c</sup> )	No	14	16	14	21	9	10	7	17	7	6	8	11	2	4
	Yes	13	15	15	22	12	14	12	26	14	16	19	25	8	16
Poor promotion prospects (55% <sup>c</sup> )	No	8	12	13	17	8	7	5	16	8	7	9	13	3	4
	Yes	18	18	16	24	13	16	13	26	13	14	19	20	8	14
No work time flexibility (41% <sup>c</sup> )	No	13	11	12	20	10	12	10	21	9	9	14	17	5	11
	Yes	15	22	19	24	13	14	10	22	13	12	15	17	7	9
Regular overtime (32% <sup>c</sup> )	No	13	15	16	22	10	11	9	19	10	10	12	14	4	8
	Yes	14	16	12	20	13	13	11	26	12	11	21	26	9	15
Monotonous work <sup>b</sup> (30% <sup>c</sup> )	No	11	10	11	20	9	10	7	19	8	9	12	17	4	8
	Yes	19	27	23	24	14	17	16	27	18	13	20	18	11	14
Low job autonomy (22% <sup>c</sup> )	No	12	14	13	21	9	12	8	21	9	10	13	19	4	10
	Yes	17	22	19	23	15	14	16	21	19	14	20	13	10	13
Low social support (21% <sup>c</sup> )	No	12	13	14	21	10	8	9	17	9	6	11	13	3	6
	Yes	20	21	16	23	13	27	13	35	17	25	30	31	16	21
Status inconsistency (18% <sup>c</sup> )	No	12	16	14	22	9	10	8	19	9	10	13	18	4	9
	Yes	21	14	17	12	16	21	16	35	18	14	22	16	13	12
Job insecurity (17% <sup>c</sup> )	No	11	15	13	20	11	13	9	21	9	9	13	16	4	9
	Yes	23	14	22	30	11	6	13	22	18	18	23	24	12	18
High work-life conflict (0–48; >18) (16% <sup>c</sup> )	No	11	15	13	21	9	11	7	20	6	8	9	12	1	6
	Yes	27	23	23	28	21	20	20	28	31	30	39	59	25	43
Work time changes at short notice (15% <sup>c</sup> )	No	13	16	15	22	10	12	9	21	10	10	13	16	5	9
	Yes	15	18	15	18	14	20	14	23	13	15	24	26	12	21
Poor compatibility of work hours (15% <sup>c</sup> )	No	12	16	14	21	10	13	8	21	8	9	12	15	3	8
	Yes	21	18	20	29	14	9	15	27	26	27	30	55	18	46

Chi-square tests:  $P \leq 0.05$  (in bold).<sup>a</sup>Prevalence rates of health outcomes in the non-exposed or reference group (upper percentage) and the exposed group (lower percentage).<sup>b</sup>Applies partly, largely or fully to the job situation.<sup>c</sup>Frequency of such working condition, job characteristic or occupational exposure in the entire study population.

**Table 2.** Associations of adverse physical and psychosocial working conditions with different health outcomes among industrial workers (n = 2014)

	Poor self-rated health		Long sickness absence (6+ days/year)		Severe back/low back pain		Severe neck/shoulder pain		Severe sleep disorders		Strong stress feelings		Increased burnout symptoms (16–24)	
	14% <sup>a</sup>		16% <sup>a</sup>		11% <sup>a</sup>		12% <sup>a</sup>		11% <sup>a</sup>		15% <sup>a</sup>		6% <sup>a</sup>	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<b>Physical working conditions</b>														
High work pace <sup>b</sup> (82% <sup>a</sup> )	0.68	0.45–1.04	0.87	0.59–1.29	1.25	0.73–2.12	0.69	0.43–1.10	0.96	0.57–1.63	1.06	0.67–1.70	1.18	0.50–2.83
Uniform arm or hand movements <sup>b</sup> (50% <sup>a</sup> )	0.89	0.63–1.27	1.23	0.89–1.70	0.95	0.64–1.39	1.38	0.94–2.03	0.96	0.64–1.43	1.14	0.81–1.60	0.75	0.42–1.31
Repetitive work <sup>b</sup> (49% <sup>a</sup> )	0.95	0.66–1.38	0.85	0.61–1.20	0.87	0.58–1.31	0.77	0.52–1.15	0.95	0.63–1.47	0.76	0.53–1.09	0.65	0.35–1.20
Painful or tiring posture <sup>b</sup> (45% <sup>a</sup> )	<b>2.27</b>	<b>1.61–3.22</b>	1.20	0.88–1.65	<b>3.32</b>	<b>2.24–4.90</b>	<b>2.99</b>	<b>2.05–4.37</b>	<b>1.57</b>	<b>1.06–2.33</b>	1.15	0.82–1.61	<b>2.53</b>	<b>1.42–4.50</b>
Carrying heavy loads <sup>b</sup> (35% <sup>a</sup> )	1.10	0.78–1.56	0.90	0.65–1.24	1.02	0.70–1.50	<b>0.66</b>	<b>0.45–0.97</b>	0.93	0.63–1.39	0.95	0.66–1.36	0.90	0.49–1.63
<b>Psychosocial working conditions</b>														
High time pressure (72% <sup>a</sup> )	<b>1.83</b>	<b>1.22–2.76</b>	0.97	0.68–1.38	0.87	0.56–1.34	1.02	0.66–1.58	0.96	0.60–1.54	1.11	0.73–1.70	0.82	0.38–1.76
Frequent interruptions (58% <sup>a</sup> )	0.77	0.55–1.08	0.90	0.66–1.23	0.99	0.68–1.45	1.07	0.74–1.54	1.12	0.76–1.68	<b>1.47</b>	<b>1.04–2.09</b>	<b>1.84</b>	<b>1.00–3.39</b>
Steadily growing workload (57% <sup>a</sup> )	<b>0.53</b>	<b>0.38–0.73</b>	1.17	0.86–1.59	1.01	0.69–1.46	1.43	0.99–2.06	<b>1.51</b>	<b>1.01–2.27</b>	<b>1.58</b>	<b>1.12–2.23</b>	<b>2.14</b>	<b>1.15–3.97</b>
Poor promotion prospects (55% <sup>a</sup> )	<b>1.65</b>	<b>1.17–2.32</b>	1.12	0.83–1.52	1.35	0.93–0.95	<b>1.74</b>	<b>1.20–2.54</b>	1.06	0.73–1.56	<b>1.40</b>	<b>1.00–1.94</b>	1.24	0.70–2.19
No work time flexibility (41% <sup>a</sup> )	1.10	0.77–1.58	1.20	0.86–1.66	0.98	0.66–1.45	0.82	0.55–1.21	0.89	0.59–1.36	1.10	0.77–1.57	1.41	0.78–2.52
Regular overtime (32% <sup>a</sup> )	1.11	0.76–1.61	0.83	0.58–1.20	1.38	0.92–2.06	1.27	0.86–1.89	1.03	0.66–1.56	1.29	0.90–1.84	1.17	0.64–2.13
Monotonous work <sup>b</sup> (30% <sup>a</sup> )	1.32	0.92–1.88	<b>1.71</b>	<b>1.23–2.37</b>	0.97	0.65–1.45	<b>1.58</b>	<b>1.08–2.30</b>	<b>1.52</b>	<b>1.02–2.29</b>	1.39	0.97–2.00	<b>2.68</b>	<b>1.50–4.80</b>
Low job autonomy (0–52; <27) (22% <sup>a</sup> )	0.68	0.46–1.01	0.90	0.63–1.29	1.18	0.77–1.80	1.33	0.88–2.02	1.37	0.91–2.08	0.90	0.60–1.34	0.91	0.50–1.66
Low social support (21% <sup>a</sup> )	1.24	0.86–1.78	1.06	0.74–1.52	1.24	0.84–1.83	1.26	0.86–1.83	<b>1.66</b>	<b>1.13–2.45</b>	<b>2.07</b>	<b>1.49–2.89</b>	<b>3.24</b>	<b>1.97–5.34</b>
Status inconsistency (18% <sup>a</sup> )	1.31	0.90–1.89	0.80	0.54–1.18	1.47	0.99–2.19	<b>1.51</b>	<b>1.03–2.21</b>	1.22	0.81–1.85	0.91	0.63–1.32	1.47	0.86–2.50
Job insecurity (17% <sup>a</sup> )	<b>1.78</b>	<b>1.25–2.54</b>	<b>1.80</b>	<b>1.28–2.53</b>	0.66	0.42–1.04	0.88	0.58–1.34	<b>1.52</b>	<b>1.02–2.27</b>	1.30	0.91–1.86	1.70	0.99–2.91
High work–life conflict (0–48; >18) (16% <sup>a</sup> )	<b>2.44</b>	<b>1.64–3.61</b>	<b>1.98</b>	<b>1.35–2.91</b>	<b>2.62</b>	<b>1.71–4.01</b>	<b>1.89</b>	<b>1.23–2.88</b>	<b>4.27</b>	<b>2.84–6.32</b>	<b>4.35</b>	<b>3.04–6.23</b>	<b>10.93</b>	<b>6.20–19.3</b>
Work time changes at short notice (15% <sup>a</sup> )	1.17	0.75–1.83	1.13	0.73–1.75	1.15	0.72–1.83	1.21	0.77–1.92	1.21	0.74–2.00	1.27	0.85–1.89	1.61	0.86–3.01
Poor compatibility of work hours with private obligations (15% <sup>a</sup> )	1.21	0.77–1.89	1.10	0.72–1.68	0.73	0.43–1.21	1.10	0.67–1.81	<b>1.68</b>	<b>1.07–2.64</b>	1.27	0.84–1.93	1.37	0.75–2.51

**Table 2.** (Continued)

	Poor self-rated health	Long sickness absence (6+ days/year)	Severe back/low back pain	Severe neck/shoulder pain	Severe sleep disorders	Strong stress feelings	Increased burnout symptoms (16–24)
	14% <sup>a</sup>	16% <sup>a</sup>	11% <sup>a</sup>	12% <sup>a</sup>	11% <sup>a</sup>	15% <sup>a</sup>	6% <sup>a</sup>
	OR 95% CI	OR 95% CI	OR 95% CI	OR 95% CI	OR 95% CI	OR 95% CI	OR 95% CI
<b>Control variables</b>							
Sex (female) (18% <sup>a</sup> )	1.07 0.71–1.60	<b>1.56 1.10–2.21</b>	1.30 0.85–1.97	<b>2.64 1.82–3.82</b>	1.38 0.87–2.18	<b>1.48 1.01–2.18</b>	<b>3.89 2.15–7.06</b>
Age (16–69; one additional year)	<b>1.02 1.01–1.04</b>	0.99 0.98–1.00	1.01 0.99–1.02	0.99 0.98–1.01	1.01 1.00–1.03	0.99 0.98–1.00	0.99 0.96–1.01
Education (1–10; one higher level)	<b>0.90 0.83–0.98</b>	<b>0.87 0.81–0.95</b>	0.96 0.88–1.05	0.93 0.85–1.02	<b>0.89 0.81–0.98</b>	0.96 0.89–1.04	1.01 0.89–1.16

Multiple adjusted odds ratios (ORs) (all variables simultaneously included in the analysis);  $P \leq 0.05$  (in bold); those not exposed or not working under such conditions were used as a reference group (OR = 1). CI, confidence interval.

<sup>a</sup>Frequency of such health problem, working condition or demographic characteristic in the entire study population.

<sup>b</sup>Applies partly, largely or fully to the job situation.

## Methods

The study was based on cross-sectional data from an employee survey conducted in 2010 among the workforces of four medium-sized and large companies from different regions of Switzerland and diverse industries (building; machine; chemical/pharmaceutical; metal working). Physical demands and exposures at work were measured using five single items taken mainly from the Swiss Health Survey.

Psychosocial demands and resources at work were assessed using 12 single-item measures selected mostly from the Effort-Reward Imbalance Questionnaire of Siegrist *et al.* [6] or from the European Working Conditions Survey, and two multiple-item measures of job autonomy and work-life conflict taken and adapted from the Copenhagen Psychosocial Questionnaire of Kristensen *et al.* [7] and the work-family conflict scale of Carlson *et al.* [8].

Health outcomes were assessed by commonly used self-reported general health and days of absence from work for health reasons, by reports of severe backache or low back pain and severe neck or shoulder pain as measured in the Swiss Health Survey, by a well-validated single item on general psychological stress symptoms used in the Occupational Stress Questionnaire [9], and by a scale of six items selected from the Copenhagen Burnout Inventory [10].

## Results

The overall return rate of the postal survey was 49%, with a total of 2014 submitted and completed questionnaires.

The return rates among the four companies varied between 44 and 66%.

Bivariate analyses almost consistently showed higher prevalence rates among those exposed compared with the non-exposed (Table 1), particularly in men, whereas in women prevalence rates were mostly higher but differences were sometimes not statistically significant due to the small number of cases.

Multivariate analyses then showed independent health effects of the adverse working conditions included (Table 2). Only the strongest associations observed in Table 1 remained significant after adjustment for all covariates. Among the physical working conditions, painful or tiring posture at work was found to be a major and independent risk factor for health, particularly for self-rated general health and musculoskeletal health. Among the psychosocial work factors, frequent interruptions, a growing workload, monotony and low social support turned out to be important risk factors for mental health, whereas time pressure, poor promotion prospects and job insecurity were found to be risk factors for self-rated general health. Work-life conflict was the only work-related risk factor that was significantly and strongly associated with all the health outcomes studied and was found to be the strongest of all risk factors, except for musculoskeletal health.

## Discussion

The most significant finding of our study was that work-life conflict was the clearest and strongest health risk factor of all the associations between physical and psychosocial work factors and various health outcomes. Previous

studies in occupational medicine either did not consider both types of work factors and/or ignored work–life conflict as an additional psychosocial factor and a proven work-related stressor. This study included them all and found psychosocial work factors to be stronger risk factors for health than physical work factors and occupational exposures across different health outcomes. This finding is fully in line with Niedhammer *et al.* [4], one of the few other studies to have examined psychosocial work factors and other occupational risk factors simultaneously.

In this study, numerous physical and psychosocial working conditions and various general, physical and mental health outcomes were considered and particularly work–life conflict as a largely ignored psychosocial work and health risk factor in occupational medicine was included. Moreover, the present study provides initial evidence from a sample of mostly blue-collar workers from the industrial sector who would be expected to be more exposed to adverse physical loads and less exposed to psychosocial demands at work.

The study has some limitations. Firstly, long-term effects of adverse working conditions on health outcomes and causal relations between these factors could not be studied and reverse causality cannot be excluded either, as the data used were cross-sectional. Secondly, the findings cannot be fully generalized and transferred to other populations since the study sample was not representative of the entire blue-collar workforce or the industrial sector as a whole. Thirdly, common method variance cannot be completely excluded due to the use of self-reported data on working conditions and health outcomes.

It can be concluded from the study results that psychosocial work factors in general and negative spillover effects and role conflicts between professional and personal life in particular play an important role even among blue-collar workers and in an industrial work environment, and need to be taken into consideration in the practice of prevention and workplace health promotion.

### Key points

- Even among industrial and construction workers, psychosocial work factors were found to be stronger risk factors for general, and particularly for mental health, than physical work factors.
- Work–life conflict turned out to be the only (psychosocial) work factor that was significantly, consistently and strongly associated with all the health outcomes studied.
- Psychosocial work factors, and particularly work–life conflict, need to be considered as a higher priority in occupational health research and in the organizational practice of prevention and health promotion.

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### Conflicts of interest

None declared.

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