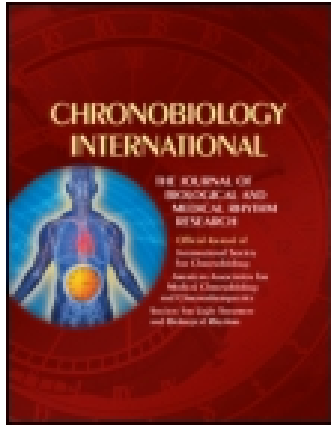


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Health effects of supplemental work from home in the European Union

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ORIGINAL ARTICLE

Health effects of supplemental work from home in the European Union

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Internationalization and technological developments have changed the work organization in developed and developing industrial economies. Information and communication technologies, such as computers and smartphones, are increasingly used, allowing more temporal and spatial flexibility of work. This may lead to an increase in supplemental work, i.e. constant availability or working in addition to contractually agreed work hours. This in turn extends work hours and leads to work hours in evenings and weekends, causing interferences of work hours with biological and social rhythms for sleep, recovery and social interaction. However, empirical findings on the effects of supplemental work and work hours on occupational health are rather scarce. Therefore, the aim of this study was to investigate the association between (1) work-related contacts outside of regular work hours and (2) working in the free time with self-reported work-related health impairments in the fourth and fifth European Working Conditions Surveys (EWCS 2005, EWCS 2010). Out of these cross-sectional, large-scale surveys, data on $n = 22\,836$ and $n = 34\,399$ employed workers were used for weighted logistic regression analyses. About half of the sample reported at least occasional supplemental work. The results showed an increased risk of reporting at least one health problem for employees who had been contacted by their employer (EWCS 2005), or worked in their free time to meet work demands (EWCS 2010) in the last 12 months, compared to those reporting no supplemental work or work-related contacts during free time. These results were controlled for demographic variables, physical and mental work load, worker autonomy, and several work hours characteristics (e.g. hours per week, unusual and variable hours). The risk of reporting health problems was increased by being contacted both sometimes (Odds Ratio [OR] 1.26, 95% Confidence Interval [CI] 1.14–1.39) and often (OR 1.13, 95% CI 1.02–1.25), whereas the frequency of working in the free time showed a clear dose-response effect (sometimes: OR 1.14, 95% CI 1.04–1.24; often: OR 1.60, 95% CI 1.47–1.75), both compared to the category “never”. The findings, thus, indicate that even a small amount of supplemental work beyond contractually agreed work hours may increase the risk of work-related health impairments. Working in the free time was associated with a substantial risk increase and might be a better indicator for actual work load than being contacted by the employer outside of contractually agreed work hours. Thus, in order to minimize negative health effects, availability requirements for employees outside their regular work hours should be minimized. While these effects definitely need further study, especially regarding a quantification of actual supplemental work and its temporal location, addressing the company culture and using incentives and policies might be options to reduce the amount of supplemental work and maintain the risks of health impairments in the working population at a lower level.

Keywords: Constant availability, occupational health, recovery, work hours, work organization

INTRODUCTION

Internationalization and technological developments have changed the work organization in developed and developing industrial economies (Kompier, 2006; Sauter et al., 2002). Information and communication technologies (ICTs), such as computers and smartphones, are increasingly used, allowing more temporal and spatial flexibility of work. ICTs have the potential benefit and the potential inherent danger of making it possible for employees to be available anytime and anywhere

(Golden & Geisler, 2007; Jarvenpaa & Lang, 2005; Park et al., 2011). This changes not only our work organization, but probably also our patterns of social participation and integration.

An increasing amount of flexible working times and flexible workplace arrangements, related to ICT use, has been observed in the last years. For example, a growing number of employees in the US have at least partially been working from home between 2003 and 2007 (Krantz-Kent, 2009), over one-third regularly used a

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computer for work-related tasks at home and were contacted for work-related matters, and about one-fifth read and sent work-related e-mails from home (Bond et al., 2002). ICT use and constant availability, thus, may lead to diminishing boundaries between work and non-work domains (Grant & Kiesler, 2001; Green, 2002; Jarvenpaa & Lang, 2005) and employees might feel – or be given the impression – that they need to be available anytime and anywhere, and work outside of their “regular” (in the sense of their normal or agreed) working hours (i.e. work hours agreed between employers and employees, e.g. by collective agreements or by individual work contracts) and in addition to these normal, agreed working hours (both with regard to the extent and the chronological position of these work hours) to meet work demands or to further their careers. The term “regular” in combination with “work hours” hereafter will be used to refer to these normal, agreed work hours, independent of whether these work hours are themselves regular or irregular, as for example in flexible work hours, as long as they are agreed and the rule. Regular work hours can thus be quite irregular.

For the purpose of this paper, this emerging trend will be named “supplemental work”, which means working in addition to regular or contractually agreed work hours (independent of technology use; our definition is therefore an extension to the term “technology-assisted supplemental work” defined by Fenner & Renn, 2004). This construct is not uni-dimensional since it might imply different kinds of additional work, e.g. working in one’s free time, or being available at home for work-related contacts without any formal agreements concerning the extent of availability (as opposed to on-call work). In our view, this supplemental work is characterized by a lack of formal agreement between employees and employers (or their representatives, as in collective agreements) regarding the extent to which employees are or can be expected to be available or working outside their agreed or regular hours (where “regular” hours can be day work or any agreed duration and temporal location of work hours, as long as they represent the typical pattern of work or have been agreed upon in a work contract). This is independent of whether these are agreed in collective or individual agreements, with the latter giving much more space and possibilities for agreeing to unusual work hours (with “unusual” as opposed to “normal” work hours from an ergonomics, normative point of view, e.g. about 8 h per day, from Monday to Friday, between 07:00 and 19:00). Supplemental work may be initialized by the employer (by phone calls, e-mails, etc.) or by the employee (e.g. taking work home, or checking work-related e-mails in the work-free time without being specifically asked or expected to do so), and may have very different reasons (emergencies, reaching project deadlines, curiosity, informally extending work hours, etc.).

Supplemental work leads to additional working hours and therefore to a reduction in work-free time. Since

supplemental work by definition means additional work, it most certainly leads to unusual (in contrast to normal) work hours (e.g. on evenings, weekends or holidays) beyond “normal” (from the ergonomics position) work hours, and most probably will therefore interfere with biological and social rhythms, as has been shown previously for flexible work hours (e.g. Costa et al., 2004; Giebel et al., 2008; Wirtz et al., 2008) and shift work (Kogi, 1985; Reinberg et al., 1986; Rutenfranz et al., 1977). Besides reducing and interrupting recovery times between two work periods and potentially interfering with sleep times, unusual work hours also interfere with the socially most valuable times on evenings and weekends, which might lead to social desynchronization (Wirtz et al., 2011). This desynchronization should, in turn, lead to impairments in social participation and health problems, since social impairments and work-life conflict have been reported to increase health risks (Frone, 2000; Grant-Vallone & Donaldson, 2001; Wirtz & Nachreiner, 2010).

Supplemental work is most certainly more frequent in occupations which include tasks that can be carried out outside the regular workplace and outside of regular work hours. The authors of Eurofound (2012) defined the term “e-nomad” for workers using ICT for their work, and not working at their employer’s or their own business premises all the time. Those workers were dominantly found in the service sectors, such as financial services, other services, education and public administration, and in occupations that included managers, professionals, technicians and associate professionals, based on the 5th European Working Conditions Survey 2010. Workers in those occupations might work more often under trust based (self-determined) than under contractually agreed work hours, making it hard to define “regular”, “agreed” working hours; however, supplemental work could still occur in the form of any work activity during any planned free time (e.g. reading emails on the weekend, taking work home or answering a work-related phone call). Therefore, it seems important to take working conditions (work load, working time characteristics and work hour control) into account when studying the effects of supplemental work on health.

However, empirical findings regarding the effects of supplemental work on occupational health, safety and social participation are still quite rare, although studies on this topic with different approaches are increasingly reported. Therefore, it seems to be important to study the potential risks of these emerging trends in the organization of work and work hours.

A previous study on work-related contacts in the European Union showed that being contacted by the employer outside of their regular work hours was associated with an increased risk of health impairments (Arlinghaus & Nachreiner, 2013). Based on this first study, we wanted to expand the findings by using a different but conceptually related indicator

for supplemental work, i.e. working in one's free time. Using both indicators, the aims were to (1) measure the prevalence of supplemental work in the European Union, (2) to examine the association between supplemental work and different working conditions, and (3) to investigate the structural associations between supplemental work and work-related health impairments. Using two indicators from two different data sets from the European Union, the findings of the first study were to be extended and compared (cross-validation).

MATERIAL AND METHODS

Study samples

Two different data sources were used for secondary analyses: The fourth and fifth European Working Conditions Survey (EWCS 2005 and 2010), including $n=22\,836$ and $n=34\,399$ employed workers, respectively. These surveys are collected using in-household interviews every five years by the European Foundation for the Improvement of Living and Working Conditions, which also provided access to the data. Thus, the samples are cross-sectional survey data, and are aimed to be representative for each of the participating European member states. The surveys cover many aspects of living and working conditions, such as demographic variables, work schedules, type and intensity of subjectively perceived work load, worker control over working conditions, and work-related health complaints (for details about the sample and survey, see Eurofound, 2007, 2012).

The EWCS 2005 sample contained respondents from 31 countries (25 EU member states at that time, new member states since 2007 Bulgaria and Romania, candidate countries Turkey and Croatia, plus non-EU states Switzerland and Norway). The EWCS 2010 was extended to include individuals from 34 countries (27 EU member states, candidate countries Turkey, Croatia, Macedonia, Montenegro, potential candidates Albania and Kosovo, and non-EU state Norway).

Indicators for supplemental work

The indicators for supplemental work were measured with two different questions. In EWCS 2005, the question was: "In the past 12 months, have you been contacted, e.g. by email or telephone, in matters concerning your main paid job outside your normal working hours?", while in EWCS 2010 it was: "Over the last 12 months how often has it happened to you that you have worked in your free time in order to meet work demands?". Both items were answered on a similar 5-point scale (every day/at least once a week/a couple of times a month/less often than a couple of times a month/never). For some analyses, the answers were re-coded into "often" (every day/at least once a week/a couple of times a month), "sometimes" (less often than a couple of times a month), and "never", to provide for acceptable cell sizes.

Work-related health problems

Both surveys contained the question: "Does your work affect your health, or not?". If the participant answered in the affirmative, they were asked to identify their impairments using a list of 16 (2005) or 14 (2010) different health problems, including musculoskeletal, psychological, gastro-intestinal and cardiovascular problems. To operationalize the occupational health and safety concept that working conditions should not be associated with any health impairments, participants from both samples were classified into "no health impairments" if they did not report any health problems and " ≥ 1 health impairments reported" if they reported at least one work-related health problem. Thus, the indicator included a wide range of different health problems, indicating general work-related health as opposed to unimpaired health, i.e. unimpaired by work, one of the goals of ergonomic design.

Covariates

Several variables were included as covariates based on theoretical assumptions (see above) and preliminary analyses: demographics (age, sex, children in household, income, education), work demands (physical, mental), autonomy over working conditions, and work hours (number of hours/week, night work, shift work, regular work on evenings and weekends, variable hours). Physical and mental work demands and worker autonomy were aggregated into three components from a total of 36 items using principal component analysis with subsequent varimax rotation. Worker control over work hours was not included in the component "autonomy" but examined separately, since it was supposed to have a differential association to the work hour-related construct "supplemental work".

Statistical analyses

The distribution of supplemental work was estimated by demographic characteristics and working conditions. Sample weights provided by the European Foundation were used to adjust for unequal sampling probabilities in each country (Gallup Europe, 2010).

Bivariate correlation analysis was conducted to examine the association of supplemental work and different working conditions (e.g. work load, autonomy, work hour characteristics). Additional correlation analysis was carried out to investigate which health problems were correlated with supplemental work to obtain additional information on specific health effects.

To estimate the risk of reporting ≥ 1 health problems by supplemental work, weighted logistic regression models were calculated in each sample, controlling for the above-mentioned covariates (demographics, work demands (physical, mental), autonomy over working conditions, work hours, worker control over work hours). All analyses were conducted using IBM SPSS 15 for Windows and are in agreement with the ethical standards of this journal (Portaluppi et al., 2010).

RESULTS

Prevalence of supplemental work and sample characteristics for work in free time

The EWCS 2005 sample included a weighted proportion of 46.2% women, and the mean age of the population was 38.9 years (standard deviation [SD] 11.7). EWCS 2010 contained a similar proportion of women (45.7%), and the mean age was 39.62 years (SD 11.7).

In 2005, 13 961 (61.5%) individuals reported to never have been contacted by their employer outside their regular working hours, 3979 (17.5%) had been contacted sometimes, and 4746 (20.9%) had been contacted often. In 2010, 18 067 (52.2%) participants had never worked in their free time, 7334 (21.3%) reported that they had sometimes worked in their free time, and 8998 (26.2%) had often worked in their free time.

Demographic variables, work characteristics, supplemental work and health

Table 1 shows the distribution of demographic characteristics and work hours by working in the free time. The respective data for being contacted outside of regular working hours was very similar and has previously been reported (for the unweighted data) by Arlinghaus & Nachreiner (2013) and is therefore not shown here. The results show that working in the free time is more frequent in employees with longer work hours, and those working on evenings and weekends, and thus strongly support the previous findings for being contacted (Arlinghaus & Nachreiner, 2013).

Covariation between supplemental work, work characteristics and specific health impairments

Bivariate correlation analyses in both samples (data not shown) revealed that both indicators for supplemental work were significantly ($p < 0.05$) correlated with conditions generally regarded as positive, such as higher socio-economic status, higher work hour control, higher mental demands and higher autonomy. On the other hand, supplemental work was also related to potentially detrimental working conditions, such as longer work hours per week, work on evenings and weekends, and more variable (i.e. irregular) work hours with no fixed starting and ending times, and variable hours per day and per week.

One example of the strong covariance between supplemental work and work hour control is shown in Figure 1 (being contacted shows the same relationship, see also Arlinghaus & Nachreiner, 2013). While about 60% of employees with work hours determined by their employer had never worked in their free time, only some 35% of those with entirely self-determined working hours had never done so. Therefore, the potential positive health effects of high work hour control and the potential detrimental effects of often working in the free time could cancel each other out. This demonstrates the importance of controlling for such potentially confounding factors when examining health effects of supplemental work.

While both indicators for supplemental work were significantly correlated with most health problems in both samples, the strongest (but still rather small)

TABLE 1. Distribution of demographic variables and working hour characteristics by working in the free time (EWCS, 2010).

	Work in free time							
	Never		Sometimes		Often		Total	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Total	18 067	52.5	7334	21.3	8998	26.2	34 399	100
Gender								
Male	9477	50.7	4022	21.5	5184	27.7	18 683	54.3
Female	8590	54.7	3312	21.1	3814	24.3	15 716	45.7
Age (Mean, SD)	39.36 (12.1)		39.58 (11.4)		40.16 (11.2)		39.62 (11.7)	
Usual number of working h/wk (Mean, SD)	36.43 (11.4)		37.78 (10.5)		39.96 (12.4)		37.64 (11.6)	
Days worked >10 h	1.21 (4.0)		1.64 (4.3)		3.94 (6.2)		2.01 (4.9)	
Work on evenings								
Yes	5186	38.8	2900	21.7	5294	39.6	13 380	39.4
No	12 678	61.7	4329	21.1	3535	17.2	20 542	60.6
Work on Saturdays								
Yes	7458	46.0	3546	21.9	5211	32.1	16 215	47.7
No	10 452	58.7	3691	20.7	3659	20.6	17 802	52.3
Work on Sundays								
Yes	3387	40.1	1747	20.7	3303	39.1	8437	24.8
No	14 552	56.8	5507	21.5	5580	21.8	25 639	75.2
Control over working hours								
None (determined by employer)	13 963	57.8	5025	20.8	5173	21.4	24 161	70.6
Choose between fixed schedules	1352	47.8	604	21.4	873	30.9	2829	8.3
Adapt working hours within limits	2109	38.4	1336	24.3	2045	37.2	5490	16.0
Entirely self-determined	568	32.8	329	19.0	837	48.3	1734	5.1
≥1 health impairment								
Yes	3482	45.5	1552	20.3	2612	34.2	7646	23.4
No	13 703	54.7	5374	21.5	5967	23.8	25 044	76.6

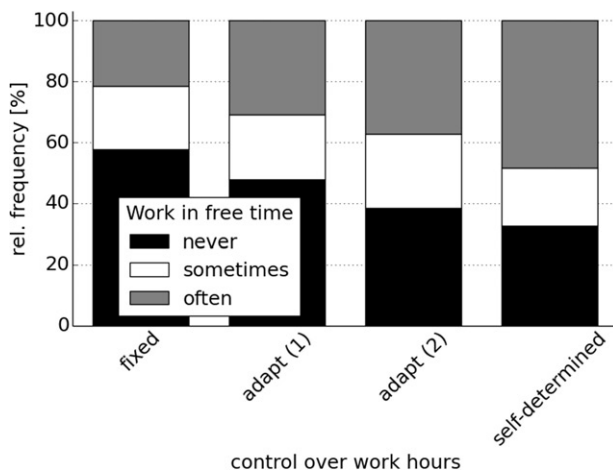


FIGURE 1. Association of work in the free time with worker control over working hours in EWCS 2010. Adapt (1): can choose between different schedules; adapt (2): can adapt working hours within limits.

correlations were observed for sleep problems (EU 2005: $r=0.06$, EU 2010: $r=0.12$), overall fatigue ($r=0.02$ and $r=0.19$, respectively), depression or anxiety ($r=0.02$ and $r=0.10$), headaches ($r=0.02$ and $r=0.09$) and stomach ache ($r=0.04$ and $r=0.06$). In EU 2005, stress and irritability (both $r=0.05$) were also statistically significantly correlated with contacts outside of regular work hours, but these variables were not included in EU 2010. While all correlations were, in general, quite low (most probably due to the large sample sizes and the resulting elimination of the peculiarities of smaller samples, but thus indicating the unbiased or true effect sizes (Schönbeck & Perugini, 2013), the strongest associations were observed for sleep and mental health/stress outcomes. Overall, correlations in EU 2010 (work in free time) were stronger than in EU 2005 (work-related contacts).

Supplemental work and health

Results of weighted adjusted logistic regression analyses in both samples (Table 2) showed that both indicators for supplemental work were significantly associated with an increased risk of reporting work-related health impairments after controlling for all covariates. While ever being contacted outside of regular working hours, as compared to never, increased health risk significantly, it did not show a dose-response relationship. Contrarily, working more frequently in the free time was related to a substantial increase in health risk, thus showing the expected dose-response relation.

The differential association of each indicator with health impairments is also demonstrated in Figure 2 using the original item scales for supplemental work in additional weighted logistic regression models (including the same covariates as those in Table 2). While being contacted one or two times per month or less showed a significant increase in the risk of health problems compared to never, being contacted more often than

TABLE 2. Results of weighted logistic regression models to predict the risk of reporting ≥ 1 work-related health impairments by supplemental work in two samples.

Parameter	EWCS 2005		EWCS 2010	
	OR ^a	95% CI	OR ^a	95% CI
Contacted by employer				
Never	Reference			
Sometimes	1.26	1.14–1.39	–	–
Often	1.13	1.02–1.25	–	–
Work in free time				
Never	–	–	Reference	
Sometimes	–	–	1.14	1.04–1.24
Often	–	–	1.60	1.47–1.75
Covariates				
Sex	1.31	1.21–1.43	1.31	1.22–1.42
Age	1.01	1.01–1.02	1.03	1.02–1.03
Children in household	1.38	1.28–1.49	1.12	1.05–1.20
Education	1.08	1.04–1.11	1.15	1.11–1.18
Income	0.97	0.96–0.99	0.96	0.95–0.97
Physical work load ^b	2.05	1.96–2.13	2.37	2.28–2.46
Autonomy ^b	0.77	0.74–0.80	0.71	0.69–0.74
Mental work load ^b	1.35	1.29–1.40	1.27	1.22–1.32
Working hours/week	1.02	1.02–1.03	1.01	1.01–1.01
Control over working time	0.98	0.94–1.02	0.96	0.92–1.00
Variable working times				
Variable number of working hours/day	1.20	1.09–1.32	1.08	0.97–1.21
Variable number of working hours/week	1.02	0.92–1.13	1.31	1.19–1.44
Variable start/end times	0.82	0.74–0.90	0.90	0.83–0.99
Shift work	0.88	0.80–0.98	1.01	0.92–1.11
Work on evenings	1.24	1.13–1.36	1.17	1.07–1.28
Work on Sundays	1.18	1.06–1.31	1.07	0.98–1.19
Work on Saturdays	1.16	1.06–1.26	0.87	0.80–0.95
Night work	1.04	0.93–1.16	1.42	1.29–1.58

Odds Ratios (OR) and 95% Confidence Intervals (CI).

^aEstimates adjusted for the full model.

^bFactor scores aggregated via principal component analysis.

once per week did not. Thus, no dose-response relation was observed for this indicator. Contrarily, an increasing frequency of working in the free time in 2010 was associated with a disproportionate risk increase. Working in the free time every day increased the risk of work-related health impairments by more than two-fold, compared to never working in the free time.

To test the effect of work hour control on the association between supplemental work and health, an interaction term “control” \times “supplemental work” was included in the adjusted logistic regression models, but no significant interaction was found.

DISCUSSION

The results of this study indicate a high prevalence of supplemental work in the European Union with half or more of the employed workers having ever worked in their free time to meet work demands, or having been contacted outside of their regular, agreed work hours. Very frequent supplemental work, however, is rather rare.

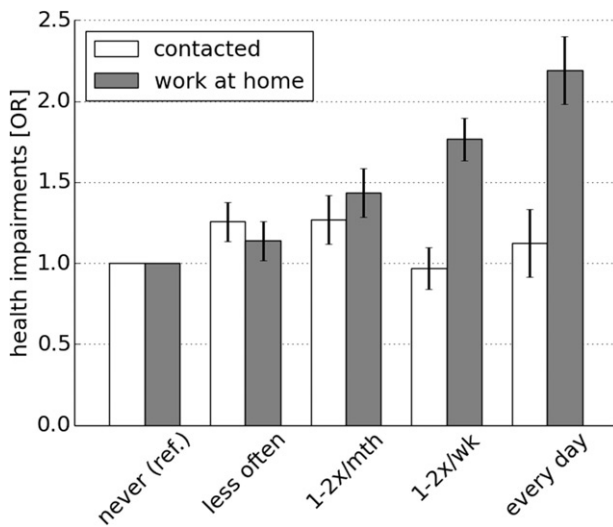


FIGURE 2. Risk of reporting at least one health impairment by the frequency of being contacted for work-related matters (EWCS 2005) and working in the free time to meet work demands (EWCS 2010). Odds Ratios (OR) and 95% Confidence Intervals.

Supplemental work is connected to potentially favorable high demand/high control working conditions, but it is also associated with potentially hazardous conditions, such as long and variable working hours, as well as work on evenings and weekends. This finding is in line with previous studies linking ICT use at home to longer work hours, and to a subjective spill-over of work into private domains (Chesley, 2005; Popma, 2013). Thus, controlling for these working conditions is essential to rule out confounding factors when investigating health effects of supplemental work. As supplemental work may lead to work at unusual work hours, e.g. on evenings and weekends (which can have negative implications for health and well-being, e.g. Wirtz & Nachreiner (2010), controlling for regular evening and weekend work in the present study most probably underestimates the potential negative impact of supplemental work on health.

In case of high work hour control (which in fact only a rather small minority of workers in the European samples report), it is quite difficult to define “regular” (in the sense of normal) or “agreed” working hours; since, for example, employees with trust-based hours are completely responsible themselves for their own work hours (and thus might be regularly or normally working quite irregular work hours). However, even in this case it can be reasonably expected that those employees are planning and scheduling their work and free time, at least to some degree, which would lead to similar negative effects resulting from a desynchronization between intended work hours and biological and social rhythms in case of (unintended) supplemental work (i.e. during times intended for private or leisure use).

Both indicators for supplemental work are associated with an increased risk of health impairments after

controlling for all covariates. While any contact by the employer outside of regular working hours increases the risk, more frequent contacts do not lead to an additional risk increase. Contrarily, work in the free time shows a clear dose-response effect, with more frequent work in the free time being associated with a disproportionate increase in health risk. The association here is clearly non-linear. Thus, measuring how often a person actually works outside their regular work hours might be a more precise indicator for the resulting work load and work-related strain than measuring contacts outside of regular hours (which might or might not lead to additional work for the employee).

These findings support the results of previous studies reporting poor recovery and detachment from work when working in evenings (Sonnetag & Kruehl, 2006), and work-life conflict and spill-over when using ICT at home (Boswell & Olson-Buchanan, 2007; Chesley, 2005; Derks et al., 2014). Additionally, a large-scale study of young adults linked intensive cell phone use to sleep disorders and symptoms of depression (Thomé et al., 2011). The present study, however, adds new information based on large-scale population data on the effects of supplemental work on subjective health outcomes, since in many studies cell phone or ICT use at home is studied without the explicit investigation of work-related behavior, or small and probably selected samples are used.

Strengths and limitations

This study has some limitations due to its cross-sectional design and the sole use of subjective reports. Although a cross-sectional design in general does not allow causal inferences, we controlled for a number of potential confounders, and based on these results we think that a reversed causality is rather unlikely, i.e. individuals reporting more health problems will – as a consequence – also report more supplemental work (which in fact they do), possibly indicating that bad health leads to reporting more supplemental work. It should thus be mentioned that health questions were asked later in the interview, when temporal variables had already been ascertained. However, it cannot completely be ruled out that individuals with certain health problems, e.g. depressed participants, in general report more unfavorable working conditions, including supplemental work. However, under the conditions given and the results achieved when controlling for possible confounders, the results in general would argue for the (internal) validity of assuming a causal association (cf. Shadish et al., 2002) from supplemental work to health impairments, but not for the reverse.

The reported rather low correlations between specific impairments and supplemental work, which in part are due to the large variation of complaints in the sample, argue for a more integrated analysis of impairments, since supplemental work might result in different effects within different individuals. Aggregating health effects into a latent variable or “health related impairments vs.

no health related impairments” combines these different effects into one (conceptually relevant) dependent variable and thus provides for a better indication of the effects of supplemental work, an effect that has also been observed by Wirtz et al. (2011) in the context of unusual working hours.

On the other hand, the samples are very large and representative of each EU member state, and thus the external validity is likely high. Since we used two different indicators for supplemental work in two independent samples, which represented different facets of the construct of interest and yielded conceptually comparable results, construct validity for supplemental work can very likely be assumed as well. The agreement in the fact that working outside of regular work hours is related to an increased risk for health in two independent samples with varying operationalizations between samples can be interpreted as an indicator of the construct validity of the results, e.g. in the sense of a cross-validation of the assumed causal association between the constructs involved.

CONCLUSIONS

This study adds new and cross-validated information about the health effects of emerging trends in work organization, e.g. the extension of work hours and work load via supplemental work. However, still little is known on actual time use (e.g. the duration and temporal location of supplemental work, the use of ICTs, the reasons for supplemental work). Diary or time use data, which, however, need a large amount of resources, would be necessary to address these questions adequately, i.e. the effects of the extension and temporal relocation of working time on safety, health and social participation.

Large differences seem to exist by occupation and by country. For example, “e-nomads” are prevalent to only 5% in Albania, Romania, Turkey – whereas over 40% of workers in the Netherlands, Denmark and Sweden, and 45% in Finland reported this behavior in 2010 (Eurofound, 2012). Future studies are therefore necessary to examine between-country differences, although the structural associations of the negative health effects of supplemental work should not differ vastly.

For practical implications from an occupational health and safety standpoint, it seems that employees should not have to take sole responsibility for setting boundaries between work and private domains. Work needs to be designed in a way so that tasks can be accomplished within regular or contractually agreed work hours, and requirements for employees to be available for work in their free time should be minimized. Free time should be free time, otherwise it must be expected that it cannot fulfill functions of recovery and recuperation. Addressing the company cultures, and using incentives and policies for maintaining the distinction between work and non-work

hours might be a way to reduce the amount of supplemental work and maintain the risks of health impairments in the working population at a lower level instead of increasing it by a probably unintended and uncontrolled use of supplementary work.

DECLARATION OF INTEREST

The authors report no conflict of interest.

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