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32. King A, King D. Physical activity for an aging population. Public Health Rev 2010; 32: 401–26.
33. McMurdo ME. A healthy old age: realistic or futile goal? BMJ 2000; 321: 1149–51.
34. Nooyens ACJ, Visscher TLS, Schuit AJ *et al*.. Effects of retirement on lifestyle in relation to changes in weight and waist circumference in Dutch men: a prospective study. Public Health Nutr 2005; 8: 1266–74.
35. Myck M. Physical activity patterns of European 50+ populations. Adv Rehabil 2010; 3: 6–13.
36. Varo JJ, Martinez-Gonzalez MA, De Irala-Estevez J *et al*.. Distribution and determinants of sedentary lifestyles in the European Union. Int J Epidemiol 2003; 32: 138–46.
37. Ford ES, Caspersen CJ. Sedentary behaviour and cardiovascular disease: a review of prospective studies. Int J Epidemiol 2012; 41: 1338–53.
38. Penedo FJ, Dahn JR. Exercise and well-being: a review of mental and physical health benefits associated with physical activity. Curr Opin Psychiatry 2005; 18: 189–93.
39. Grant BC. 'You're never too old': beliefs about physical activity and playing sport in later life. Ageing Soc 2001; 21: 777–98.

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Job strain in the public sector and hospital in-patient care use in old age: a 28-year prospective follow-up

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Abstract

Background: high job strain increases the risk of health decline, but little is known about the specific consequences and long-term effects of job strain on old age health.
Objectives: purpose was to investigate whether physical and mental job strain in midlife was associated with hospital care use in old age.
Methods: study population included 5,625 Finnish public sector employees aged 44–58 years who worked in blue- and white-collar professions in 1981. The number of in-patient hospital care days was collected from the Finnish Hospital Discharge Register for the 28-year follow-up period.
Results: rates of hospital care days per 1,000 person-years for men were 7.78 (95% confidence interval [CI] 7.71–7.84) for low, 9.68 (95% CI 9.50–9.74) for intermediate and 12.56 (95% CI 12.47–12.66) for high physical job strain in midlife. The corresponding rates for women were 6.63 (95% CI 6.57–6.68), 7.91 (95% CI 7.87–7.95) and 10.35 (95% CI 10.25–10.42), respectively. Rates were parallel but lower for mental job strain. Reporting high physical job strain in midlife increased the risk of hospital care in old age compared with those who reported low job strain, fully adjusted incidence rate ratio 1.17 (95% CI 1.00–1.38) for men and 1.42 (95% CI 1.25–1.61) for women. These associations were robust in analyses confined to hospital care that took place after the employees had turned 65 years.

Conclusion: exposure to high mental and, particularly, high physical job strain in midlife may set employees on a higher healthcare use trajectory which persists into old age.

Keywords: *ageing, job strain, hospital care, epidemiology, cohort study, older people*

Introduction

The rising prevalence of chronic disease and disability with older age increases the need for healthcare services in the ageing population. Healthy living habits play a major role in the ageing process [1, 2], but other exposures that the persons face during the life course increase the risk of adverse health outcomes in old age. Both high mental and physical job strain contribute to increased sickness absence from work and early withdrawal from the workforce [3, 4]. Higher mental and physical job strain have been found to increase the prevalence of several chronic diseases and conditions such as coronary heart disease, diabetes and obesity as well as mortality [5–9].

Recent findings indicate that mental job strain and work-related stress [10–12] and physical work conditions [13] have long-term effects on health and functioning also after retirement in old age. Although evidence on the long-term effects of job strain is accumulating, physical and mental job strain have less frequently been investigated simultaneously in a representative population using concrete public health indicators such as care use. These findings are of interest while simultaneously as the demands of the working life increase, the ageing workforce is expected to transition into retirement at an older age [14]. This might potentially exert negative effects to the health and functioning of the individuals who enter into third age. In the present study, we explore further the effects of physical and mental job strain assessed in midlife on the volume of hospital in-patient care use in old age among public sector employees working in blue- and white-collar professions.

Methods

Participants and design

The Finnish Longitudinal Study on Municipal Employeesby the Finnish Institute of Occupational Health included 6,257 middle-aged municipal professions randomly chosen from all municipals in Finland [15, 16]. At baseline in 1981, 5,625 individuals aged 44–58 years had postal questionnaire data available on physical and mental job strain, for a response rate of 89.9%. Compared with the original sample, those with missing data on job strain in midlife were on average older (51.5 versus 50.3 years, t-test $P < 0.001$) and more often blue-collars (66.6% versus 44.5%, χ^2-test $P < 0.001$), but there were no differences in gender or health behaviours such as smoking or alcohol consumption. The Ethical Committee of the Finnish Institute of Occupational Health approved the study.

Mental and physical job strain in midlife

We used baseline data on job strain to avoid the 'healthy worker effect' [17, 18], which might have resulted in underestimation of the association between job strain and hospital care use. Job strain had most likely been relatively stable during the latest years of the work careers, because >70% of the male participants had held the current work position for the last 10 years.

Mental job strain was examined with the job demand–control concept described by Karasek [19, 20]. The five items (Cronbach's alpha = 0.73) included questions on, e.g. pressures related to work, work-pace and time schedule. Participants were asked whether these items were present at work 'not at all = 0', 'little = 1', 'somewhat = 2' or 'a lot = 3'. The summary score ranged between 0 and 15 with a higher score indicating higher demand. The 10-item scale termed job control (Cronbach's alpha = 0.85) included questions on, e.g. to what extent it was possible to influence the work environment or participate in planning of the work. Participants were asked whether the items were present at work 'not at all = 0', 'little = 1', 'somewhat = 2' or 'enough = 3'. The summary score ranged between 0 and 30 with a higher score indicating higher level of job control. Summary scores on job demand and job control were calculated and divided into thirds indicating low, intermediate and high levels of demand or control. The mental job strain indicator was constructed as: low job strain (low demands with high or intermediate control), high job strain (high or intermediate demands and low control) and intermediate job strain (all other combinations of demands and control) [21].

Physical job strain at work was assessed with three items on cardiorespiratory strain [22] and three on musculoskeletal strain, Cronbach's alpha = 0.87. Cardiorespiratory strain was assessed with the question: 'How often does physical exertion in your work cause: (i) sweating, (ii) breathlessness and (iii) heart palpitation?' The answering alternatives for these three items were: 'never or very rarely = 0', 'rarely = 1', 'occasionally = 2', 'quite frequently = 3' and 'frequently = 4'. Musculoskeletal strain was assessed with the question 'How much strain does work cause to your: (i) arms, (ii) legs and (iii) back?' The answering alternatives for these three items were 'not at all/ very little = 0', 'not much = 1', 'pretty much = 3' and 'very much = 4'. The summary score ranged between 0 and 24 with a higher score indicating higher physical strain. The summary score of these six items was calculated with a higher score indicating higher physical strain and it was further divided into distribution-based thirds indicating low, intermediate and high physical job strain.

Hospital in-patient care in old age

Hospital in-patient admission and discharge dates were extracted from the Finnish Hospital Discharge Register (FHDR) between January 1, 1981 and December 31, 2008 for all participants. A recent review showed that compared with external information on hospital care, >95% of discharges were identified in the FHDR [23]. One hospital care day was defined as an overnight stay or day surgery in a central, district or university hospital or health centre. The total volume of hospital care was calculated by adding together all hospital care days which had accumulated during the 28-year follow-up. Mortality dates were obtained from the Finnish National Population Register.

Background variables

Occupational class was formed from the 133 different occupational titles identified by clustering them into 13 occupations based on job analysis at the participants' workplaces [24]. These were further collapsed into blue-collar (e.g. maintenance and cleaning), lower white-collar (transport work and nursing) and upper white-collar (e.g. administrator and physician) professions. Smoking (never smoked, ex-smoker or current smoker), alcohol consumption (never, twice a month at most or at least once a week) and physical activity during previous year (inactive, moderate activity once a week at most or vigorous activity at least once a week) were also inquired in the questionnaires. Main chronic illnesses diagnosed or treated by a physician such as cardiovascular diseases (e.g. hypertension), metabolic disorders (e.g. diabetes) and musculoskeletal diseases (e.g. arthritis) were inquired in the questionnaires.

Statistical analyses

Use of hospital in-patient care per 1,000 person-years was calculated for the job strain groups indicating the days spent in hospital during the follow-up that 1,000 participants in the respective job strain group produce per year. Follow-up time was calculated as the number of days between the beginning of the study January 1, 1981 and the date of death or end of follow-up December 31, 2008, whichever happened first. We excluded care that took place during the first 2 years of follow-up, in order to avoid potential reverse causation between exposure and outcome but because there were no differences in these results, we report results for the entire follow-up time.

The association between physical and mental job strain in midlife and the volume of hospital care use were tested using negative binomial regression models, where the strength of an association is estimated as an incidence rate ratio (IRR) and 95% confidence interval (CI). IRRs are interpreted as relative risk estimates and represent the risk for persons in the predictor variable groups relative to those in the reference group. The analyses were conducted for subjects who died or survived over the follow-up period. An offset variable of the length of follow-up time was used to adjust estimation for a function of the number of days the subjects spent under observation. Volume of hospital care was a continuous variable with 1 day as a unit. Analyses were adjusted first for age and length of follow-up and then for occupational class, health behaviours and main chronic illnesses. We analysed men and women separately (Wald test $P = 0.051$ for the interaction between gender and job strain on hospital care use). Modelling was performed in the R statistical programming environment (version 2.12.2) using the MASS-package (version 7.3–11) [25].

For the job strain variables, we imputed missing values with a mean value calculated from the other items included in the job strain scales for those with missing data on at most two items of five for job demands (2.7%), five items of 10 for job control (3.9%) and three items of the six for physical job strain (13.0%). We did complete case analyses on the data but while the results were very similar to the imputed ones, we show results from the latter analyses.

Results

The mean age at baseline was 50.3 years (SD 3.6) and 45.0% were men. The characteristics in midlife according to gender are presented in Table 1. Over the course of 28 years, only a few individuals (0.5%) had no in-patient hospital care days. Duration of hospital in-patient care ranged between 0 and 2,875 days. Median duration of hospital care during the follow-up was 39 days (interquartile range [IQR] 13, 96 days) for men and 32 days (IQR 12, 78 days) for women. The median number of hospital care episodes during the follow-up was 6 (IQR 3, 12 episodes) and ranged between 0 and 123 episodes.

Of the 5,625 participants, 1,738 (1,073 men and 665 women) died during the follow-up. For the deceased, median duration of follow-up was 19.5 years (IQR 13.5, 24.5 years)

Table 1. Characteristics of the study population, values are *n* (%) unless stated otherwise

	Men *n* = 2,531	Women *n* = 3,094
Age, years (mean, SD)	50.4 (3.6)	50.3 (3.6)
Body mass index (mean, SD)	26.1 (3.1)	25.2 (3.5)
Occupational class		
Upper white-collars	504 (19.9)	701 (22.7)
Lower white-collars	280 (11.1)	1,637 (52.9)
Blue-collars	1,747 (69.0)	756 (24.4)
Never smoked	723 (28.7)	2,358 (76.4)
Alcohol consumption ≥1 per week	508 (20.2)	92 (3.0)
Vigorous physical activity ≥1 per week	1,167 (46.7)	1,537 (50.7)
Cardiovascular disease	594 (23.5)	630 (20.4)
Metabolic disorder	215 (8.5)	345 (11.2)
Musculoskeletal disease	1,233 (39.9)	937 (37.0)
No hospital care during the follow-up[a]	142 (0.06)	153 (0.05)
Duration of hospital care (median, IQR)[a]	39.0 (13.0, 96.0)	32.0 (12.0, 78.0)
Number of hospital care episodes (median, IQR)[a]	6.0 (3.0, 12.0)	6.0 (3.0, 12.0)

SD, standard deviation; IQR, interquartile range.
[a]Calculated for the 28-year follow-up.

ranging from 20 days to 28 years. The ones who survived the follow-up were at baseline slightly younger (49.8 years SD 3.4 versus 51.6 years SD 3.6, *t*-test $P < 0.001$), more often women (78.5% versus 57.6%, χ^2-test $P < 0.001$) and white-collars (61.2% versus 42.7%, χ^2-test $P < 0.001$), reported more frequently low physical (34.3% versus 28.8%, χ^2-test $P < 0.001$) and mental (21.1% versus 19.0%, χ^2-test $P = 0.017$) job strain in midlife than the ones who did not survive.

The rates of hospital in-patient care days per 1,000 person-years, presented in Table 2, for men were 7.78 (95% CI 7.71, 7.84) for low, 9.68 (95% CI 9.50, 9.74) for intermediate and 12.56 (95% CI 12.47, 12.66) for high physical job strain in midlife. For men, these rates were parallel but slightly lower for mental job strain. For women, the rates of hospital care were 6.63 (95% CI 6.57, 6.68) for low, 7.91 (95% CI 7.87, 7.95) for intermediate and 10.35 (95% CI 10.25, 10.42) for high physical job strain in midlife. Among women, there were no differences in the rates of hospital care according to mental job strain in midlife.

The associations between job strain and volume of hospital in-patient care in the 28-year follow-up are presented in Table 3. Compared with those public sector employees with low job strain in midlife, men with high job strain had on average a 42% and women a 71% higher risk of spending an in-patient day in a hospital during the follow-up, IRRs adjusted for age and length of follow-up time were 1.42 (95% CI 1.24, 1.62) and 1.71 (95% CI 1.53, 1.92), respectively. For men the association between mental job strain in midlife and volume of hospital care was parallel but lower. For women, the association between mental job strain in midlife and volume of hospital in-patient care was less clear and not statistically significant. Further adjustment for occupational class, health behaviours and main chronic illnesses assessed in midlife attenuated the IRR's, but they remained statistically significant for

Table 2. Unadjusted rates and 95% CI of hospital in-patient care days per 1,000 person-years according to physical and mental job strain in midlife

	Men			Women		
	n	Rate per 1,000 person-years, (95% CI)		*N*	Rate per 1,000 person-years, (95% CI)	
Physical job strain						
Low	795	7.78	(7.71, 7.84)	1,034	6.63	(6.57, 6.68)
Intermediate	1,019	9.68	(9.50, 9.74)	1,112	7.91	(7.87, 7.95)
High	717	12.56	(12.47, 12.66)	948	10.35	(10.25, 10.42)
Mental job strain						
Low	489	7.85	(7.76, 7.93)	664	8.42	(8.35, 8.49)
Intermediate	1,373	10.05	(9.99, 10.11)	1,852	8.20	(8.15, 8.24)
High	669	10.89	(10.80, 10.97)	578	8.14	(8.07, 8.22)

Table 3. Physical and mental job strain in midlife as predictors of hospital in-patient care days in the 28-year follow

	Men				Women			
	IRRs (95% CI) adjusted for				IRRs (95% CI) adjusted for			
	Age and length of follow-up		Age, length of follow-up, occupational class, health behaviour and main chronic illnesses		Age and length of follow-up		Age, length of follow-up, occupational class, health behaviour and main chronic illnesses	
Separate effects of job strain								
Physical job strain								
Low	1.00		1.00		1.00		1.00	
Intermediate	1.25	(1.11, 1.41)	1.11	(0.97, 1.27)	1.29	(1.16, 1.44)	1.19	(1.06, 1.33)
High	1.42	(1.24, 1.62)	1.17	(1.00, 1.38)	1.71	(1.53, 1.92)	1.42	(1.25, 1.61)
Mental job strain								
Low	1.00		1.00		1.00		1.00	
Intermediate	1.20	(1.05, 1.37)	1.13	(0.99, 1.30)	1.09	(0.97, 1.23)	1.09	(0.97, 1.22)
High	1.30	(1.12, 1.51)	1.14	(0.98, 1.34)	1.08	(0.94, 1.26)	0.97	(0.84, 1.12)
Simultaneous effects of job strain								
Physical job strain								
Low	1.00		1.00		1.00		1.00	
Moderate	1.23	(1.09, 1.39)	1.10	(0.96, 1.26)	1.30	(1.16, 1.45)	1.18	(1.05, 1.33)
High	1.38	(1.21, 1.58)	1.16	(0.99, 1.36)	1.73	(1.54, 1.95)	1.43	(1.25, 1.63)
Mental job strain								
Low	1.00		1.00		1.00		1.00	
Intermediate	1.17	(1.02, 1.33)	1.13	(0.99, 1.29)	1.00	(0.89, 1.13)	1.03	(0.91, 1.15)
High	1.19	(1.02, 1.39)	1.13	(0.97, 1.32)	0.93	(0.80, 1.08)	0.90	(0.77, 1.04)

physical job strain. Next, we included both physical and mental job strain simultaneously in the models to examine whether they modified each other's effect on the volume of in-patient hospital care, see Table 3. In the model adjusted for age and length of follow-up, the effects of physical and mental job strain in midlife on hospital care in old age were similar to the separate effects described above. Adjusting for occupational class, health behaviours and main chronic illnesses attenuated the associations particularly for men.

Finally, we only included hospital care that took place after the employees turned 65 years ($n = 5,097$) to investigate the long-term effects of job strain on hospital care use. The results were similar, if not even more pronounced, compared with those reported for all hospital care during the follow-up.

Discussion

We found in this population-based cohort including male and female employees working in the public sector, that high physical job strain assessed in midlife predicted an increased need for in-patient all-cause hospital care in old age. Findings were parallel but less evident for mental job strain. To our knowledge, this is the first prospective study to investigate the long-term effects of both physical and mental job strain on the overall volume of hospital care use in a representative old population.

Our study extends previous findings on the relation between job strain and morbidity by using hospital in-patient care days as a measure of the burden of morbidity over a long follow-up period. Earlier findings on the effect of higher physical job strain on increased cardiovascular morbidity and mortality have been reported [8, 26]. A number of epidemiologic studies have found that high mental job strain increase the prevalence of certain chronic diseases and conditions such as cardiovascular disease, diabetes and obesity [5, 6]. However, few studies have investigated the effect of both physical and mental job strain in the same cohort and little is still known about the effects of work strain on old age health.

We found the rate of hospital in-patient care per 1,000 person-years to be almost two times higher for those with high physical job strain. Exposure to high job strain during the work career seemed to set individuals on a higher care use trajectory also years later, which was confirmed in the present analyses showing that employees with high job strain in midlife had an increased risk of hospital in-patient care also after turning 65 years. This is in line with earlier findings on the association between low work ability in midlife and higher prevalence of disability in old age [16], which is a well-known risk factor for increased need of care in older age [27].

We found that the longer the person survived, the less hospital care days were needed. This can be explained by the increase in hospital care need in the last years of life due to decreasing health [28]. Contrary to the common view of death being a competing risk, the competing risk in our study was the end of the follow-up. This meant that most of the participants who survived until the end of the follow-up did not reach the last years of life where need for hospital care is highest. Further studies in unselected decedent populations are warranted to examine job strain as a predictor of hospital care use in the last years of life.

The study strengths include a long prospective follow-up in a large population-based dataset consisting of a wide variety of professions. We had complete register-based data available until old age for all participants for the entire study period and did not lose anyone to follow-up. There are some limitations that need to be addressed. First, we imputed missing values in the job strain items at midlife which might have introduced some bias to the results. However, the results were similar when using non-imputed data. Second, the participants with data on job strain were younger and more often white-collars than those who did not have data available on job strain. Furthermore, our study included occupationally active public sector employees and should be considered when generalising the present results on a population level.

In our study, high mental and particularly physical job strain in midlife increased the volume of hospital in-patient care use in old age. These findings are of clinical importance while the demands of the working life increase among the ageing workforce, which is expected to continue to work in older age in Western countries. A recent meta-analysis [29] showed that a healthy lifestyle reduced the risk of coronary artery disease substantially among those with high job strain. This indicates that along with measures that improve work conditions and decrease job strain among the middle-aged employees, promoting a healthy lifestyle is likely to reduce the long-term negative effects of job strain. For example, work place physical activity programs have yielded positive results in terms of increased physical activity and decreased musculoskeletal disorders [30]. However, more research on the effectiveness of programs that help preserve the health and functioning of ageing employees is warranted in the effort to prevent increase in the volume of healthcare services needed in old age.

Key points

- Previous studies show that both high mental and physical job strain contribute to early withdrawal from the workforce and increase the prevalence of several chronic diseases, but little is still known about the specific consequences (e.g. hospital care) and long-term effects of job strain on old age health.
- Our study found that high mental and particularly physical job strain in midlife increased the volume of hospital in-patient care use in old age in the long-term follow-up.
- The associations were robust also in analyses confined to hospital care that took place after the employees had turned 65 years.
- Exposure to high mental and, particularly, high physical job strain in midlife may set employees on a higher healthcare use trajectory which persists into old age.

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Conflicts of interest

None declared.

References

1. Sabia S, Singh-Manoux A, Hagger-Johnson G, Cambois E, Brunner EJ, Kivimäki M. Influence of individual and combined healthy behaviours on successful aging. CMAJ 2012; 184: 1985–92.
2. Chakravarty EF, Hubert HB, Krishnan E, Bruce BB, Lingala VB, Fries JF. Lifestyle risk factors predict disability and death in healthy aging adults. Am J Med 2012; 125: 190–7.
3. Laine S, Gimeno D, Virtanen M *et al*. Job strain as a predictor of disability pension: the Finnish public sector study. J Epidemiol Community Health 2009; 63: 24–30.
4. Duijts SF, Kant I, Swaen GM, van den Brandt PA, Zeegers MP. A meta-analysis of observational studies identifies predictors of sickness absence. J Clin Epidemiol 2007; 60: 1105–15.
5. Kivimäki M, Nyberg ST, Batty GD *et al*. Job strain as a risk factor for coronary heart disease: a collaborative meta-analysis of individual participant data. Lancet 2012; 380: 1491–7.
6. Heraclides A, Chandola T, Witte DR, Brunner EJ. Psychosocial stress at work doubles the risk of type 2 diabetes in middle-aged women: evidence from the Whitehall II study. Diabetes Care 2009; 32: 2230–5.
7. Nyberg ST, Heikkila K, Fransson EI *et al*. Job strain in relation to body mass index: Pooled analysis of 160 000 adults from 13 cohort studies. J Intern Med 2012; 272: 65–73.
8. Bourgkard E, Wild P, Massin N *et al*. Association of physical job demands, smoking and alcohol abuse with subsequent premature mortality: a 9-year follow-up population-based study. J Occup Health 2008; 50: 31–40.
9. Holtermann A, Mortensen OS, Sogaard K, Gyntelberg F, Suadicani P. Risk factors for ischaemic heart disease mortality among men with different occupational physical demands. A 30-year prospective cohort study. BMJ Open 2012; 2: e000279.
10. von Bonsdorff MB, Seitsamo J, von Bonsdorff ME, Ilmarinen J, Nygård CH, Rantanen T. Job strain among blue-collar and white-collar employees as a determinant of total mortality: a 28-year population-based follow-up. BMJ Open 2012; 2: e000860.
11. Kulmala J, von Bonsdorff MB, Stenholm S *et al*. Perceived stress symptoms in midlife predict disability in old age: a 28-year prospective cohort study. J Gerontol A Biol Sci Med Sci 2013 doi: 10.1093/gerona/gls339.
12. Wahrendorf M, Sembajwe G, Zins M, Berkman L, Goldberg M, Siegrist J. Long-term effects of psychosocial work stress in midlife on health functioning after labor market exit-results from the GAZEL study. J Gerontol B Psychol Sci Soc Sci 2012; 67: 471–80.
13. Platts LG, Netuveli G, Webb E *et al*. Physical occupational exposures during working life and quality of life after labour market exit: Results from the GAZEL study. Aging Ment Health 2013 doi: 10.1080/13607863.2013.781120.
14. United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2010 Revision, Highlights and Advance Tables. Working Paper No. ESA/P/WP.220. United Nations; 2011.
15. Ilmarinen J, Tuomi K, Eskelinen L, Nygård CH, Huuhtanen P, Klockars M. Background and objectives of the Finnish research project on aging workers in municipal occupations. Scand J Work Environ Health 1991; 17(Suppl. 1): 7–11.
16. von Bonsdorff MB, Seitsamo J, Ilmarinen J, Nygård CH, von Bonsdorff ME, Rantanen T. Work ability in midlife as a predictor of mortality and disability in later life: A 28-year prospective follow-up study. CMAJ 2011; 183: E235–42.
17. Kivimäki M, Theorell T, Westerlund H, Vahtera J, Alfredsson L. Job strain and ischaemic disease: does the inclusion of older employees in the cohort dilute the association? The WOLF Stockholm study. J Epidemiol Community Health 2008; 62: 372–4.
18. Theorell T, Tsutsumi A, Hallquist J *et al*. Decision latitude, job strain, and myocardial infarction: a study of working men in Stockholm. The SHEEP study group. Stockholm heart epidemiology program. Am J Public Health 1998; 88: 382–8.
19. Karasek RA. Job demands, job decision latitude, and mental strain: implications for job redesign. Administr Sci Quart 1979; 24: 285–308.
20. Karasek RA, Theorell T. Healthy Work. Stress, Productivity, and the Reconstruction of Working Life. New York: Basic Books, 1990.
21. Kivimäki M, Leino-Arjas P, Luukkonen R, Riihimaki H, Vahtera J, Kirjonen J. Work stress and risk of cardiovascular mortality: prospective cohort study of industrial employees. BMJ 2002; 325: 857.
22. Eskelinen L, Toikkanen J, Tuomi K, Mauno I, Nygård CH, Ilmarinen J. Symptoms of mental and physical stress in different categories of municipal work. Scand J Work Environ Health 1991; 17(Suppl. 1): 82–6.
23. Sund R. Quality of the Finnish hospital discharge register: a systematic review. Scand J Public Health 2012; 40: 505–15.
24. Ilmarinen J, Suurnäkki T, Nygård CH, Landau K. Classification of municipal occupations. Scand J Work Environ Health 1991; 17(Suppl. 1): 12–29.
25. R Development Core Team. R: A language and environment for statistical computing. Vienna, Austria: R Foundation for Statistical Computing, 2011.
26. Virkkunen H, Härmä M, Kauppinen T, Tenkanen L. Shift work, occupational noise and physical workload with ensuing development of blood pressure and their joint effect on the risk of coronary heart disease. Scand J Work Environ Health 2007; 33: 425–34.
27. Fried TR, Bradley EH, Williams CS, Tinetti ME. Functional disability and health care expenditures for older persons. Arch Intern Med 2001; 161: 2602–7.
28. von Bonsdorff MB, Rantanen T, Leinonen R, Kujala UM, Törmäkangas T, Mänty M *et al*. Physical activity history and end-of-life hospital and long-term care. J Gerontol A Biol Sci Med Sci 2009; 64: 778–84.

29. Kivimäki M, Nyberg ST, Fransson EI *et al*. Associations of job strain and lifestyle risk factors with risk of coronary artery disease: a meta-analysis of individual participant data. CMAJ 2013; 185: 763–9.
30. Proper KI, Koning M, van der Beek AJ, Hildebrandt VH, Bosscher RJ, van Mechelen W. The effectiveness of worksite physical activity programs on physical activity, physical fitness, and health. Clin J Sport Med 2003; 13: 106–17.

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Do health provider–patient relationships matter? Exploring dentist-patient relationships and oral health-related quality of life in older people

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Abstract

Background: patient experience is now a key parameter in health care. Yet, very little is known about the possible impact of dentist–patient relationships on patient-centred outcomes including older peoples' oral health-related quality of life (OHRQoL).
Objective: this study assessed the relationship between OHRQoL and dentist–patient relationships related to perceived unmet dental needs; shared decision-making; time spent discussing oral health problems; respect and confidence and trust.
Participants: older people aged 65 years and over living in East London, UK in 2011.
Methods: a cross-sectional study using stratified random sampling recruited a representative sample of older people ($n = 772$). Participants completed an oral examination and a structured questionnaire including the Oral Health Impact Profile-14 (OHIP-14) measuring OHRQoL and five dentist–patient relationship questions taken from the UK 2009 Adult Dental Health Survey. Multivariate Poisson regressions modelled the association between OHRQoL and dentist–patient factors adjusting for socio-demographic factors, clinical oral indicators, and dental attendance.
Results: having a perceived unmet need for dental treatment (PRR = 1.84; 95% CI: 1.32, 2.56) and expressing a lack of trust and confidence in one's dentist (PRR = 1.74; 95% CI: 1.01, 2.98) were significant predictors of poor OHRQoL among older people.
Conclusions: these findings suggest that older people with unmet dental needs and those who expressed a lack of trust and confidence in their dentist were more likely to experience poor OHRQoL reinforcing the importance of the dental patient experience in healthy ageing and well-being.

Keywords: *oral health, dentists, quality of life, patient–provider relationships, older people*

Introduction

Dramatic improvements in oral health over the past 50 years in most industrialised countries now mean that more people retain their natural teeth into older age [1]. UK Adult Oral Health Surveys have shown a decline in the percentage of older people with no natural teeth from 78% in 1978 to only 24% in 2009 [2]. The preference for keeping teeth is socially