

Lack of Detachment and Impaired Sleep Connect Perceived Unfairness with Health Complaints: a Population-Based Mediation Test

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Abstract In a sample of 8223 working individuals, representative for Swiss employees, a lack of detachment from daily problems and sleep problems were tested to mediate the association between experienced unfairness in life and health problems. Mediation was compared with respect to the life domain of unfairness (work life or private life), sex and age (ages 18 to 45 and older than 45). Unfairness at work and private unfairness were tested separately with mutual control of other domains of unfairness. In an analysis of overall unfairness in life, unfairness in both domains was summed up. Both life domains of unfairness were related directly and indirectly with health problems. All indirect paths were significant. The sum of unfairness at work and unfairness in private life showed the strongest direct and indirect association with health problems. Sleep problems turned out to be a stronger mediator than lack of detachment. Differences in mediation between men and women were not significant. Sleep problems were a significantly stronger mediator in older, compared with younger, individuals. Sleep problems seem to connect experienced unfairness at different life domains with health impairments. The study adds knowledge to the health-related interplay of work, leisure, and sleep.

Keywords Unfairness at work and in private life · Sex differences · Older workers · Lack of detachment · Impaired sleep quality

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Introduction

Experienced unfairness at work may best be described as an individual's experience of an inequitable and unjust situation (Colquitt et al. 2001; Robbins et al. 2012), and it can be seen as an act that negatively affects people's dignity or self-respect, which, in turn, may have serious consequences for identity and self-esteem (De Vogli et al. 2007). Based on the well-established fact that people strive to protect their self-esteem (Baumeister and Vohs 2004), Semmer and colleagues suggested, with respect to occupational stress, that anything that signals a lack of appreciation and respect, and thus, constitutes a threat to self-esteem, is likely to be especially upsetting and frustrating and is likely to play a major role in the experience of stress and the development of health impairments (Semmer et al. 2007, 2015).

The evidence is increasing, as there are a growing number of empirical studies showing that unfairness may have adverse effects on several indicators of health (Greenberg 2010; Robbins et al. 2012). According to the perceived unfairness model, perceived unfairness acts like other stressors, leading to short-term psychological stress reactions, such as negative emotional states (Meier et al. 2009), and perceived stress, as well as more chronic conditions, such as physical health problems (Greenberg 2010; Jackson et al. 2006; Robbins et al. 2012). In line with that model, studies have shown that unfairness is related to negative affectivity, various aspects of negative health behaviour, sleep impairments and coronary heart disease (De Vogli et al. 2007; Greenberg 2010; Robbins et al. 2012).

Although studies examining the relationship between unfairness and occupational health impairments have been almost entirely limited to the organisational context (De Vogli et al. 2007), unfairness may not be reduced to the workplace, but rather, may be experienced in other life domains, including the home, or simultaneously in both life areas. Although work may be an important domain of unfairness for employees, sources of unfairness outside the organisational context are also likely to impede health (De Vogli et al. 2007). There is thus a need to investigate the relationship between unfairness and health impairments using measures that include perceptions of unfairness in different areas of life. Accordingly, research needs to test the unique associations of unfairness experienced at work and in private life by mutual control in analyses, in order to test for the specific net risk from unfairness in work life and in private life. In addition to testing the unique effects of unfairness in the specific life area itself (work vs. private life), there is also evidence that work demands relate to the exhaustion of the partner (Bakker et al. 2008). Cross-over processes may also result in conflicts at home and experienced unfairness in private life. Therefore, the strength of the association of unfairness in both life areas with employees' health is important and should be considered in research (Grebner et al. 2004). Thus, in addition to examining the unique effects of unfairness, research should also test the joint associations of the sum of unfairness experienced at work and in private life to estimate the total impact of unfairness on employees' health.

In line with meta-analyses, as well as the theoretical framework provided by the perceived unfairness model and several empirical studies, the effect of perceived unfairness on health impairments might not be solely a direct one; rather, it may be mediated by third variables, such as the components of the stress reaction (Greenberg 2010; Hietapakka et al. 2013; Jackson et al. 2006; Robbins et al. 2012). According to

Elovainio et al. (2003), explicating the potential mechanisms underlying this relationship is a further step needed to increase the confidence in the hypothesis of the causality of organisational justice as a measure of unfairness at work and health. The importance of explicating the mechanisms through which psychosocial factors influence health not only relates to the advancement of scientific knowledge but is also crucial because it may offer clues for health promotion (Elovainio et al. 2003). One potential mechanism underlying the relationship between unfairness and health impairments is sustained activation (Ford 2014) and reduced recovery (Brosschot et al. 2005). In line with the effort-recovery theory (Meijman and Mulder 1998) and the allostatic load model (McEwen 1998), stressors require coping efforts, which involve adaptive psychophysiological reactions, such as accelerated heart rate, elevated blood pressure and increased rumination. Under normal conditions, these acute reactions are short-lived and fully reversible within a short period of time. However, especially stressful and frustrating conditions, such as the perception of repeated unfairness (which represents a threat to the human need to belong), may lead to persistent psychophysiological load reactions that persist after work, causing impaired recovery processes, such as the lack of psychological detachment and impaired sleep quality, and may result in health impairments (Jackson et al. 2006; McEwen 1998; Meijman and Mulder 1998).

According to Åkerstedt et al. (2009), the increased psychophysiological activation that arises when an individual is confronted with stress is incommensurate with the deactivation that is a main characteristic of sleep. Lack of detachment from work issues, often experienced as the “failure to switch off” when away from one’s work (Sonnentag and Bayer 2005), represents another way that the psychophysiological arousal caused by stressors is prolonged. In the literature on specific workplace demands and non-work activities and their predictive role in recovery, detachment is involved as a key mediator (Demerouti et al. 2009; Sonnentag 2001, 2003; Sonnentag and Zijlstra 2006). Detachment from work issues, however, captures only part of life—therefore, detachment in this study is defined more generally as detachment from daily problems. The role of detachment as a mediator of the link between work demands and recovery is in line with the perceived unfairness model (Jackson et al. 2006). Accordingly, perceived unfairness may have cognitive consequences, particularly because situations come to be framed as threatening. According to Geurts and Sonnentag (2006), incomplete recovery, such as impaired sleep quality or lack of psychological detachment, is the linking mechanism between acute stressors and the development of health impairments in the long run. In a study conducted by Elovainio et al. (2003), much of the effect of unfairness on health was attributable to sleeping problems. Hietapakka et al. (2013) found in nurses psychological distress and job involvement to mediate the association between organisational justice and sleep and sleeping problems partly mediated the association between organisational justice and performance. Cropley and colleagues, with the use of sleep diaries, found additional evidence that work rumination mediates the influence of work strain on sleep quality (e.g. Cropley et al. 2006). Pereira and Elfering (2014a) showed, in a longitudinal study, that occupational stressors predicted increased psychosomatic health impairments 6 weeks later, and this effect was fully mediated by physiologically assessed sleep quality. In this study, both recovery processes, namely, a lack of detachment from daily problems and sleep problems, were simultaneously tested to mediate the association between unfairness and health problems.

Health problems that arise from experiences of unfairness may differ in individuals and may differ by gender and age. The relative and joint impact of unfairness at work and in private life on health may vary with age because older individuals are more vulnerable to health decrements. Thus, Robbins et al. (2012) suggested that the unfairness-health relations were stronger in older individuals than in younger ones. Gender may also moderate the weighing of unfairness at work (Robbins et al. 2012). The direction of the difference, however, is unclear. For instance, findings have shown that men are more sensitive than women to violations of distributive justice (Brockner and Adsit 1986), but women are sometimes thought to be more sensitive with respect to poor interpersonal or interactional justice (Lee et al. 2000). Many studies that have compared working conditions and stress reactions in men and women who did the same work, with the same level of complexity, showed that women were more stressed due to their greater unpaid workload in private life and due to a greater responsibility for duties related to home and family (Lundberg and Frankenhaeuser 1999). Considering the joint effects of unfairness at work and unfairness in private life, we therefore expect women to have a closer indirect total-domain unfairness-health relation than men.

Therefore, we expected three indirect pathways: (H1) domain-specific unfairness at work and unfairness in private life predict a lack of detachment that, in turn, predicts health problems, (H2) domain-specific unfairness at work and unfairness in private life predict sleep problems that, in turn, predict health problems and (H3) domain-specific unfairness at work and unfairness in private life predict a lack of detachment that predicts sleep problems, which, in turn, predict health problems. The joint influence of unfairness at work and unfairness in private life on health problems should be stronger than the domain-specific influence of both domains. Thus, all three mediation paths should be stronger in a model that pools work-related and private unfairness compared with models that include either unfairness at work or unfairness in private life, with mutual control of the other domain of unfairness (H4). In testing the joint domains of unfairness, we expect stronger mediation in women compared with men (H5). Moreover, as sleep is more vulnerable in older individuals than in younger ones (Åkerstedt et al. 2002), we expect stronger mediation in older, than in younger, workers (H6).

Methods

Procedure

Computer-based randomisation was used to select 32,440 private households in the German-speaking part of Switzerland from the telephone directory. Invalid telephone numbers had to be excluded (5295), and 2515 households had to be excluded because the residents were unable to understand German. Another 726 working individuals were deceased, and 141 households included individuals that were all aged below 18 years (Fig. 1), leaving 23,763 individuals eligible for a telephone interview.

Ninety per cent (21,377) of these households could be contacted by phone between November 2002 and June 2003 and informed about the study. After a maximum of 12 calls per phone number, 10 % (2386 of 23,763 households) could not be reached. An extended cover letter was sent to them by postal mail. Those who still did not reply

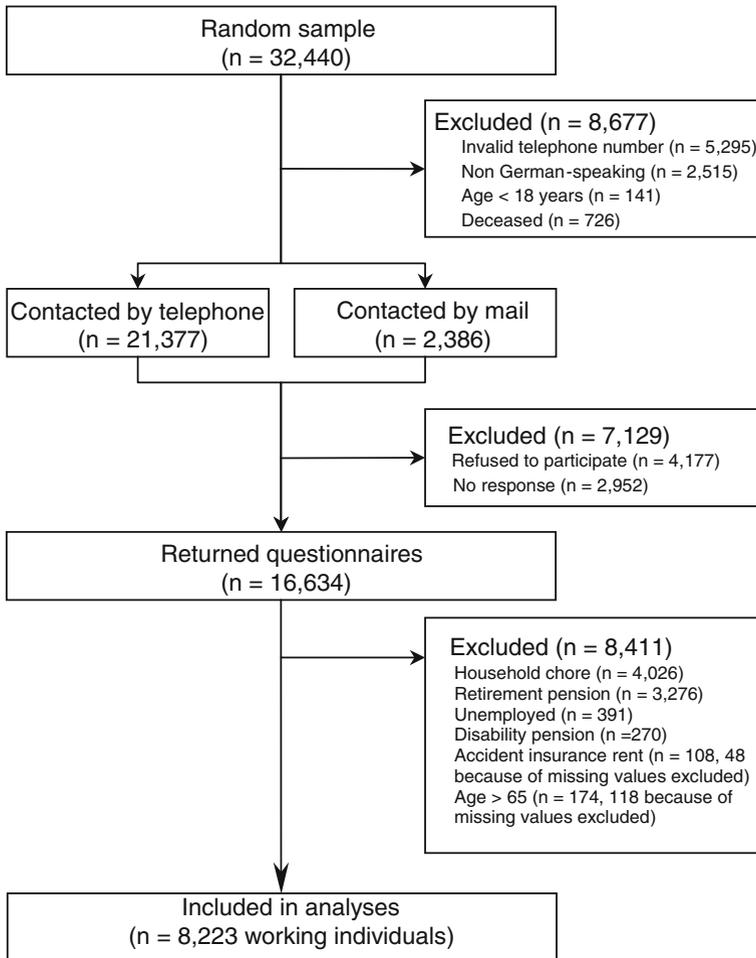


Fig. 1 Flowchart of the study

were sent reminders after 3 weeks and after 6 weeks. All letters were delivered within 24 h. In those 90 % who were reached by phone, and in those who were not reached by phone but contacted us after the inviting letter was sent, the last birthday technique was used in households where more than one resident was 18 years or older (Salmon and Nichols 1983). Overall, 17,341 of 21,377 addressed individuals (81 %) agreed to participate during the telephone interview and were sent a cover letter, a questionnaire and a prepaid return envelope.

Participants

Only employed working individuals were included in the study. Thus, individuals doing homework ($n=4026$), retired persons ($n=3276$) and individuals with age beyond 65 ($n=174$), individuals receiving a disability pension ($n=270$) of accident insurance

rent ($n=108$) and individuals who were unemployed ($n=391$) were excluded from the current study (Fig. 1). The final sample included 8223 participants.

Table 1 presents the characteristics of the participants. With respect to age, older workers were defined as at least 45 years of age (WHO 2001). According to this definition, 38.3 % of the participants were older workers and 51.9 % were between 40 and 64 years old, which is comparable with Swiss census data (Swiss population data reports 52 % of the Swiss working population to be between 40 and 64 ages, BFS, Bundesamt für Statistik 2014). The sample is also representative with respect to gender (sample, 45.1 % women vs. Swiss population, 45.3 %, BFS, Bundesamt für Statistik 2014).

Questionnaire Assessment

All of the information collected in this study was self-reported, including the assessment of body weight and height.

The predictor variables in the mediation model were *unfairness at work and unfairness in private life*. The two questions were: “How often do you feel that you are treated unfairly at your workplace?” and “How often do you feel that you are treated unfairly in your private life?” (adapted from De Vogli et al. 2007). Participants rated their response on a 7-point scale (1, very rarely, to 7, very often).

The first mediator in the model *lack of detachment* was assessed with a single item. The item, from Breakwell (1990, “I can switch off thinking about problems in free time”), was slightly adapted to “When you find yourself with some time on your hands” ... 1=“I can forget problems” ... 7=“I cannot switch off”. The reason for the adaptation was that “free time” in pretests was reported to be misleading to some individuals (did it mean “non-paid” time with or without house and family work etc.). Therefore, we chose the expression “with some time on your hands” instead of “free time”. It is important to note that a lack of detachment is not restricted to a lack of detachment from work problems but refers to problems in all life domains.

The second mediator in the model *sleep problems* was assessed with a single question from the brief Sleep Standard Evaluation Questionnaire (Aghayev et al. 2010). The question was “How was the quality of your sleep in the last 4 weeks” with the response options “I had no sleep problems at all” (0) to “I had severe sleep problems” (6).

The criterion variable in the mediation model was *health problems*. Self-reported health problems comprised 25 symptoms or diseases from the Eurostat Yearbook 2001 questionnaire (Table 1). For all items, the response options were 0=no, 1=yes, not in treatment, 2=yes, in treatment. All items were summed up to an index of health problems that theoretically ranged from 0 to 50.

The *control variables* within the mediation model comprised age, BMI, smoking, full- vs. part-time work, alcohol, physical activity and physical workload. In domain-specific unfairness models, the mutual domain of unfairness was added to control variables (when unfairness at work was the predictor, unfairness in private life was a control variable and vice versa). Age was calculated from dates of birth and time of filling out the questionnaire. BMI was calculated from self-reported body weight and body height. Smoking had three response options, 0=“no smoking,” 1 “less than 10 cigarettes a day”, and 2 “more than 10 cigarettes a day”. Part-time work was included

Table 1 Characteristics of included participants and descriptive statistics of study variables

	All participants	Women	Men
Females (<i>n</i> (%))		3708 (45.1)	4512 (54.9)
Age band (<i>n</i> (%))			
18 to 25 years	745 (9.1)	425 (11.5)	320 (7.1)
25 to 34 years	2020 (24.6)	983 (26.5)	1036 (23.0)
35 to 44 years	2303 (28.0)	946 (25.5)	1355 (30.0)
45 to 54 years	1846 (22.4)	804 (21.7)	1042 (23.1)
55 to 64 years	1286 (15.6)	541 (14.6)	745 (16.5)
65 years	23 (0.3)	9 (0.2)	14 (0.3)
Body mass index (<i>n</i> (%))			
Less than 25 kg/m ²	5312 (64.6)	2891 (78.0)	2421 (53.7)
25 to 30 kg/m ²	2308 (28.1)	576 (15.5)	1729 (38.3)
30 kg/m ² and above	602 (7.3)	241 (6.5)	361 (8.0)
Educational level (<i>n</i> (%))			
Compulsory schooling/vocational training	4400 (53.5)	2134 (57.5)	2265 (50.2)
High school graduation	2780 (33.8)	949 (25.6)	1609 (35.6)
Technical college/university degree	1023 (12.4)	392 (10.6)	631 (14.0)
Living independently (<i>n</i> (%))			
How do you live at the moment? 1=shared housing	2092 (25.4)	1073 (28.9)	1019 (22.6)
2=with a partner/family	5895 (71.7)	2512 (67.7)	3381 (74.9)
3=alone	266 (3.2)	133 (3.6)	133 (2.9)
Rural residence			
Where do you live? (<i>n</i> (%))			
1=small village, under 500 inhabitants	469 (5.7)	188 (5.1)	279 (6.2)
2=medium-sized village, 500–2000 inhabitants	1582 (19.2)	700 (18.9)	882 (19.5)
3=large village, 2000–10,000 inhabitants	2758 (33.5)	1165 (31.4)	1593 (35.3)
4=smaller city, 10,000–50,000 inhabitants	1565 (19.0)	714 (19.3)	851 (18.9)
5=city, over 50,000 inhabitants	1723 (21.0)	873 (23.5)	849 (18.8)
What is your current employment status? full-time work (1=yes; <i>n</i> (%))	6474 (78.7)	2271 (61.2)	4201 (93.1)
What is your current employment status? part-time work (1=yes; <i>n</i> (%))	1749 (21.3)	1437 (38.8)	311 (6.9)
How often do you feel that you are treated unfairly at your workplace? (<i>n</i> (%))			
1 (very rarely)	4079 (49.6)	1876 (50.6)	2203 (48.8)
2	2011 (24.5)	821 (22.1)	1189 (26.4)
3	455 (5.5)	202 (5.4)	253 (5.6)
4	536 (6.5)	232 (6.3)	304 (6.7)
5	286 (3.5)	129 (3.5)	157 (3.5)
6	203 (2.5)	84 (2.3)	119 (2.6)
7 (very often)	147 (1.8)	77 (2.1)	68 (1.5)
How often do you feel that you are treated unfairly in your private life? (<i>n</i> (%))			
1 (very rarely)	4278 (52.0)	1946 (52.5)	2332 (51.7)
2	2405 (29.2)	1017 (27.4)	1387 (30.7)
3	563 (6.8)	258 (7.0)	305 (6.8)
4	466 (5.7)	227 (6.1)	238 (5.3)

Table 1 (continued)

	All participants	Women	Men
5	223 (2.7)	108 (2.9)	115 (2.5)
6	126 (1.5)	66 (1.8)	60 (1.3)
7 (very often)	76 (0.9)	41 (1.1)	34 (0.8)
When you find yourself with some time on your hands... (<i>n</i> (%))			
1 (I can forget problems in daily life)	3009 (36.6)	1443 (38.9)	1565 (34.7)
2	2167 (26.4)	923 (24.9)	1243 (27.5)
3	938 (11.4)	411 (11.1)	526 (11.7)
4	972 (11.8)	430 (11.6)	542 (12.0)
5	503 (6.1)	200 (5.4)	303 (6.7)
6	393 (4.8)	173 (4.7)	220 (4.9)
7 (I cannot switch off)	167 (2.0)	92 (2.5)	75 (1.7)
In the last 4 weeks, how well did you sleep? (<i>n</i> (%))			
0 (no problems)	4007 (48.7)	1716 (46.3)	2290 (50.8)
1	1902 (23.1)	804 (21.7)	1098 (24.3)
2	955 (11.6)	419 (11.3)	535 (11.9)
3	676 (8.2)	397 (10.7)	279 (6.2)
4	444 (5.4)	222 (6.0)	221 (4.9)
5	175 (2.1)	103 (2.8)	72 (1.6)
6 (worst problems sleeping)	52 (0.6)	39 (1.1)	13 (0.3)
Reported complain or condition (<i>n</i> (%); currently in treatment <i>n</i> (%))			
Rheumatism	576 (7.0); 95 (1.2)	307 (8.3); 52 (1.4)	268 (5.9); 42 (0.9)
Cough lasting more than 3 months	269 (3.2); 45 (0.5)	108 (2.9); 21 (0.6)	161 (3.5); 24 (0.5)
Asthma	384 (4.7); 99 (1.2)	193 (5.2); 49 (1.3)	191 (4.2); 24 (0.5)
High blood pressure	689 (8.3); 422 (5.1)	251 (6.8); 163 (4.4)	438 (9.7); 259 (5.7)
Myocardial infarction (heart attack) or angina	68 (0.8); 33 (0.4)	17 (0.5); 7 (0.2)	51 (1.2); 26 (0.6)
Stroke	25 (0.3); 11 (0.1)	8 (0.1); 3 (0.1)	17 (0.4); 8 (0.2)
Kidney disease/kidney stones	155 (1.9); 23 (0.3)	52 (1.4); 6 (0.2)	103 (2.3); 17 (0.4)
Cancer/tumour	118 (1.4); 45 (0.5)	72 (2.0); 29 (0.8)	46 (1.1); 16 (0.4)
Hay fever or other allergies	1861 (22.6); 197 (2.4)	923 (24.9); 110 (3.0)	938 (20.8); 87 (1.9)
Nervous breakdown/depression	284 (3.6); 102 (1.2)	177 (4.8); 63 (1.7)	107 (2.4); 39 (0.9)
Other psychological problems	378 (4.6); 148 (1.8)	207 (5.6); 88 (2.4)	171 (3.8); 60 (1.3)
Headache	1515 (18.5); 120 (1.5)	948 (25.5); 83 (2.4)	566 (12.5); 37 (0.8)
Vertigo/dizziness/balance disturbance	450 (5.5); 51 (0.6)	302 (8.1); 37 (1.0)	148 (3.3); 14 (0.3)
Digestive/stomach complaints or gallstones	772 (9.4); 106 (1.3)	416 (11.2); 50 (1.3)	356 (7.8); 56 (1.2)
Diabetes	106 (1.3); 85 (1.0)	41 (1.1); 36 (1.0)	65 (1.5); 49 (1.1)
Problems with vision	2215 (26.9); 373 (4.5)	1102 (29.7); 201 (5.4)	1112 (24.6); 172 (3.8)
Hearing problems	573 (7.0); 50 (0.6)	143 (3.9); 18 (0.5)	430 (9.5); 32 (0.7)
Diseases of the nervous system/nerves or paralysis	63 (0.8); 22 (0.3)	26 (0.7); 12 (0.3)	37 (0.8); 10 (0.2)
General muscle weakness	113 (1.4); 21 (0.3)	64 (1.8); 13 (0.4)	48 (1.1); 7 (0.2)
Neck problems	1631 (19.9); 261 (3.2)	1019 (33.1); 187 (5.0)	611 (13.5); 73 (1.6)
Back problems	2547 (30.9); 364 (4.1)	1225 (33.1); 221 (6.0)	1319 (29.2); 140 (3.1)
Shoulder or arm problems	1187 (14.4); 233 (2.8)	575 (15.5); 139 (3.7)	611 (13.5); 73 (1.6)
Hip problems	537 (6.5); 76 (0.9)	264 (7.1); 37 (1.0)	272 (6.0); 93 (2.1)

Table 1 (continued)

	All participants	Women	Men
Knee problems	1439 (17.5); 158 (1.9)	635 (17.1); 81 (2.2)	804 (17.8); 77 (1.7)
Ankle or foot problems	658 (8.0); 114 (1.4)	292 (7.8); 53 (1.4)	366 (8.2); 2 (1.4)
Currently smoking			
No smoking (<i>n</i> (%))	5639 (68.6)	2632 (71.0)	3006 (66.6)
1–10 cigarettes/day (<i>n</i> (%))	1174 (14.3)	494 (13.3)	679 (15.0)
> 10 cigarettes/day (<i>n</i> (%))	1359 (16.5)	563 (15.2)	795 (17.6)
Alcohol consumption (<i>n</i> (%))			
0 (no alcohol)	1732 (21.1)	1068 (28.8)	664 (14.7)
1 (sometimes)	4863 (59.1)	2184 (58.9)	2676 (59.3)
2 (frequently)	1501 (18.3)	395 (10.7)	1106 (24.5)
Do you play sports or carry out sporting activities (e.g. cycling to work, hiking, yoga etc.)			
Yes (<i>n</i> (%))	7068 (86.0)	3264 (88.0)	3801 (84.2)
No (<i>n</i> (%))	1118 (13.6)	426 (11.5)	692 (15.3)
Which of these 4 statements best describes your daily physical workload (at work, home, voluntary work etc.)?			
1 my work is mostly sedentary and I rarely need to move around (<i>n</i> (%))	3261 (39.7)	1410 (38.0)	1851 (41.0)
2 I have to move around a lot at work, but I do not have to carry or move any heavy things (<i>n</i> (%))	3290 (40.0)	1718 (46.3)	1571 (34.8)
3 at work I often need to climb stairs or carry relatively heavy things (<i>n</i> (%))	897 (10.9)	364 (9.8)	532 (11.8)
4 my work involves heavy manual labour, as I need to carry loads or move heavy objects (<i>n</i> (%))	735 (8.9)	192 (5.2)	542 (12.0)

as a control variable because the Whitehall II study showed part-time work to be associated with higher self-reported unfairness at work (De Vogli et al. 2007). Part-time work had two response options, 0=“full time”, and 1=“less than full time”. The question on alcohol consumption had three response options, 0=“I drink no alcohol”, 1=“I sometimes drink alcohol” and 2=“I frequently drink alcohol”. The question on sports/physical activity was “Do you play sports or carry out sporting activities (e.g. cycling to work, hiking, yoga etc.)” with 0=“no” and 1=“yes”, as response options. *Physical workload* was assessed using a physical demands item that was adapted from Rossignol (2004), “Which of these 4 statements best describes your daily physical workload (at work, home, voluntary work etc.)?” with four response options (1=“My work is mostly sedentary and I rarely need to move around,” 2=“I have to move around a lot at work, but I don’t have to carry or move any heavy things,” 3=“At work I often need to climb stairs or carry relatively heavy things,” 4=“My work involves heavy manual labour, as I need to carry loads or move heavy objects”).

Statistical Analysis

All statistical analyses were performed using SPSS 22. The mediation tests were based on OLS regression analyses. The mediation tests were done using the MED3C SPSS macro written by Hayes and coauthors, which estimates total, direct and indirect effects

using a set of OLS regressions and bootstrapping to estimate the confidence intervals for indirect path coefficients (Hayes et al. 2011). Bootstrapping included 5000 samples. Three mediations were tested simultaneously (M1=mediation 1: unfairness at work, in private life or sum of both→lack of detachment→health problems; M2=mediation 2: unfairness at work, in private life or sum of both→sleep problems→health problems; M3=mediation 3: unfairness at work, in private life or sum of both→lack of detachment→sleep problems→health problems). Comparisons of the total indirect path coefficients between men and women and the younger vs. older work force were done by use of the SPSS tool of Weaver and Wuensch (2013) for the comparison of regression coefficients. In gender comparisons, sex was not a control variable, and in age comparisons, age was not included as a control variable. The alpha level was 5 %, and all tests were two-tailed.

Results

Unfairness at work ($M=1.98$) was experienced more often than unfairness in private life ($M=1.83$, $t(7702)=8.123$, $p<.001$). The mean level of unfairness, lack of detachment, sleep problems and health complaints did not significantly differ between men and women. The interrelation between both domains of unfairness was moderate ($r(8223)=.32$, $p<.001$, Table 2). Table 2 shows correlations between study variables that are—in part, because of the large sample—mostly significant. It is noteworthy that measures of unfairness, lack of detachment, sleep problems and health problems are all positively interrelated. The correlations of variables that are included in mediation hypotheses with control variables were small, with the exception of age, which was positively related to health complaints ($r(8223)=.19$, $p<.001$).

Test of Lack of Detachment and Sleep Problems as Mediators of the Association of Domain-Specific Unfairness with Health Problems (Hypotheses 1 to 3) The results of mediation tests confirmed that unfairness at work (Fig. 2) and unfairness in private life (Fig. 3) predict a lack of detachment that, in turn, predicted health problems (H1). The tests of that specific indirect path were significant for unfairness at work ($B=0.02$, 95 % confidence interval (CI)=0.01 to 0.03, Fig. 2) and unfairness in private life ($B=0.02$, 95 % CI=0.01 to 0.03, Fig. 3). The second mediation hypothesis proposed unfairness to predict sleep problems that, in turn, predict health problems (H2). The tests of that indirect path were also significant for unfairness at work ($B=0.04$, 95 % CI=0.03 to 0.05, Fig. 2) and unfairness in private life ($B=0.07$, 95 % CI=0.05 to 0.08, Fig. 3). Finally, the third hypothesis proposed mediation via both mediators, i.e. unfairness predicting a lack of detachment that predicts sleep problems that, in turn, predicts health problems (H3). The tests of that indirect path were also significant for unfairness at work ($B=0.01$, 95 % CI=0.01 to 0.02, Fig. 2) and unfairness in private life ($B=0.02$, 95 % CI=0.01 to 0.02, Fig. 3). The strength of the indirect paths represents the unique associations between the domains of unfairness, because the tests included unfairness in the other life domain as a control variable.

Joint Unfairness at Work and Unfairness in Private Life and Health Problems (Hypothesis 4) The fourth hypothesis stated that all mediation paths would be *stronger*

Table 2 Correlations among study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Unfairness work													
2. Unfairness private life	0.32***												
3. Unfairness work and private life	0.85***	0.79***											
4. Lack of detachment	0.17***	0.18***	0.21***										
5. Sleep problems	0.16***	0.20***	0.22***	0.28***									
6. Health problems	0.15***	0.16***	0.19***	0.16***	0.31***								
7. Age	-0.07***	-0.02	-0.05***	-0.02	0.04***	0.19***							
8. BMI	0.01	0.00	0.01	-0.02	-0.00	0.10***	0.23***						
9. Smoking	0.01	0.04**	0.03**	-0.00	0.02	0.03*	-0.01	0.02					
10. Alcohol	0.00	0.03*	0.01	-0.01	0.01	-0.04**	-0.00	0.02	0.20***				
11. Sport	-0.05***	-0.06***	-0.07***	-0.07***	-0.04**	-0.03*	-0.05***	-0.12***	-0.14***	0.04**			
12. Work status	-0.04***	0.04**	-0.01	-0.01	0.05***	0.07***	0.12***	-0.11***	-0.04***	-0.08***	0.04***		
13. Physical workload	0.03**	-0.00	0.02	0.01	-0.04***	0.01	0.04**	0.09***	0.08***	-0.08***	-0.12***	-0.04***	

* $p < .05$; ** $p < .01$; *** $p < .001$, two-tailed

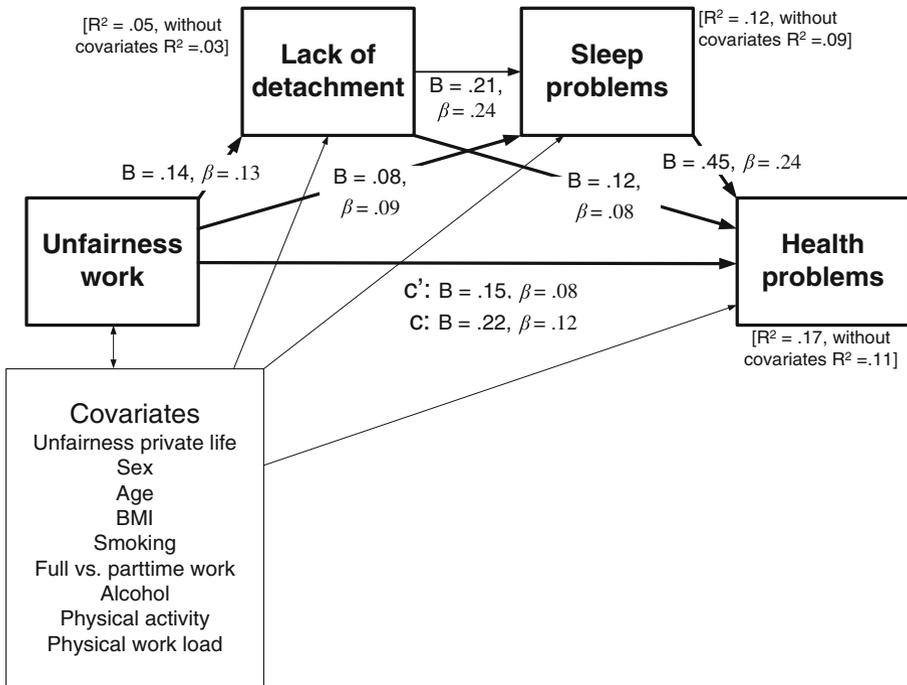


Fig. 2 Mediation model of the link between unfairness at work and health problems controlled for unfairness in private life. All coefficients $p < .001$, two-tailed

in a model of cumulative unfairness, experienced at work and in private life. In this mediation model, both domains of unfairness were summed. Figure 4 shows the path coefficients for the model when unfairness at work and unfairness in private life were summed. The effect size in predicting health problems was $f^2 = .21$ with summed unfairness of both life domains (f^2 values of .02, .15 and .35 are considered to indicate small, medium and large effects, respectively). All three indirect pathways were significant. The summed unfairness of both life domains predicted a lack of detachment that, in turn, predicted health problems ($B = 0.04$, 95 % CI = 0.02 to 0.05); the indirect path, however, was stronger than the indirect path when unfairness at work was tested ($t = -2.67, p = .008$) but did not differ significantly when unfairness in private life was tested ($t = -1.79, p = .074$). The summed unfairness of both life domains also predicted sleep problems that, in turn, predicted health problems ($B = 0.10$, 95 % CI = 0.08 to 0.11), and this path was significantly stronger than in domain-specific unfairness models (unfairness at work: $t = -5.40, p < .001$; unfairness in private life: $t = -2.41, p = .016$). Finally, the summed unfairness of both life domains predicted a lack of detachment that predicted sleep problems that, in turn, predicted health problems ($B = 0.03$, 95 % CI = 0.02 to 0.04). This indirect path was again stronger, compared with domain-specific unfairness models (unfairness at work: $t = -4.73, p < .001$; unfairness in private life: $t = -3.21, p = .001$).

Stronger Mediation in Women Compared with Men (Hypothesis H5) Table 3 shows model comparisons for men vs. women. Testing the model with summed

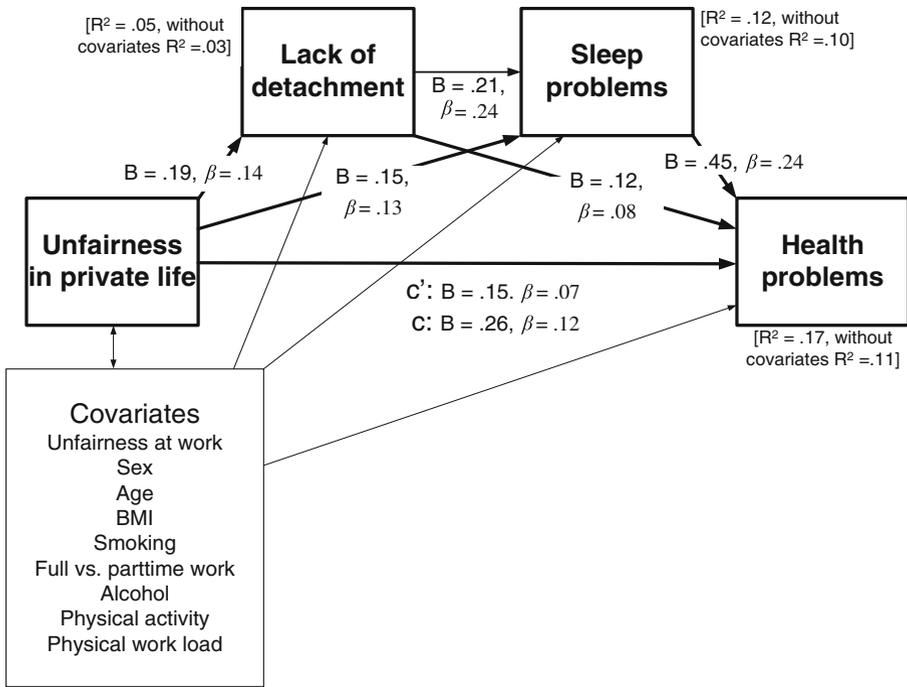


Fig. 3 Mediation model of the link between unfairness in private life and health problems controlled for unfairness at work. All coefficients $p < .001$, two-tailed

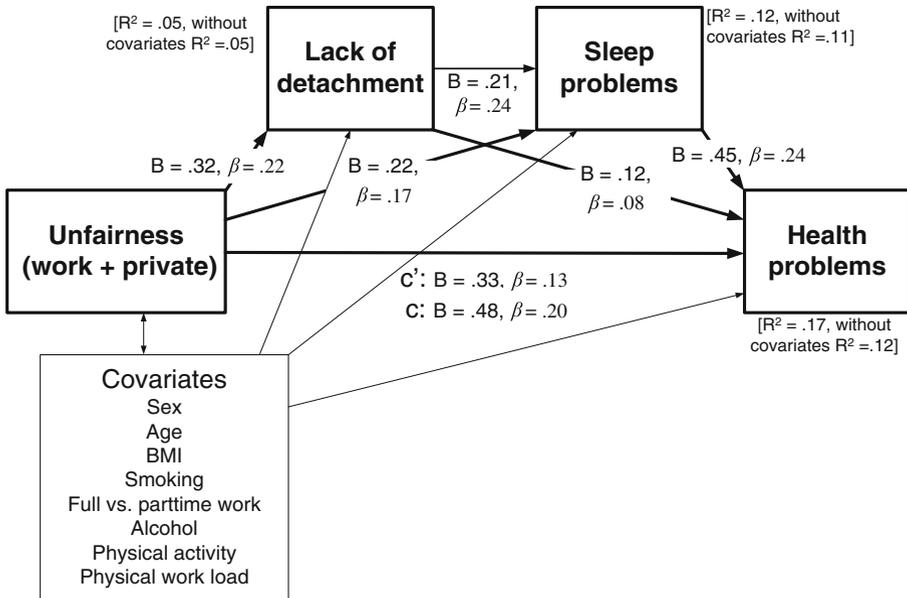


Fig. 4 Mediation model of the link between unfairness in life as sum of unfairness at work and unfairness in private life. All coefficients $p < .001$, two-tailed

Table 3 Unstandardized regression coefficients of total mediation, including mediation paths M1 (unfairness at work and in private life→lack of detachment→health problems), M2 (unfairness at work and in private life→sleep problems→health problems) and M3 (unfairness at work and in private life→lack of detachment→sleep problems→health problems)

	Correlation between unfairness and health problems	<i>p</i> value ^a	Total mediation (M1+M2+M3)	CI95	<i>p</i> value ^a
Women vs. men	0.494	.169	0.170	0.135–0.210	.421
	0.425		0.152	0.125–0.180	
Age<45 vs. age≥45	0.443	.632	0.143	0.118–0.170	.036
	0.468		0.193	0.150–0.239	

Mediation tests performed using the MED3C SPSS macro, which estimates indirect effects using a set of OLS regressions and bootstrapping, including 5000 samples (Hayes et al. 2011). Controlled for age, BMI, smoking, full- vs. part-time work, alcohol consumption, physical activity, and physical work load

^a Comparison of regression coefficients (Weaver and Wuensch 2013)

unfairness at work and in private life, the overall association between unfairness and health problems was not stronger in women, compared with men ($t=1.38$, $p=.169$, Table 3). Moreover, no differences in mediation between men and women were significant ($t=0.81$, $p=.421$, Table 3).

Stronger Mediation in Older, Compared with Younger, Participants (Hypothesis H6) The overall association between unfairness at work and in private life and health problems was not stronger in older, compared with younger, participants ($t=-0.48$, $p=.632$), but the older workforce had a stronger total mediation path (sum of the three mediation paths, Table 3) in older, compared with younger, participants ($t=-2.10$, $p=.036$, Table 3). Especially, sleep problems were expected to be a stronger mediator in older workers than in younger ones. Indeed, the joint contribution of the two mediation paths that included sleep problems as a mediator (indirect unfairness→sleep problems→health problems path *plus* unfairness→lack of detachment→sleep problems→health problems path) was stronger in older, compared with younger, workers ($t=-2.90$, $p=.004$).

Discussion

Unfairness, as an employee's experience of an inequitable and unjust situation (Colquitt et al. 2001; Robbins et al. 2012), can be seen as an act that negatively affects people's self-esteem, which, in turn, may have serious effects for individuals' health (Baumeister and Vohs 2004; Semmer et al. 2007). Despite that work may be an important domain of unfairness, unfairness at home is also likely to be important for the development of ill health (De Vogli et al. 2007).

According to our results, unfairness at work and unfairness at home were both related to health impairments. This result provides further empirical evidence for the perceived unfairness model and existing empirical studies that have shown that

perceived unfairness may lead to the development of physical health problems (e.g. De Boer et al. 2002; Greenberg 2010; Jackson et al. 2006; Robbins et al. 2012).

In line with our hypothesis, incomplete recovery, i.e. lack of detachment and sleep impairments, mediated the relationship of unfairness on health impairments. This result is in line with a study conducted by Elovainio et al. (2003). Accordingly, the authors found that incomplete recovery, namely, sleep impairments, mediated the effect of unfairness on health impairments. Our results provide further empirical evidence for this result pattern. Furthermore, our results are in line with the effort-recovery theory (Meijman and Mulder 1998), the allostatic load model (McEwen 1998) and the incomplete-recovery approach (Åkerstedt et al. 2009; Geurts and Sonnentag 2006). Accordingly, stressors lead to increased psychophysiological reactions, which are incommensurable with the deactivation that is a main characteristic of recovery, and thus, impair recovery; in turn, in the long run, incomplete recovery may result in health impairments.

The effect sizes of the overall indirect effects of detachment, including the sum of M1 and M3, are small. Thinking about problems in free time may include thinking about ways to solve the problems actively, e.g. by asking for support. However, thinking about problems in free time may also primarily include negative ruminative thoughts. There is increasing evidence that rumination and worrying are more closely related to sleep and psychological problems than mere lack of detachment (Hoyer et al. 2009). Thus, if participants had been asked explicitly about ruminating, worry could have resulted in stronger mediation. Moreover, the measure of unfairness also might not cover important facets of social life, and thus, may have restricted the mediation. Unfairness covers an important, but only a restricted, part of social (working) life; other aspects are status, conflicts, individual animosities and illegitimate tasks, which are not covered by unfairness (Semmer et al. 2015) but have been shown to relate to sleep problems (Berset et al. 2011; Pereira and Elfering 2014b; Pereira et al. 2014).

Health problems that arise from experiences of unfairness may differ by age and gender. We supposed that sleep is more liable in older individuals than in younger ones, and therefore, we expected unfairness to have a stronger indirect link with health complaints in older than in younger workers. This hypothesis was supported. The absence of sex differences is in line with recent meta-analytic results on the association between perceived unfairness and employee health (Robbins et al. 2012).

The results confirm the view that unfairness at work and unfairness in private life are distinct. Perceived unfairness at work and in private life were not too closely related ($r=.32$). Both domains had unique contributions within the unfairness health problem linkage, and consequently, a joint life domain unfairness model showed stronger associations than domain-specific models. In sum, the recommendation of Robbins and colleagues (2012, p. 249) that “researchers should examine profiles of unfairness rather than solitary facets” should be extended to look at profiles of unfairness within and across life domains. To summarise, our results confirm the perceived unfairness model that links perceived unfairness to morbidity and mortality (Jackson et al. 2006). Furthermore, the current study adds evidence that a lack of detachment and sleep problems are critical mediating variables involved in that process. These findings contribute to recent evidence that sleep problems precede the onset of health problems (Agmon and Armon 2014).

To prevent stress elicited by perceived unfairness at work, employers should foster a positive organisational culture and prevent poor social relationships at work (Semmer 2006). For instance, supervisors should be instructed in providing adequate social support. Leadership should contribute to a work climate in which people feel free to mention problems and to seek support (Schein 2009). In addition, supervisors and coworkers should be educated in handling negative emotions (e.g. anger, frustration, anxiety) and thoughts related to unfairness, conflicts and lack of support (e.g. task-irrelevant cognitions, rumination) using cognitive-behavioural stress management (e.g. Richardson and Rothstein 2008). The person-oriented approach to sleep in workers and employees so far includes sleep extension on weekends especially for those who sleep less than 6 h after work days (Kubo et al. 2011) and online sleep training intervention (including mindfulness training) to increase sleep quality after work (Thiart et al. 2013).

Limitations

First, a main limitation arises from the cross-sectional data. Preferably, the mediation should have been tested on longitudinal data. Only longitudinal data could serve to compare the proposed mediation model with the alternative reversed causation model, i.e. the fatigue or impaired sleep that is caused by health problems may influence how we evaluate our environment (including fairness issues). Second, bias from common source variance may have boosted correlations in this study (cf. Semmer et al. 2004). However, in analyses of domain-specific unfairness, the mediation models' mutual control of unfairness in the other domain did also control for the potential bias from response style, which should be the same in both measures of unfairness. Harman's single factor test—a test of common method variance (Podsakoff and Organ 1986)—indicated that common method variance is below the critical threshold of 50 % (15.6 % in Harman's single factor test with all variables included; 36.8 % in Harman's single factor test without control variables). Third, relying on single-item measures of unfairness and lack of detachment can be criticised for a lack of reliability in measurement. Meanwhile, as Wanous et al. (1997) showed for job satisfaction, single items can be appropriate when measuring mid-range constructs that might be one dimensional and can ask for an "overall" judgement, such as overall job satisfaction or overall unfairness and detachment. The Whitehall II study successfully used a single item of (overall) unfairness (De Vogli et al. 2007).

Conclusion

The findings confirm the view of Rook and Zijlstra (2006) that studies should look at leisure and sleep in order to understand the effects of job stressors on individuals' health. Perceived unfairness at work is associated with working conditions that are changeable and largely under the control of organisations (e.g. illegitimate tasks at work, Semmer et al. 2015).

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