RODNE RAZLIKE NA RADNOM MESTU: BOLOVANJE I GUBITAK PRODUKTIVNOSTI NA POSLU I NJIHOVA POVEZANOST SA ZDRAVLJEM I FAKTORIMA RADNOG MESTA

ORIGINALNI RAD

ORIGINAL ARTICLE

GENDER DIFFERENCES AT THE WORKPLACE: SICKNESS ABSENCE AND PRODUCTIVITY LOSS AT WORK AND THEIR ASSOCIATION WITH HEALTH AND WORK-RELATED FACTORS

Bosiljka Đikanović[1,2], Tessa A. Kouwenhoven-Pasmooij[3], Roderik A. Kraaijenhagen[4], Jeanine E. Roeters van Lennep[5], Alex Burdorf[6], Vladimir Vasilev[7], Suzan J.W. Robroek[6]

[1] Univerzitet u Beogradu, Medicinski fakultet, Institut za socijalnu medicinu, Beograd, Srbija
[2] Univerzitet u Beogradu, Medicinski fakultet, Centar – Škola javnog zdravlja, Beograd, Srbija
[3] *VitAll*, Roterdam, Holandija
[4] *NIPED* istraživačka fondacija, Istraživanje i razvoj, Amsterdam, Holandija
[5] Odeljenje za internu medicinu, Erazmus MC, Roterdam, Holandija
[6] Odeljenje za epidemiologiju, Erazmus MC, Roterdam, Holandija
[7] Klinika *VFV*, Skoplje, Severna Makedonija

[1] *University of Belgrade, Faculty of Medicine, Institute of Social Medicine, Belgrade, Serbia*
[2] *University of Belgrade, Faculty of Medicine, Center – School of Public Health, Belgrade, Serbia*
[3] *VitAll, Rotterdam, The Netherlands*
[4] *NIPED Research Foundation, Research & Development, Amsterdam, The Netherlands*
[5] *Department of Internal Medicine, Erasmus MC, Rotterdam, The Netherlands*
[6] *Department of Epidemiology, Erasmus MC, Rotterdam, The Netherlands*
[7] *VFV Clinic, Skopje, North Macedonia*

SAŽETAK

Uvod: Razlike u odsustvovanju sa radnog mesta zbog bolovanja i u gubitku produktivnosti na poslu između muškaraca i žena su prepoznate, ali ih je potrebno bolje razumeti.

Materijali i metode: Na veb platformi je sprovedena studija preseka u kojoj je učestvovalo 10.407 zaposlenih radnika iz 37 kompanija u Holandiji, u periodu između 2010. i 2014. godine. Zaposleni su se izjašnjavali o učestalosti kratkotrajnih (<9 dana) i dugotrajnih (10 ili više dana) odsustvovanja sa radnog mesta zbog bolovanja, tokom prethodnih 12 meseci, kao i o produktivnosti na radnom mestu, fizičkim i psihosocijalnim faktorima na radu, i zdravstvenim problemima. Log-linearni modeli su korišćeni za procenu odnosa prevalencije (OP), sa 95% intervalom poverenja (IP).

Rezultati: Žene su češće od muškaraca koristile kratkotrajno i dugotrajno bolovanje (OP 1,06, 95% IP 1,01-1,11, i OP 1,33, 95% IP 1,21-1,46, respektivno), ali su ređe beležile više od 30% smanjenja produktivnosti na radnom mestu (OP 0,90, 95% IP 0,81 – 0,99). U kratkotrajnom odsustvovanju sa posla zbog bolovanja, rodne razlike su smanjene za 20%, nakon prilagođavanja modela za potencijalni uticaj psihosocijalnih faktora na radu, i za 60%, nakon kontrole za uticaj zdravstvenih problema, nezavisno jedni od drugih. Nijedan od gore navedenih faktora nije mogao da objasni veći gubitak produktivnosti na poslu kod muškaraca u odnosu na žene.

Zaključci: Veća prevalencija bolovanja kod žena se može delimično objasniti psihosocijalnim faktorima povezanim sa radom i zdravstvenim problemima. Potrebne su dalje studije kako bi se istražio veći gubitak produktivnosti na poslu među muškarcima.

Ključne reči: rodne razlike, odsustvovanje sa posla zbog bolovanja, gubitak produktivnosti na poslu, zdravlje, bolest, psihosocijalni faktori povezani sa poslom

ABSTRACT

Introduction: Differences in sickness absence and productivity loss at work between men and women are recognized but need to be better understood.

Materials and methods: In a cross-sectional study, 10,407 employees from 37 companies in the Netherlands participated in a web-based health risk assessment, between 2010 and 2014. Self-reported short-term (<9 days) and long-term (10 or more days) sickness absences during the preceding 12 months were assessed. The questionnaire also asked about productivity loss at work, physical and psychosocial work-related factors, and health problems. Log-linear models were used to estimate prevalence ratios (PR), with 95% confidence intervals (CI).

Results: Women, more often than men, experienced short-term and long-term sickness absence (PR 1.06, 95% CI 1.01 – 1.11, and PR 1.33, 95% CI 1.21 – 1.46, respectively) but were less likely to have productivity loss at work (more than 30%), (PR 0.90, 95% CI 0.81 – 0.99). In short-term sickness absence, gender differences were reduced by 20%, after controlling for psychosocial work-related factors, and by 60%, after controlling for health problems, separately. None of the factors mentioned above could explain a large productivity loss at work among men.

Conclusions: Higher prevalence of sickness absence among women can partly be explained by psychosocial work-related factors and health problems. Further studies are needed to explore large productivity loss at work among men.

Keywords: gender differences, sickness absence, productivity loss at work, health, disease, psychosocial work-related factors

Autor za korespondenciju:
Bosiljka Đikanović
Institut za socijalnu medicinu, Medicinski fakultet, Univerzitet u Beogradu
Dr Subotića 8, 11000 Beograd, Srbija
Elektronska adresa: bosiljka.djikanovic@med.bg.ac.rs

Corresponding author:
Bosiljka Đikanović
Institute of Social Medicine, Faculty of Medicine, University of Belgrade
8 Dr Subotića Street, 11000 Belgrade, Serbia
E-mail: bosiljka.djikanovic@med.bg.ac.rs

Primljeno • *Received*: February 22, 2023; **Revidirano • *Revised*:** February 26, 2023; **Prihvaćeno • *Accepted*:** February 27, 2023; ***Online first*:** Mach 3, 2023

DOI: 10.5937/smclk4-43005

UVOD

Smanjena produktivnost na poslu i odsustvovanje sa posla zbog bolovanja predstavljaju značajnu pretnju održivoj zaposlenosti. Povezani su sa značajnim troškovima za poslodavce i društvo u celini, pre svega zbog socijalnih davanja [1–3]. Široko je prepoznato da su i prevalencija i trajanje odsustvovanja sa posla zbog bolovanja veći među ženama nego među njihovim muškim kolegama [4–6]. Ova razlika bi se mogla pripisati većoj prevalenciji hroničnih oboljenja među ženama, mada su kardiovaskularna oboljenja, kao vodeće hronične nezarazne bolesti, zastupljenije među muškarcima [4,7–9]. Međutim, objašnjenje rodnih razlika u odsustvovanju sa posla zbog bolovanja seže izvan bioloških razlika. One se mogu pripisati i različitim fizičkim i psihosocijalnim uslovima rada kojima su zaposleni izloženi na radnom mestu, što je široko prepoznato kao 'rodne razlike' ili 'rodne nejednakosti' [10].

Rodne razlike se ogledaju u nekoliko pitanja koja su u vezi sa poslom. Sistematski pregled podataka pokazao je da je verovatnije da će zaposlene žene imati veću nesigurnost po pitanju posla, manju kontrolu nad poslom, kao i lošije uslove rada, nego muškarci [10]. Nepovoljni faktori povezani sa poslom su takođe u vezi sa hroničnim zdravstvenim problemima i, kao posledica toga, sa dužim i češćim odsustvovanjima sa posla zbog bolovanja među ženama [11]. Mada su rodne razlike po pitanju odsustvovanja sa posla zbog bolovanja potvrđene u mnogim studijama, manje se zna o gubitku produktivnosti na poslu, što se smatra još jednim značajnim faktorom održivog zapošljavanja. Neke studije izveštavaju o većoj prevalenciji gubitka produktivnosti na poslu među ženama u poređenju sa muškarcima [12], dok druge studije nisu ustanovile bilo kakve rodne razlike po pitanju gubitka produktivnosti na poslu [13]. Kao što je već navedeno, postoje dokazi da zaposlene žene prijavljuju više zdravstvenih problema i nepovoljnih karakteristika posla nego što to čine njihove muške kolege. Utvrđeno je da su ovi faktori takođe povezani sa gubitkom produktivnosti na poslu [14,15], te da mogu doprineti rodnim razlikama u gubitku produktivnosti na poslu [14–18].

Važno je analizirati i odsustvovanje sa posla zbog bolovanja i gubitak produktivnosti na poslu, pošto su obe ove vrednosti deo istog procesa donošenja odluka kod zaposlenih koji su na neki način ugroženi, a žene i muškarci mogu reagovati drugačije. Cilj nam je da steknemo jasniji uvid u međusobno dejstvo faktora povezanih sa poslom, zdravstvenih problema, i ishoda rada, među muškarcima i ženama. Stoga, ova studija istražuje rodne razlike po pitanju odsustvovanja sa posla zbog bolovanja i gubitka produktivnosti na poslu, te procenjuje u kojoj meri zdravstveni problemi i faktori

INTRODUCTION

Reduced productivity at work and sickness absence are considerable threats to sustainable employability. They are associated with substantial costs for employers and society, mainly due to social benefits [1–3]. It is widely recognized that both the prevalence and duration of sickness absence are higher among female workers than their male colleagues [4–6]. This difference may be attributed to the higher prevalence of chronic diseases among women, although cardiovascular diseases, as leading chronic non-communicable diseases, are more prevalent among men [4,7–9]. However, the explanation of gender differences in sickness absence goes beyond biological differences. They can also be ascribed to different physical and psychosocial working conditions that the workers experience at the workplace, widely recognized as 'gender differences' or 'gender inequality' [10].

Gender differences are reflected in several work-related issues. A systematic review showed that employed women were more likely to have job insecurity, lower job control, and worse working conditions than men [10]. Unfavorable work-related factors are also associated with chronic health problems and, consequently, with longer and more frequent sickness absence among women [11]. While gender differences in sickness absence have been confirmed in many studies, less is known about productivity loss at work, which is considered another important factor for sustainable employability. Some studies report a higher prevalence of productivity loss at work among women than among men [12], while others have not found any gender differences in productivity loss at work [13]. As reported above, there is evidence that employed women report more health problems and unfavorable work characteristics than their male colleagues. These factors have also been found to be associated with productivity loss at work [14,15] and may contribute to gender differences in productivity loss at work [14–18].

It is important to study both sickness absence and productivity loss at work, since both are part of the same decision-making process of workers in distress, whereas men and women might respond differently. We aim to get more insight into the interplay between work-related factors, health problems, and work outcomes among men and women. Therefore, this study investigates gender differences in sickness absence and productivity loss at work and estimates the contribution of health problems and work-related factors to these differences. We hypothesize a higher prevalence and duration of sickness absence and productivity loss at work among women than among men and that both health problems and work-related factors play a role in gender inequalities in these outcomes.

ri povezani sa poslom doprinose ovim razlikama. Naša hipoteza je da postoji veća prevalencija i duže trajanje odsustvovanja sa posla zbog bolovanja i gubitka produktivnosti na poslu kod žena nego kod muškaraca, te da i zdravstveni problemi i faktori povezani sa poslom igraju ulogu u rodnim nejednakostima kod ovih ishoda.

MATERIJALI I METODE

Način na koji je studija osmišljena i populacija koju obuhvata

Populacija ove studije preseka obuhvatila je 34.264 lica zaposlenih u 37 firmi u Nizozemskoj, koja su pokazala interesovanje da budu uključena u procenu zdravstvenih rizika koja je obavljena putem veb platforme, pod nazivom „Kompas prevencije" (kao što je detaljnije opisano u daljem tekstu). Podaci su prikupljani u periodu između 2010. i 2014. godine. Većina pojedinaca koji su pozvani da učestvuju u ovoj proceni zdravstvenih rizika bila je zaposlena u firmama u javnom sektoru (57,2%), potom u sektoru informacionih tehnologija (16,6%), zdravstvenom sektoru (9,5%), te u drugim sektorima (16,7%). Broj muškaraca i žena zaposlenih u javnom sektoru bio je ravnomerno raspoređen, dok su među ispitanicima iz sektora informacionih tehnologija preovlađivali muškarci (71,8%), a u zdravstvenom sektoru su, pak, preovlađivale žene (89,6%).

Svi zaposleni su pozvani da učestvuju u proceni zdravstvenih rizika (PZR) koja je obavljena putem veb platforme, pod nazivom „Kompas prevencije" [21]. Pozive za učešće upućivale su kadrovske službe datih firmi ili *NIPED*, istraživačka organizacija uključena u osmišljavanje „Kompasa prevencije" i u upravljanje podacima u okviru ovog istraživanja. Zaposleni su obavešteni da je učešće na dobrovoljnoj bazi, da je besplatno i poverljivo, u smislu da nikakvi pojedinačni rezultati istraživanja neće biti dostupni ni njihovim poslodavcima niti nekim trećim licima. Od 34.264 zaposlenih lica pozvanih da učestvuju u proceni zdravstvenih rizika, ukupno je 11.962 (34,9%) njih popunilo PZR. U našoj studiji, pažnja je usmerena na podgrupu pitanja koja se odnose na pojedinačne karakteristike, faktore povezane sa zdravljem, karakteristike povezane sa poslom (nezavisne varijable), kao i na odsustvovanje sa posla zbog bolovanja i gubitak produktivnosti na poslu (zavisne varijable). Ukupno je iz studije isključeno 1.555 osoba, usled nepotpunih podataka o gubitku produktivnosti na poslu ili odsustvovanju sa posla zbog bolovanja (n = 1.224), psihosocijalnim faktorima povezanih sa poslom (objašnjeno u daljem tekstu), (n = 9), fizičkim faktorima povezanih sa poslom (n = 56), zdravstvenim problemima (n = 2), i demografskim varijablama (starosno doba, rod, zanimanje, obrazovanje), (n = 264). Nakon isključivanja ovih 1.555 ispitanika, 10.407 zaposlenih (87,0%

MATERIALS AND METHODS

Study design and population

The population of this cross-sectional study consisted of 34,264 employees from 37 companies in the Netherlands who expressed an interest in being involved in the web-based health risk assessment entitled *Prevention Compass* (described in the text below). Data were collected in the period between 2010 and 2014. The majority of the individuals invited to participate in the health risk assessment were employed at companies in the public (57.2%), information technology (16.6%), health care (9.5%), and other (16.7%) sectors. The number of men and women in the public sector was equally distributed, whereas in the information technology sector the participants were predominantly men (71.8%), and in the health care sector they were predominantly women (89.6%).

All employees were invited to participate in a web-based health risk assessment (HRA) entitled the *Prevention Compass* [21]. Invitations to participate were sent by the human resources departments of these companies or by NIPED, the research organization involved in the development and data management of the *Prevention Compass*. Employees were informed that participation was voluntary, free of charge, and confidential, meaning that no individual results would be shared with their employer or any other third party. In total, 11,962 (34.9%) of the 34,264 employees invited to participate in the health risk assessment completed the HRA. In the current study, we focus on the subset of questions concerning individual characteristics, health-related factors, work-related characteristics (independent variables), as well as sickness absence and productivity loss at work (dependent variables). A total of 1,555 individuals were excluded from the study, based on missing information on productivity loss at work or sickness absence (n = 1,224), psychosocial work-related factors (explained later in the text), (n = 9), physical work-related factors (n = 56), health problems (n = 2), and demographic data (age, gender, occupation, education), (n = 264). After excluding these 1,555 individuals, 10,407 employees (87.0% of the respondents) were included in the analysis, of whom 53.2% were male (n = 5,541) and 46.8% (n = 4,866) were female.

Digital informed consent was obtained from all study participants prior to the study, following requirements for identifiable data collection in the Dutch Code of Conduct for Observational Research.

Sickness absence

Sickness absence was defined as being off work due to the presence of health problems and was derived from

ispitanika) uključeno je u analizu, od kojih je 53,2% bilo muškog (n = 5.541) a 46,8% (n = 4.866) ženskog roda.

Svi učesnici u studiji dali su svoj informisani pristanak elektronskim putem, pre početka studije, u skladu sa zahtevima za prikupljanje podataka Holandskog koda za sprovođenje opservacionih istraživanja (engl. *Dutch Code of Conduct for Observational Research*).

Odsustvovanje sa posla zbog bolovanja

Odsustvovanje sa posla zbog bolovanja je definisano kao odsustvovanje sa posla usled postojanja zdravstvenih problema i izvedeno je iz indeksa radne sposobnosti (IRS) [22]. Odsustvovanje sa posla zbog bolovanja je prijavljivano od strane samih ispitanika, odnosno, od ispitanika je traženo da naznače broj dana, u prethodnih 12 meseci, tokom kojih nisu bili u mogućnosti da rade usled zdravstvenih problema, pri čemu se raspon odgovora kretao između 0 dana i preko 100 dana (0 dana; 1 – 9 dana; 10 – 24 dana; 25 – 99 dana; 100 – 365 dana). Odgovori su dalje kategorisani u tri kategorije: bez odsustvovanja sa posla zbog bolovanja, 1 – 9 dana odsustvovanja sa posla zbog bolovanja (kratkotrajno odsustvovanje sa posla zbog bolovanja) i deset i više dana odsustvovanja sa posla zbog bolovanja (dugotrajno odsustvovanje sa posla zbog bolovanja) [14].

Gubitak produktivnosti na poslu

Gubitak produktivnosti na poslu, koji su sami ispitanici prijavili, meren je korišćenjem kvantitativne dimenzije Skale kvantiteta i kvaliteta (engl. *Quantity and Quality scale – QQ scale*) [14], koja je pokazala solidnu korelaciju sa objektivnim rezultatima na poslu [15–16]. Od ispitanika se tražilo da označe, na skali od 0 (ništa) do 10 (uobičajena količina), koliko posla su zaista i obavili tokom redovnog radnog vremena, u okviru svojeg najskorijeg redovnog radnog dana, u poređenju sa očekivanim. Gubitak produktivnosti na poslu je klasifikovan u tri kategorije: bez gubitka produktivnosti na poslu (skor = 10), 10 – 20% gubitka produktivnosti na poslu (skor = 8 ili skor = 9) i 30% ili više gubitka produktivnosti na poslu (skor = 7 ili niži) [14].

Fizički faktori povezani sa poslom

Sledeći fizički faktori povezani sa poslom su procenjivani primenom da/ne pitanja: 1) izloženost vibracijama na radnom mestu u trajanju dužem od pet godina, 2) svakodnevno podizanje, guranje i/ili vučenje teških tereta i 3) rad u neprirodnim telesnim položajima duže od dva sata dnevno [23].

Psihosocijalni faktori povezani sa poslom

Sledećih pet psihosocijalnih faktora povezanih sa poslom mereni su skraćenom verzijom validiranog Ho-

the work ability index (WAI) [22]. Sickness absence was self-reported, i.e., the participants were asked to indicate how many days in the preceding 12 months they were unable to work due to health problems, with answers ranging from 0 days to more than 100 days (0 days; 1 – 9 days; 10 – 24 days; 25 – 99 days, and 100 – 365 days). The answers were further categorized into three categories: no sickness absence, 1 – 9 days of sickness absence (short-term sickness absence), and ten or more days of sickness absence (long-term sickness absence) [14].

Productivity loss at work

Self-reported productivity loss at work was measured using the quantity dimension of the Quantity and Quality (QQ) scale [14], which showed a reasonable correlation with objective work output [15–16]. Respondents were asked to indicate, on a scale from 0 (nothing) to 10 (regular amount), how much work they actually performed during regular working hours, on their most recent regular workday, compared to the expected. Productivity loss at work was classified into three categories: no productivity loss at work (score = 10), 10 – 20% productivity loss at work (score = 8 or score = 9), and 30% or more productivity loss at work (score of 7 or lower) [14].

Physical work-related factors

The following physical work-related factors were assessed by using yes/no questions: 1) exposure to vibrations at the workplace for more than five years, 2) daily lifting, pushing, and/or pulling heavy loads, and 3) working in awkward body postures more than two hours daily [23].

Psychosocial work-related factors

The following five psychosocial work factors were measured with an abbreviated version of a validated Dutch questionnaire on the experience and assessment of work: work demands, autonomy, skills discretion, social support by colleagues, and social support by the supervisor [24,25].

Work demands were measured using three questions (Cronbach's alpha = 0.66) concerning too much work to do, the need to hurry, and problems with work pressure. Job autonomy was measured using three questions (Cronbach's alpha = 0.83) regarding the freedom in carrying out work activities, the influence in the planning of work activities, and personally deciding how much time one needs for a specific activity. Skill discretion was assessed by two questions related to variations in the work and personal input (Cronbach's alpha = 0.66). Social support by

landskog upitnika o iskustvu na poslu i oceni posla/radnog mesta: zahtevi na radnom mestu, stepen autonomije na radnom mestu, stepen mogućnosti primene i razvoja veština, socijalna podrška od strane kolega, socijalna podrška od strane nadređenog [24,25].

Zahtevi na radnom mestu su mereni primenom tri pitanja (Kronbahov alfa koeficijent = 0,66) koja su bila povezana sa prevelikom količinom posla, potrebom da se žuri sa poslom, i problemima sa pritiscima na radnom mestu. Autonomija na radnom mestu je merena primenom tri pitanja (Kronbahov alfa koeficijent = 0,83) koja su se odnosila na slobodu u izvršavanju radnih aktivnosti, na uticaj u planiranju radnih aktivnosti, te na lično donošenje odluka o vremenu potrebnom da se obave konkretne aktivnosti. Stepen mogućnosti primene i razvoja veština je procenjivan pomoću dva pitanja koja su se odnosila na varijacije u radnom i ličnom doprinosu (Kronbahov alfa koeficijent = 0,66). Socijalna podrška od strane kolega (tri stavke, Kronbahov alfa koeficijent = 0,60) i socijalna podrška od strane nadređenog (tri stavke, Kronbahov alfa koeficijent = 0,76) merene su pomoću pitanja o konfliktima, o mogućnosti oslanjanja na kolege/nadređenog kada zaposleni naiđe na poteškoće na poslu, te o radnoj atmosferi. Za sva pitanja, korišćena je četvorostepena skala, sa sledećim ocenama: „nikada", „ponekad", „često", „uvek", pri čemu je, za svaku stavku, najviši skor pripisivan manjim zahtevima na radnom mestu, visokoj autonomiji na radnom mestu, visokom stepenu mogućnosti primene i razvoja veština, i visokom stepenu socijalne podrške. Za svaku dimenziju zasebno, standardizovani zbirni skor se kretao između 0 i 100, a za zaposlene sa skorom koji je bio u okviru najnižeg kvartila smatrano je da su bili izloženi nepovoljnim psihosocijalnim faktorima rizika.

Zdravstveni problemi

Smatrano je da je postoji prisustvo zdravstvenih problema u slučajevima kada su ispitanici prijavljivali da im je dijagnostikovana određena bolest, da uzimaju terapiju za navedeno oboljenje i/ili u slučaju da su posetili lekara tokom prethodnih 12 meseci. Smatrano je da postoji prisustvo karcinoma u slučajevima kada su ispitanici prijavili da im je ova bolest dijagnostikovana, te da nisu proglašeni izlečenim. Zdravstveni problemi su klasifikovani u pet grupa najčešćih oboljenja: kardiovaskularne bolesti (angina pektoris, srčani udar, prolazni ishemijski napad, srčana insuficijencija, cerebrovaskularni insult, hiperholesetrolemija, hipertenzija, ili drugo srčano ili kardiovaskularno oboljenje), mišićno- koštani poremećaji (leđa, gornji i donji ekstremiteti), psihološki poremećaji (anksiozni poremećaj, sindrom sagorevanja na poslu, tzv. „*burnout syndrome*", depresija, drugi psihološki poremećaji), kancer (rak dojke, rak debelog

colleagues (three items, Cronbach's alpha = 0.60) and social support by the supervisor (three items, Cronbach's alpha = 0.76) were measured with questions about conflicts, the possibility of counting on colleagues/the supervisor when encountering difficulties at work, and the work atmosphere. For all questions, a four-point scale was used with the following ratings: 'never,' 'sometimes,' 'often,' and 'always', in such a way that, for every item, the highest score was assigned to low work demands, high autonomy, high skill discretion, and high social support. For each dimension separately, a standardized sum score ranged from 0 to 100, and workers with a score in the lowest quartile were regarded as exposed to adverse psychosocial risk factors.

Health problems

Health problems were defined to be present when respondents reported that they had been diagnosed with a certain disease, when they were currently taking medication for it and/or when they visited a physician during the preceding 12 months. Cancer was defined as being present when respondents reported they had been diagnosed with this disease and had not been declared cured. Health problems were classified into five groups of most common diseases: cardiovascular (angina pectoris, heart attack, transient ischemic attack, heart failure, cerebrovascular accident, hypercholesterolemia, hypertension, or other heart or cardiovascular disease), musculoskeletal disorders (back, upper and lower extremities), psychological disorders (anxiety disorder, burn out, depression, other psychological disorders), cancer (breast, colon, pharyngeal, urinary tract, or other), and other diseases (including respiratory, gastrointestinal, metabolic and endocrine diseases). Participants could report several health problems simultaneously.

Individual characteristics

In the questionnaire, the respondents were asked to report their gender, age, educational level, marital status, and number of working hours per week. Age was classified into the following three categories: 18 – 34 years, 35 – 49 years, and 50 years and above. Educational level was classified into the following two groups: low (primary school level, lower and intermediate secondary school level, or lower vocational training) and medium/high (higher secondary school level or intermediate vocational school level, higher vocational school level or university). The respondents' marital status was marked as 'married' if they were cohabiting or married.

creva, rak grla, rak urinarnog trakta, drugi kanceri), i ostale bolesti (uključujući respiratorna, gastrointestinalna, metabolička i endokrina oboljenja). Učesnici su mogli da prijave nekoliko zdravstvenih problema istovremeno.

Pojedinačne karakteristike

U upitniku je od ispitanika traženo da navedu svoj rod, starosno doba, nivo obrazovanja, bračno stanje, te broj radnih sati na nedeljnom nivou. Starosno doba je klasifikovano u sledeće tri kategorije: 18 – 34 godine, 35 – 49 godina i 50 godina i više. Nivo obrazovanja je klasifikovan u sledeće dve grupe: nizak nivo obrazovanja (nivo osnovne škole, niži nivo srednje škole, niži nivo srednje stručnog obrazovanja) srednji/viši/visoki nivo obrazovanja (viši nivo srednje škole, srednji i viši nivo srednje stručnog obrazovanja, univerzitetski nivo obrazovanja). Bračno stanje ispitanika je označeno kao „u braku", ukoliko su ispitanici bili venčani ili su živeli u vanbračnoj zajednici.

Statistička analiza

Deskriptivna statistička analiza je korišćena za izveštavanje o karakteristikama ispitivane populacije. Spirmanov koeficijent korelacije je korišćen za analizu korelacije između gubitka produktivnosti na poslu i odsustvovanja sa posla zbog bolovanja, kao i između zavisnih varijabli i potencijalnih medijatora.

Kako bi se analizirala povezanost između roda (nezavisna varijabla), faktora povezanih sa poslom i zdravstvenih problema, i odsustvovanja sa posla zbog bolovanja i gubitka produktivnosti na poslu (zavisne varijable), izvršena je medijaciona analiza. Urađena je Poasonova log-linerana regresiona analiza kako bi se dobili odnosi prevalencije (OP) za povezanosti između prevalencije individualnih karakteristika, faktora povezanih sa poslom, zdravstvenih problema, i odsustvovanja sa posla zbog bolovanja i gubitka produktivnosti na poslu. Prvo je ispitivana povezanost između roda i zavisnih varijabli. Povezanost između roda, faktora povezanih sa poslom i zdravstvenih problema je ispitivana druga. Na trećem mestu su, u različitim modelima, faktori povezani sa poslom i zdravstveni problemi dodati u regresioni model odsustvovanja sa posla zbog bolovanja i gubitka produktivnosti na poslu, za oba roda. U prvom modelu, povezanost između roda i zavisnih varijabli je prilagođena samo za životno doba, nivo obrazovanja i bračno stanje (Osnovni model, Model 1). Drugi, treći i četvrti model se sastojao od Osnovnog modela i sledećih faktora: fizičkih faktora povezanih sa poslom (Model 2), psihosocijalnih faktora povezanih sa poslom (Model 3), te zdravstvenih problema (Model 4). Peti model se sastojao od Osnovnog modela, psihoso-

Statistical analysis

Descriptive statistics was used to report the characteristics of the study population. Spearman's correlation was used to analyze the correlation between productivity loss at work and sickness absence, as well as between the dependent variables and the potential mediators.

In order to analyze the association between gender (independent variable), work-related factors and health problems, and sickness absence and productivity loss at work (dependent variables), a mediation analysis was performed. Poisson log-linear regression analysis was performed to obtain prevalence ratios (PR) for the associations between the prevalence of individual characteristics, work-related factors, health problems, and sickness absence and productivity loss at work. The association between gender and the dependent variables was investigated first. The association between gender, work-related factors, and health problems was analyzed second. Thirdly, in different models, the work-related factors and health problems were added to the regression model of sickness absence and productivity loss at work, for both genders. In the first model, the association between gender and the dependent variables was only adjusted for age, education, and marital status (Basic Model, Model 1). The second, third, and fourth models consisted of the Basic Model and the following: physical work-related factors (Model 2), psychosocial work-related factors (Model 3), and health problems (Model 4), respectively. The fifth model consisted of the Basic Model, psychosocial work-related factors, and health problems (Model 5). The sixth model contained the Basic Model, physical and psychosocial work-related factors, as well as health problems, together (Model 6). We calculated the percentage change in PRs for adjusted gender associations (Models 1 to 6), using the formula $((PR_{(Basic\ Model\ association)} - PR_{(Model\ 2\text{-}6)})/(PR_{(Basic\ Model\ association)} - 1))100)$ [26]. All analyses were conducted in SPSS V22.

RESULTS

The results of the study show that women were more likely than men to report dealing with daily lifting, pushing, and/or pulling of heavy loads, lower autonomy, and lower skill discretion (Table 1). Women were also more likely to report all types of health problems, except cardiovascular problems (women 15.9% vs. men 21.1%). Men were more likely to report exposure to vibrations for longer than five years and lesser social support by their supervisor.

Both short-term (up to 9 days) and long-term (10 days and more) sickness absence was more prevalent among women (41.4% vs. 39.8%, and 14.9% vs. 11.8%), while productivity loss at work of 30% and more was more

Tabela 1. Karakteristike 10.407 pojedinaca koji su učestvovali u proceni zdravstvenih rizika: pojedinačne karakteristike, zdravstveni faktori, faktori povezani sa poslom i gubitak produktivnosti na poslu

Table 1. Characteristics of 10,407 participants included in the health risk assessment: individual characteristics, health factors, work related factors, and productivity loss at work

	Žene / *Women* **n = 4,866 (46.8%)** **n (%)**	**Muškarci / *Men*** **n = 5,541 (53.2%)** **n (%)**
Demografski podaci / *Demographics*		
Starosno doba: 18 – 49 godina / *Age: 18 – 49 years*	2,629 (54.0)	2,239 (40.4)
Starosno doba: ≥ 50 godina / *Age: ≥ 50 years*	2,237 (46.0)	3,302 (59.6)
Nivo obrazovanja: niže obrazovanje / *Education level: low*	981 (20.2)	697 (12.6)
Nivo obrazovanja: srednje/više i visoko obrazovanje / *Education level: medium/high*	3,885 (79.8)	4,844 (87.5)
Bračno stanje: u braku/vanbračnoj zajednici naspram ostalog / *Marital status: married/cohabiting vs. other*	3,627 (74.5)	4,658 (84.1)
Fizički faktori povezani sa poslom / *Physical work-related factors*		
Izloženost vibracijama > 5 godina / *Exposure to vibration > 5 years*	17 (0.3)	82 (1.5)
Dnevno podizanje/guranje/vučenje teškog tereta / ***Daily lifting/pushing/pulling heavy weight***	508 (10.4)	193 (3.5)
Neprirodni položaji leđa u trajanju od više od dva sata dnevno / ***Awkward back postures more than two hours daily***	542 (11.1)	392 (7.1)
Psihosocijalni faktori povezani sa poslom / *Psychosocial work-related factors*		
Povećani zahtevi na radnom mestu / *Higher job demands*	2,025 (41.6)	20,817 (37.6)
Niži stepen autonomije na radnom mestu / *Lower autonomy*	1,542 (31.7)	1,275 (23.0)
Niži stepen mogućnosti primene i razvoja veština / *Lower skill discretion*	1,529 (31.4)	1,312 (23.7)
Niži nivo socijalne podrške od strane nadređenog / *Lower social support by supervisor*	1,641 (33.7)	2,008 (36.2)
Zdravstveni problemi / *Health problems*		
Kardiovaskularni poremećaji / *Cardiovascular health problems*	775 (15.9)	1,170 (21.1)
Mišićno-koštani poremećaji / *Musculoskeletal disorders*	1,241 (25.5)	991 (17.9)
Psihološki poremećaji / *Psychological disorders*	500 (10.3)	365 (6.6)
Karcinom / *Cancer*	279 (5.7)	189 (3.4)
Drugo / *Other*	1,418 (29.1)	1,294 (23.4)
Barem jedan zdravstveni problem / *At least one health problem*	2,809 (57.7)	2,777 (50.1)
Odsustvovanje sa posla zbog bolovanja u prethodnih godinu dana / *Sickness absence in the previous year*		
Bez odsustvovanja (0 dana) / *None (0 days)*	2,125 (43.7)	2,681 (48.4)
Kratkotrajno (1 - 9 dana) / *Short-term (1 - 9 days)*	2,016 (41.4)	2,207 (39.8)
Dugotrajno (≥ 10 dana) / *Long-term (≥ 10 days)*	725 (14.9)	653 (11.8)
Gubitak produktivnosti na poslu / *Productivity loss at work*		
Bez gubitka produktivnosti na poslu / *No productivity loss at work*	3,149 (64.7)	3,528 (63.7)
Gubitak produktivnosti na poslu od 10 % - 20% / *Productivity loss at work of 10% - 20%*	1,133 (23.3)	1,266 (22.8)
Gubitak produktivnosti na poslu od 30% i više / *Productivity loss at work of 30% and more*	584 (12.0)	747 (13.5)

U tekstu: / *In the text:*

	1 – 9 dana odsustvovanja sa posla zbog bolovanja / *1 – 9 days of sickness absence*	**10 dana ili više odsustvovanja sa posla zbog bolovanja / *10 days or more of sickness absence***	**10% – 20% gubitka produktivnosti na poslu / *10% – 20% productivity loss at work***	**≥ 30% gubitka produktivnosti na poslu / *≥ 30% productivity loss at work***
Žene (naspram muškaraca) / ***Women (vs. men)***	1.08 (1.03 – 1.13)*	1.30 (1.18 – 1.43)*	1.00 (0.94 – 1.07)	0.90 (0.81 – 0.99)*
Žene (naspram muškaraca) prilagođeno prema starosnom dobu / ***Women (vs. men)*** *age adjusted*	1.06 (1.01 – 1.11)*	1.33 (1.21 – 1.46)*	1.01 (0.94 – 1.08)	0.90 (0.81 – 0.99)*

cijalnih fakora povezanih sa poslom i zdravstvenih problema (Model 5). Šesti model je u sebi sadržao Osnovni model, te fizičke i psihosocijalne faktore povezane sa poslom, kao i zdravstvene probleme, zajedno (Model 6). Izračunali smo procentualnu promenu u odnosima prevalencije za prilagođene rodne povezanosti (Modeli od 1 do 6), primenom formule $((OP_{(\text{povezanost za Osnovni model})} - OP_{(\text{Modeli 2 – 6})})/(OP_{(\text{povezanost za Osnovni model})} -1))100)$ [26]. Sve analize su sprovedene u programu *SPSS V22*.

REZULTATI

Rezultati studije pokazuju da su žene češće prijavljivale svakodnevno susretanje sa podizanjem, guranjem i/ili vučenjem teških tereta, nižim stepenom autonomije na poslu i nižim stepenom mogućnosti primene i razvoja veština (Tabela 1). Žene su takođe češće prijavljivale sve vrste zdravstvenih problema, osim kardiovaskularne probleme (žene 15,9% naspram muškaraca 21,1%). Muškarci su češće prijavljivali izloženost vibracijama na poslu u trajanju dužem od pet godina kao i manju socijalnu podršku od strane nadređenog.

prevalent among men (13.5% vs. 12.0%). The correlation between sickness absence and productivity loss at work in the total population was low ($r_s = 0.09$), and even lower between the occurrence of any health problem and the presence of at least one strenuous physical or psychosocial work-related factor, calculated separately for women and men ($r_s = 0.05$), (not presented in a table).

Short-term and long-term sickness absence

Women more often reported short-term sickness absence (PR 1.08, 95% CI 1.03 – 1.13), as well as long-term sickness absence (PR 1.30, 95% CI 1.18 – 1.43), than men (not presented in a table). All psychosocial factors, except higher job demands, were associated with short-term sickness absence among both men and women, and more strongly with long-term sickness absence (Table 2). Physical factors were not associated with long-term sickness absence and showed contradictory associations for short-term sickness absence among women. While exposure to vibrations increased the likelihood of short-term sickness absence among women (not statistically significant), exposure

Tabela 2. Prilagođene povezanosti između demografskih karakteristika, zdravstvenih problema i faktora povezanih sa poslom i odsustvovanja sa posla zbog bolovanja, među ženama (n = 4.866) i muškarcima (n = 5.541)

Table 2. Adjusted associations between demographic characteristics, health problems, and work-related factors and sickness absence among women (n = 4,866) and men (n = 5,541)

	Odsustvovanje sa posla zbog bolovanja / *Sickness absence* 1 – 9 dana / *1 – 9 days*		**Odsustvovanje sa posla zbog bolovanja / *Sickness absence* 10 ili više dana / *10 or more days***	
	Žene / *Women* (n = 2,016) PR (95% CI)	**Muškarci / *Men* (n = 2,207) PR (95% CI)**	**Žene / *Women* (n = 725) PR (95% CI)**	**Muškarci / *Men* (n = 653) PR (95% CI)**
Fizički faktori povezani sa poslom / *Physical work-related factors*				
Vibracije / *Vibration*	1.47 (1.08 – 2.00)*	1.10 (0.87 – 1.39)	1.42 (0.44 – 4.57)	1.21 (0.73 – 1.99)
Podizanje tereta/guranje tereta / *Lifting/pushing*	0.83 (0.74 – 0.94)*	0.94 (0.79 – 1.12)	1.04 (0.86 – 1.27)	1.05 (0.74 – 1.48)
Neprirodni položaji leđa / *Awkward back postures*	0.89 (0.80 – 0.99)*	1.03 (0.92 – 1.16)	1.16 (0.96 – 1.39)	1.17 (0.92 – 1.49)
Psihosocijalni faktori povezani sa poslom / *Psychosocial work-related factors*				
Povećani zahtevi na radnom mestu / *Higher job demands*	1.05 (0.98 – 1.11)	1.01 (0.94 – 1.07)	1.14 (1.00 – 1.29)	0.98 (0.85 – 1.13)
Niži stepen autonomije na radnom mestu / *Lower autonomy*	1.06 (1.00 – 1.14)	1.17 (1.09 – 1.25)*	1.35 (1.19 – 1.53)*	1.81 (1.57 – 2.08)*
Niži stepen mogućnosti primene i razvoja veština / *Lower skill discretion*	1.11 (1.04 – 1.19)*	1.24 (1.16 – 1.33)*	1.34 (1.18 – 1.52)*	1.95 (1.70 – 2.25)*
Niži nivo socijalne podrške / *Lower social support*	1.09 (1.02 – 1.16)*	1.15 (1.08 – 1.23)*	1.23 (1.08 – 1.40)*	1.57 (1.37 – 1.80)*
Zdravstveni problemi / *Health problems*				
Kardiovaskularni poremećaji / *Cardiovascular*	1.07 (0.98 – 1.17)	1.11 (1.03 – 1.20)*	1.43 (1.23 – 1.65)*	2.08 (1.81 – 2.41)*
Mišićno-koštani poremećaji / *Musculoskeletal*	1.24 (1.16 – 1.33)*	1.17 (1.09 – 1.27)*	2.37 (2.10 – 2.67)*	2.39 (2.09 – 2.73)*
Psihološki poremećaji / *Psychological*	1.36 (1.25 – 1.49)*	1.38 (1.23 – 1.54)*	3.12 (2.79 – 3.49)*	3.98 (3.51 – 4.51)*
Karcinom / *Cancer*	1.14 (1.00 – 1.29)	0.90 (0.74 – 1.11)	1.53 (1.24 – 1.88)*	1.69 (1.30 – 2.19)*
Drugo / *Other*	1.24 (1.17 – 1.32)*	1.28 (1.20 – 1.37)*	2.16 (1.91 – 2.44)*	2.18 (1.90 – 2.49)*
1 zdravstveni problem / 1 health problem	1.21 (1.13 – 1.31)*	1.18 (1.10 – 1.27)*	2.79 (2.28 – 3.41)*	3.24 (2.64 – 3.97)*
2 ili više zdravstvenih problema / 2 or more health problems	1.44 (1.33 – 1.56)*	1.38 (1.27 – 1.50)*	5.44 (4.50 – 6.57)*	6.28 (5.17 – 7.64)*

*$p < 0,05$, prilagođeno prema starosnom dobu, nivou obrazovanja, bračnom stanju

*$p < 0.05$, adjusted for age, educational level, and marital status

I kratkotrajno (do 9 dana) i dugotrajno (10 dana i duže) odsustvovanje sa posla zbog bolovanja je bilo učestalije među ženama (41,4% naspram 39,8%, i 14,9% naspram 11,8%), dok je gubitak produktivnosti na poslu od 30% i više bilo češće među muškarcima (13,5% naspram 12,0%). Korelacija između odsustvovanja sa posla zbog bolovanja i gubitka produktivnosti na poslu u ukupnoj populaciji je bila niska (r_s = 0,09), a bila je i još niža između postojanja bilo kojeg zdravstvenog problema i prisustva barem jednog opterećujućeg fizičkog ili psihosocijalnog faktora povezanog sa poslom, što je obračunato posebno za žene i muškarce (r_s = 0,05), (nije predstavljeno u tabeli).

Kratkotrajno i dugotrajno odsustvovanje sa posla zbog bolovanja

Žene su češće prijavljivale kratkotrajno odsustvovanje sa posla zbog bolovanja (OP 1,08, 95% IP 1,03 – 1,13), kao i dugotrajno odsustvovanje sa posla zbog bolovanja (OP 1,30, 95% IP 1,18 – 1,43), nego muškarci (nije predstavljeno u tabeli). Svi psihosocijalni faktori, osim povećanih zahteva na radnom mestu, bili su povezani sa kratkotrajno odsustvovanje sa posla zbog bolovanja, među ženama (n = 4.866) i muškarcima (n = 5.541)

to awkward back postures or lifting/pushing was associated with a lower likelihood of short-term sickness absence. Regarding health problems, patterns of associations with sickness absence were similar in women and men: the presence of health problems increased the likelihood of sickness absence.

Small and large productivity loss at work

Small productivity loss at work was not associated with gender. However, in contrast to sickness absence, productivity loss at work of ≥ 30% was reported by women less often than by men (PR 0.90, 95% CI 0.81 - 0.99), (not presented in a table). Psychosocial work factors and health problems, except cancer, were associated with large productivity loss at work, in both men and women (Table 3). The presence of one health problem (mostly a psychological disorder) and, in particular, two or more health problems, was statistically significantly associated with the likelihood of having ≥ 30% productivity loss at work. Cardiovascular health problems were only associated with productivity loss at work among men.

Tabela 3. Prilagođene povezanosti između demografskih karakteristika, zdravstvenih problema i faktora povezanih sa poslom i odsustvovanja sa posla zbog bolovanja, među ženama (n = 4.866) i muškarcima (n = 5.541)

Table 3. Adjusted associations between demographic characteristics, health problems, and work-related factors and productivity loss at work among women (n = 4,866) and men (n = 5,541)

	10 – 20% gubitka produktivnosti na poslu / *10 – 20% productivity loss at work*		**≥ 30% gubitka produktivnosti na poslu / *≥ 30% productivity loss at work***	
	Žene / *Women* (n = 1,133) PR (95% CI)	**Muškarci / *Men* (n = 1,351) PR (95% CI)**	**Žene / *Women* (n = 584) PR (95% CI)**	**Muškarci / *Men* (n = 806) PR (95% CI)**
Fizički faktori povezani sa poslom / *Physical work-related factors*				
Vibracije / *Vibration*	1.25 (0.62 – 2.56)	0.96 (0.66 – 1.42)	1.10 (0.30 – 3.99)	0.53 (0.25 – 1.15)
Podizanje tereta/guranje tereta / *Lifting/pushing*	0.73 (0.60 – 0.88)*	0.70 (0.51 – 0.95)*	0.68 (0.51 – 0.90)*	0.86 (0.60 – 1.24)
Neprirodni položaji leđa / *Awkward back postures*	0.93 (0.79 – 1.10)	1.11 (0.93 – 1.32)	1.04 (0.82 – 1.30)	1.13 (0.88 – 1.43)
Psihosocijalni faktori povezani sa poslom / *Psychosocial work-related factors*				
Povećani zahtevi na radnom mestu / *Higher job demands*	1.20 (1.08 – 1.33)*	1.00 (0.91 – 1.11)	1.48 (1.27 – 1.72)*	1.18 (1.03 – 1.35)*
Niži stepen autonomije na radnom mestu / *Lower autonomy*	0.93 (0.83 – 1.04)	1.07 (0.96 – 1.20)	1.34 (1.15 – 1.56)*	1.27 (1.10 – 1.47)*
Niži stepen mogućnosti primene i razvoja veština / *Lower skill discretion*	1.07 (0.96 – 1.19)	1.27 (1.14 – 1.42)*	1.40 (1.20 – 1.63)*	1.85 (1.62 – 2.12)*
Niži nivo socijalne podrške / *Lower social support*	1.31 (1.19 – 1.45)*	1.35 (1.23 – 1.48)*	1.77 (1.53 – 2.05)*	1.69 (1.49 – 1.93)*
Zdravstveni problemi / *Health problems*				
Kardiovaskularni poremećaji / *Cardiovascular*	1.12 (0.98 – 1.29)	1.22 (1.09 – 1.36)*	1.12 (0.92 – 1.37)	1.29 (1.11 – 1.51)*
Mišićno-koštani poremećaji / *Musculoskeletal*	1.14 (1.02 – 1.27)*	1.15 (1.02 – 1.29)*	1.43 (1.23 – 1.68)*	1.17 (1.00 – 1.38)
Psihološki poremećaji / *Psychological*	1.29 (1.11 – 1.50)*	1.34 (1.13 – 1.58)*	2.23 (1.88 – 2.65)*	2.01 (1.68 – 2.41)*
Karcinom / *Cancer*	1.05 (0.85 – 1.29)	1.00 (0.76 – 1.29)	1.09 (0.80 – 1.48)	1.16 (0.73 – 1.62)
Drugo / *Other*	1.12 (1.00 – 1.24)*	1.10 (0.99 – 1.22)	1.19 (1.02 – 1.39)*	1.28 (1.11 – 1.48)*
1 zdravstveni problem / 1 health problem	1.06 (0.95 – 1.20)	1.06 (0.95 – 1.18)	1.21 (1.01 – 1.46)*	1.29 (1.11 – 1.50)*
2 ili više zdravstvenih problema / 2 or more health problems	1.24 (1.09 – 1.41)*	1.29 (1.14 – 1.45)*	1.79 (1.49 – 2.16)*	1.62 (1.37 – 1.91)*

*$p < 0,05$, prilagođeno prema starosnom dobu, nivou obrazovanja, bračnom stanju

*$p < 0.05$, adjusted for age, educational level, and marital status

nim odsustvovanjem sa posla zbog bolovanja i među muškarcima i među ženama, a još snažnije sa dugotrajnim odsustvovanjem sa posla zbog bolovanja (Tabela 2). Fizički faktori nisu bili povezani sa dugotrajnim odsustvovanjem sa posla zbog bolovanja i pokazali su kontradiktorne povezanosti po pitanju kratkotrajnog odsustvovanja sa posla zbog bolovanja među ženama. Dok je izloženost vibracijama povećala verovatnoću kratkotrajnog odsustvovanja sa posla zbog bolovanja među ženama (ne statistički značajno), izloženost neprirodnim položajima leđa ili podizanju/guranju tereta bila je povezana sa manjom verovatnoćom kratkotrajnog odsustvovanja sa posla zbog bolovanja. Kada su u pitanju zdravstveni problemi, obrasci povezanosti sa odsustvovanjem sa posla zbog bolovanja su bili slični kod muškaraca i žena: postojanje zdravstvenih problema povećalo je verovatnoću odsustvovanja sa posla zbog bolovanja.

Manji i veći gubitak produktivnosti na poslu

Manji gubitak produktivnosti na poslu nije bio povezan sa rodom. Međutim, za razliku od odsustvovanja sa posla zbog bolovanja, gubitak produktivnosti na poslu

Analysis of gender differences in sickness absence and in productivity loss at work

Adding physical work-related factors to the Basic Model did not explain gender differences in sickness absence (PR 1.06, 95% CI 1.02 – 1.11, Model 2), (Table 4). In comparison, a 20% reduction, i.e., percentage change in PRs between the Basic Model and the additional models, was achieved after additional adjustment for psychosocial work-related factors (Model 3), and 60% after adjustment for health problems (Model 4). A total of 80% of the gender difference was explained by individual characteristics, psychosocial work-related factors, and health problems (Model 5, PR 1.01, 95% CI 0.97 – 1.06). Adding physical work-related factors to this model reduced the mediating influence of all factors together to 60% (Model 6). Similar results were obtained for gender differences in long-term sickness absence (Table 4).

Compared to men, women were less likely to report higher productivity loss at work (PR 0.87, 95% CI 0.78 – 0.96), regardless of age, education, ethnicity, and marital status. Further adjustment for physical and

Tabela 4. Multinomalna regresiona analiza povezanosti između roda, odsustvovanja sa posla zbog bolovanja, i gubitka produktivnosti na poslu, prilagođena za određene faktore

Table 4. Multinomial regression analysis of associations between gender, sickness absence and productivity loss at work, adjusted for a number of factors

		Odsustvovanje sa posla zbog bolovanja / *Sickness absence*				Gubitak produktivnosti na poslu / *Productivity loss at work*	
		1 – 9 dana / *1 – 9 days* (n = 4,449) PR (95% CI)	% promene u OP / *% of change in PR*	10 ili više dana / *10 or more days* (n = 1,452) PR (95% CI)	% promene u OP / *% of change in PR*	≥ 30% gubitka produktivnosti na poslu / *≥ 30% productivity loss at work* (n = 1,434) PR (95% CI)	% promene u OP / *% of change in PR*
Model 1							
rod + starosno doba + obrazovanje + etnička pripadnost + bračno stanje (*Osnovni model*)	*Gender + age + education + ethnicity + marital status (Basic Model)*	1.05 (1.01 – 1.10)	Ref.	1.26 (1.14 – 1.38)	Ref.	0.87 (0.78 – 0.96)	Ref.
Model 2							
Osnovni model + fizički faktori povezani sa poslom	*Basic Model + physical work-related factors*	1.06 (1.02 – 1.11)	20%	1.26 (1.14 – 1.38)	0%	0.88 (0.79 – 0.97)	-8%
Model 3							
Osnovni model + psihosocijalni faktori povezani sa poslom	*Basic Model + psychosocial work-related factors*	1.04 (0.99 – 1.09)	-20%	1.21 (1.10 – 1.33)	-19%	0.84 (0.76 – 0.93)	23%
Model 4							
Osnovni model + zdravstveni problemi	*Basic Model + health problems*	1.02 (0.98 – 1.07)	-60%	1.08 (0.99 – 1.18)	-69%	0.82 (0.74 – 0.91)	39%
Model 5							
Osnovni model + psihosocijalni faktori povezani sa poslom + zdravstveni problemi	*Basic Model + psychosocial work-related factors + health problems*	1.01 (0.97 – 1.06)	-80%	1.06 (0.97 – 1.16)	-77%	0.81 (0.73 – 0.89)	46%
Model 6							
Osnovni model + psihosocijalni I fizički faktori povezani sa poslom + zdravstveni problemi	*Basic Model + psychosocial AND physical work-related factors + health problems*	1.02 (0.98 – 1.07)	-60%	1.07 (0.98 – 1.17)	-73%	0.82 (0.74 – 0.91)	39%

od ≥ 30% bio je prijavljivan od strane žena ređe nego od strane muškaraca (OP 0,90, 95% IP 0,81 – 0,99), (nije predstavljeno u tabeli). Psihosocijalni faktori povezani sa poslom i zdravstveni problemi, osim kancera, bili su povezani sa većim gubitkom produktivnosti na poslu, i kod žena i kod muškaraca (Tabela 3). Prisustvo jednog zdravstvenog problema (uglavnom psihološki poremećaji), a posebno dva ili više zdravstvena problema, bilo je značajno statistički povezano sa verovatnoćom gubitka produktivnosti na poslu od preko 30%. Kardiovaskularni zdravstveni problemi su bili povezani samo sa gubitkom produktivnosti na poslu među muškarcima.

Analiza rodnih razlika u odsustvovanju sa posla i u gubitku produktivnosti na poslu

Dodavanje fizičkih faktora povezanih sa poslom Osnovnom modelu nije objasnilo rodne razlike u odsustvovanju sa posla zbog bolovanja (OP 1,06, 95% IP 1,02 – 1,11, Model 2), (Tabela 4). Sa druge strane, smanjenje od 20%, odnosno procentualna promena u odnosima prevalencije između Osnovnog modela i dodatnih modela, ostvarena je nakon dodatnog prilagođavanja za psihosocijalne faktore povezane sa poslom (Model 3), i od 60% nakon prilagođavanja za zdravstvene probleme (Model 4). Ukupno 80% rodne razlike objašnjeno je pojedinačnim karakteristikama, psihosocijalnim faktorima povezanim sa poslom i zdravstvenim problemima (Model 5, OP 1,01, 95% IP 0,97 – 1,06). Dodavanje fizičkih faktora povezanih sa poslom ovom modelu smanjilo je posredni uticaj svih faktora zajedno na 60% (Model 6). Slični rezultati su dobijeni za rodne razlike kod dugotrajnog odsustvovanja sa posla zbog bolovanja (Tabela 4).

U poređenju sa muškarcima, žene su ređe prijavljivale veći gubitak produktivnosti na poslu (OP 0,87, 95% IP 0,78 – 0,96), bez obzira na životno doba, nivo obrazovanja, etničku pripadnost ili bračno stanje. Dalje prilagođavanje za fizičke i psihosocijalne faktore povezane sa poslom i zdravstvene probleme nije pružilo objašnjenje za ove rodne razlike.

DISKUSIJA

Ova studija pokazuje da su žene prijavljivale više odsustvovanja sa posla zbog bolovanja ali i manje gubitka produktivnosti na poslu, u odnosu na muškarce. Gotovo jedna petina (19%) razlike u dugotrajnom odsustvovanju sa posla zbog bolovanja između žena i muškaraca mogla se objasniti psihosocijalnim faktorima povezanim sa poslom, a gotovo 70% (69%) bi se mogla objasniti zdravstvenim problemima. Kombinacija psihosocijalnih faktora povezanih sa poslom i zdravstvenih problema mogla je da objasni okvirno 80% rodne razlike u pogledu odsustvovanja sa posla zbog bolovanja. Nasuprot tome, zdravstveni problemi ili faktori psihosocijalnog rada i zdravstveni problemi nisu objasnili ove rodne razlike.

DISCUSSION

This study shows that women reported more sickness absence but less productivity loss at work than men. Almost one fifth (19%) of the difference in long-term sickness absence between women and men could be explained by psychosocial work-related factors, and almost 70% (69%) by health problems. The combination of psychosocial work factors and health problems could explain roughly 80% of the gender difference in sickness absence. In contrast, health problems or work-related factors did not explain gender differences in large productivity loss at work.

The major strength of this study is the size of our study population (n = 10,407). Another strength is that this study provides insight into sickness absence and productivity loss at work simultaneously. Since just sickness absences (but not productivity loss at work) are usually noticed and registered at the workplace, this could create a blind spot for employers.

The results regarding sickness absence are in line with a consistently reported higher prevalence of sickness absence among women in other studies. This is mainly mediated by higher morbidity among women, as compared to men [6,27–30]. However, it seems that factors other than morbidity or occupational environment influence differences in productivity loss at work between men and women. Higher productivity loss at work by men, as compared to women, was also reported by Van den Heuvel [31], but not in some other studies [32–34]. Altogether, differences in results regarding productivity loss at work seem to be related to whether measured productivity loss at work was focused on health-related productivity loss at work or productivity loss at work in general. This finding might confirm the theory that there are different mechanisms of responses to distress among women and men, which is described as 'illness behavior' [35]. In our study, women were more exposed to distress by the perceived occupational environment (psychosocial work-related factors). However, it seems that, with regard to productivity loss at work, these factors do not make a difference in women, as compared to men.

Increased sickness absence and productivity loss at work were found for all the studied health problems, as compared to individuals without a particular health problem. This is in line with other publications on various medical conditions, such as rheumatoid or inflammatory arthritis [36,37], diabetes [38,39], psychological disorders or depression [29,40], and cancer [41]. However, some authors found no gender differences in

povezani sa poslom nisu mogli da objasne rodne razlike po pitanju velikih gubitaka produktivnosti na poslu.

Glavni kvalitet ove studije leži u veličini naše ispitivane populacije (n = 10.407). Još jedan kvalitet studije je taj što ona pruža istovremeni uvid u odsustvovanje sa posla zbog bolovanja i gubitak produktivnosti na poslu. Pošto se samo odsustvovanja sa posla zbog bolovanja (ali ne i gubitak produktivnosti na poslu) obično primećuju i registruju na radnom mestu, ovo bi moglo da predstavlja „mrtvi ugao" za poslodavce.

Rezultati koji se tiču odsustvovanja sa posla zbog bolovanja su u skladu sa stalnim izveštajima o većoj prevalenciji odsustvovanja sa posla zbog bolovanja među ženama u drugim studijama. Ovo je najčešće posredovano višim morbiditetom među ženama u odnosu na muškarce [6,27–30]. Međutim, čini se da drugi faktori osim morbiditeta i radnog okruženja utiču na razlike u gubitku produktivnosti na poslu između muškaraca i žena. Veći gubitak produktivnosti na poslu među muškarcima, u poređenju sa ženama, opisan je i u studiji Van den Hevela [31], ali ne i u nekim drugim studijama [32–34]. Sve u svemu, deluje da su razlike u rezultatima po pitanju gubitka produktivnosti na poslu povezani sa tim da li je mereni gubitak produktivnosti na poslu bio usmeren na gubitak produktivnosti na poslu povezan sa zdravstvenim problemima ili na gubitak produktivnosti na poslu uopšte. Ovaj nalaz mogao bi da potvrdi teoriju da postoje različiti mehanizmi odgovora na nepovoljne uslove kod žena i muškaraca, koji se opisuje kao „ponašanje u bolesti" (engl. '*illness behavior*') [35]. U našoj studiji, žene su više bile izložene negativnom uticaju percipiranog radnog okruženja (psihosocijalni faktori povezani sa poslom). Međutim, deluje da, kada je u pitanju gubitak produktivnosti na poslu, ovi faktori ne dovode do razlika između žena i muškaraca.

Povećano odsustvovanje sa posla zbog bolovanja i povećani gubitak produktivnosti na poslu utvrđeni su kod svih ispitivanih zdravstvenih problema, u poređenju sa pojedincima koji nisu imali neki konkretan zdravstveni problem. Ovo je u skladu sa drugim publikacijama koje se bave različitim medicinskim stanjima, kao što su reumatoidni ili inflamatorni artritis [36,37], dijabetes [38,39], psihološki poremećaji ili depresija [29,40] i kancer [41]. Međutim, neki autori su ustanovili da nema rodnih razlika u odsustvovanju sa posla zbog bolovanja ili gubitku produktivnosti na poslu povezanim sa zdravstvenim stanjem [37], dok su drugi autori objavili da žene trpe veće gubitke od muškaraca [29,42]. Takođe, postoje dokazi da smenski rad utiče na žene negativnije nego na muškarce, kada je u pitanju gubitak produktivnosti na poslu [43].

Psihosocijalni faktori povezani sa poslom i zdravstveni problemi mogli su u velikoj meri da objasne

sickness absence or health-related productivity loss at work [37], while others reported that women suffered more loss than men [29,42]. There is also evidence that shift work affects women more negatively than men when productivity loss at work is concerned [43].

Psychosocial work-related factors and health problems could largely explain differences between men and women regarding longer sickness absence, but they did not explain gender differences regarding productivity loss at work. The results may suggest that women tend to choose to call in sick, in case of unwell-being as the result of work-related or health factors, while men more often stay at work, although their productivity goes down. In other studies, combining paid work with domestic and caregiver tasks and responsibilities was mentioned as potentially affecting women more than men in their choices regarding sickness absence [34]. Our study suggests that gender differences in sickness absence are mainly due to occupational factors and health. However, gender differences regarding large productivity loss at work could not be explained by these factors, so further research is needed in this field, especially because productivity loss at work is associated with significant costs and is known as a predictor of future long-term sickness absence [12]. To improve sustainable employability at the level of both individuals and organizations, the focus should be on the prevention and adequate treatment of health problems and on addressing psychosocial factors at work. Additionally, bearing in mind the fact that women, in general, work fewer hours per week than men, and have less productivity loss at work, the practical implication could be considering shortening the expected working week. A systematic review conducted by Voglino et al., in 2022, already proved the positive impact of reduced working hours on the quality of life at work, sleep, and stress [44]. However, work flexibility, which combines work from home and at the office, might have a different impact on women and men [45], and international, culture-specific research might inform national decision-makers about the optimal working schemes.

Many intervention studies taking place in the work environment are addressing these factors, and their results are promising, although there are many different ways of studying changes in psychosocial work-related factors, and a lot of gaps in knowledge still exist [46–49]. In addition, workplace interventions to improve employees' health and reduce sickness absence should look at men and women separately, in order to realize and maximize their effectiveness and cost-effectiveness.

This study has some limitations as well. Due to the cross-sectional design, we cannot assume any causal,

razlike između žena i muškaraca po pitanju dužih odsustvovanja sa posla zbog bolovanja, ali nisu pružili objašnjenje za rodne razlike po pitanju gubitka produktivnosti na poslu. Rezultati mogu upućivati na to da žene imaju tendenciju da otvore bolovanje u slučaju da se ne osećaju dobro usled faktora povezanih sa poslom ili usled zdravstvenih problema, dok muškarci češće ostaju na poslu, iako im produktivnost opada. U drugim studijama, kombinovanje plaćenog posla sa kućnim poslovima, te poslovima i obavezama oko lica izdržavanih od strane zaposlenih pomenuto je kao nešto što potencijalno više ima uticaja na žene nego na muškarce, kada prave izbor po pitanju odsustvovanja sa posla zbog bolovanja [34]. Naša studija ukazuje na to da rodne razlike u odsustvovanju sa posla zbog bolovanja prevashodno potiču od faktora povezanih sa zanimanjem i zdravstvenih faktora. Međutim, ovi faktori nisu mogli da objasne rodne razlike po pitanju većeg gubitka produktivnosti na poslu, te je dalje istraživanje na ovom polju neophodno, posebno zato što je gubitak produktivnosti na poslu povezan sa značajnim troškovima, ali i zbog toga što je to poznati prediktor budućeg dugoročnog odsustvovanja sa posla zbog bolovanja [12]. Kako bi se unapredila održiva zaposlenost i na pojedinačnom i na organizacionom nivou, pažnju treba usmeriti na prevenciju i adekvatno lečenje zdravstvenih problema, kao i na rešavanje psihosocijalnih faktora na poslu. Takođe, imajući u vidu činjenicu da žene, opšte uzev, rade manji broj sati nedeljno od muškaraca, a da imaju manji gubitak produktivnosti na poslu, praktična implikacija bi mogla biti razmatranje skraćivanja očekivane radne nedelje. Sistematski pregled koji su sproveli Voglino i saradnici, 2022. godine, već je dokazao pozitivno dejstvo smanjenja broja radnih sati na kvalitet života na radnom mestu, kao i na spavanje i nivo stresa [44]. Međutim, fleksibilnost na poslu, koja omogućava kombinovanje rada od kuće i na radnom mestu, mogla bi da ima različito dejstvo na žene i muškarce [45], a međunarodno istraživanje, specifično za različite kulture, moglo bi da donese saznanja koja bi pomogla donosiocima odluka na nacionalnom nivou pri određivanju optimalnih obrazaca rada.

Mnoge interventne studije koje se sprovode u radnom okruženju bave se ovim faktorima, i njihovi rezultati obećavaju, mada postoji mnogo različitih načina za proučavanje promena u psihosocijalnim faktorima povezanim sa poslom, a još uvek postoji i mnogo praznina u saznanjima iz ove oblasti [46–49]. Takođe, intervencije na radnom mestu koje su usmerene na unapređivanje zdravlja zaposlenih i smanjivanje odsustvovanja sa posla zbog bolovanja, trebalo bi da analiziraju žene i muškarce odvojeno, kako bi bile maksimalno delotvorne i isplative.

one-way relationship between exposure to adverse psychosocial work-related factors, health problems, and sickness absence, as they actually might be reciprocal to each other. Another concern is the fact that our data on sickness absence were based on self-reporting and might be subject to recall bias. Finally, women in the Netherlands work fewer hours per week than men. Since we did not take work hours per week into account, the weekly cumulative work exposure for women could have been lower than for men. Therefore, if women were equally exposed as men, the cumulative exposure would, in fact, become higher, and future studies should take this into account.

CONCLUSION

Our study suggests that gender differences in sickness absence are mainly due to occupational factors and health. However, gender differences in large productivity loss at work could not be explained by these factors, so further research is needed in this field. Gender-sensitive policies might be needed to recognize the differences in behavioral patterns between men and women.

LIST OF ACRONYMS

IT	Information technology
HRA	Health risk assessment
QQ	Quantity and Quality
WAI	Work ability index
PR	Prevalence ratio

ACKNOWLEDGMENTS

This study was partly funded by the Netherlands Organization for Health Research and Development (ZonMW project number: 208030007) and partly by an Erasmus MC Health Care Efficiency Research grant (Doelm 2013-13110). BD received the Erasmus Mundus–Western Balkans (ERAWEB) scholarship for academic mobility. SR received a fellowship from the Erasmus University Rotterdam.

This study was partly supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (project No 200110). The funders had no role in the study design, data collection and analysis, the decision to publish, or manuscript preparation.

CONFLICT OF INTEREST

R. A. Kraaijenhagen is the director and co-owner of NIPED. Data are from the NIPED Research Foundation, Amsterdam, the Netherlands. This institute developed the Prevention Compass and currently markets it in the Netherlands.

Ova studija ima i nekih ograničenja. S obzirom da je u pitanju studija preseka, ne možemo pretpostaviti bilo kakav uzročno-posledični jednosmerni odnos između izloženosti nepovoljnim psihosocijalnim faktorima povezanim sa poslom, zdravstvenih problema i odsustvovanja sa posla zbog bolovanja, s obzirom da oni zapravo mogu biti međusobno recipročni. Još jedan problem može biti i činjenica da su naši podaci o odsustvovanju sa posla zbog bolovanja bili zasnovani na informacijama koje su prijavili sami ispitanici, te zbog toga mogu biti podložni „pristrasnosti sećanja" (engl. *recall bias*). Najzad, žene u Nizozemskoj rade manji broj sati nedeljno od muškaraca. S obzirom da nismo uzeli broj radnih sati nedeljno u obzir, kumulativna izloženost poslu kod žena je mogla biti niža nego kod muškaraca. Stoga, ako bi žene bile podjednako izložene poslu kao i muškarci, kumulativna izloženost bi, zapravo, postala viša, te bi buduća istraživanja ovo trebalo da uzmu u obzir.

ZAKLJUČAK

Naša studija ukazuje na to da rodne razlike po pitanju odsustvovanja sa posla zbog bolovanja uglavnom proističu iz faktora koji su povezani sa zanimanjem ili zdravljem. Međutim, rodne razlike u većem gubitku produktivnosti na poslu nisu mogle biti objašnjene ovim faktorima, te je potrebno dalje istraživanje u ovoj oblasti. Rodno osetljive politike bi mogle biti potrebne kako bi se prepoznale razlike u obrascima ponašanja između muškaraca i žena.

SPISAK SKRAĆENICA

IT	Informacione tehnologije
PZR	Procena zdravstvenih rizika
QQ	*engl. Quantity and Quality*
IRS	Indeks radne sposobnosti
OP	Odnos prevalencije

IZJAVE ZAHVALNOSTI

Ova studija je delimično finansirana od strane Holandske organizacije za zdravstvena istraživanja i razvoj (*ZonMW* broj projekta: 208030007) a delimično iz sredstava granta *Erasmus MC Health Care Efficiency Research* (*Doelm* 2013-13110). BD je dodeljena stipendija za akademsku mobilnost *Erasmus Mundus–Western Balkans* (*ERAWEB*), dok je SR dodeljena stipendija Erazmus univerziteta u Roterdamu.

Ova studija je delimično finansirana od strane Ministarstva prosvete, nauke i tehnološkog razvoja Republike Srbije (broj projekta: 200110). Finansijeri studije nisu imali nikakvog učešća u osmišljavanju studije, prikupljanju i analizi podataka, odluci o objavljivanju ili pripremi rukopisa.

SUKOB INTERESA

R. A. Kraaijenhagen je direktor i suvlasnik *NIPED* instituta. Podaci su dobijeni od *NIPED* fondacije za istraživanja iz Amsterdama u Nizozemskoj. Ovaj institut je razvio „Kompas prevencije" i trenutno ga plasira u Nizozemskoj.

LITERATURA / *REFERENCES*

1. Zhang W, Bansback N, Anis AH. Measuring and valuing productivity loss due to poor health: A critical review. Soc Sci Med. 2011 Jan;72(2):185-92. doi: 10.1016/j.socscimed.2010.10.026.
2. Helgesson M, Johansson B, Nordqvist T, Lundberg I, Vingård E. Sickness absence at a young age and later sickness absence, disability pension, death, unemployment and income in native Swedes and immigrants. Eur J Public Health. 2015 Aug;25(4):688-92. doi: 10.1093/eurpub/cku250.
3. Alavinia SM, van den Berg TI, van Duivenbooden C, Elders LA, Burdorf A. Impact of work-related factors, lifestyle, and work ability on sickness absence among Dutch construction workers. Scand J Work Environ Health. 2009 Oct;35(5):325-33. doi: 10.5271/sjweh.1340.
4. Laaksonen M, Martikainen P, Rahkonen O, Lahelma E. Explanations for gender differences in sickness absence: evidence from middle-aged municipal employees from Finland. Occup Environ Med. 2008 May;65(5):325-30. doi: 10.1136/oem.2007.033910.
5. Bekker MH, Rutte CG, van Rijswijk K. Sickness absence: A gender-focused review. Psychol Health Med. 2009 Aug;14(4):405-18. doi: 10.1080/13548500903012830.
6. Mastekaasa A. The gender gap in sickness absence: long-term trends in eight European countries. Eur J Public Health. 2014 Aug;24(4):656-62. doi: 10.1093/eurpub/cku075.
7. Hooftman WE, van Poppel MN, van der Beek AJ, Bongers PM, van Mechelen W. Gender differences in the relations between work-related physical and psychosocial risk factors and musculoskeletal complaints. Scand J Work Environ Health. 2004 Aug;30(4):261-78. doi: 10.5271/sjweh.794.
8. de Smet P, Sans S, Dramaix M, Boulenguez C, de Backer G, Ferrario M, et al. Gender and regional differences in perceived job stress across Europe. Eur J Public Health. 2005 Oct;15(5):536-45. doi: 10.1093/eurpub/cki028.
9. Hooftman WE, van der Beek AJ, Bongers PM, van Mechelen W. Gender differences in self-reported physical and psychosocial exposures in jobs with both female and male workers. J Occup Environ Med. 2005 Mar;47(3):244-52. doi: 10.1097/01.jom.0000150387.14885.6b.
10. Campos-Serna J, Ronda-Pérez E, Artazcoz L, Moen BE, Benavides FG. Gender inequalities in occupational health related to the unequal distribution of working and employment conditions: a systematic review. Int J Equity Health. 2013 Aug 5;12:57. doi: 10.1186/1475-9276-12-57.
11. Leijten FR, van den Heuvel SG, Ybema JF, Robroek SJ, Burdorf A. Do work factors modify the association between chronic health problems and sickness absence among older employees? Scand J Work Environ Health. 2013 Sep 1;39(5):477-85. doi: 10.5271/sjweh.3353.
12. Janssens H, Clays E, De Clercq B, De Bacquer D, Braeckman L. The relation between presenteeism and different types of future sickness absence. J Occup Health. 2013;55(3):132-41. doi: 10.1539/joh.12-0164-oa.

13. Robroek SJ, van den Berg TI, Plat JF, Burdorf A. The role of obesity and lifestyle behaviours in a productive workforce. Occup Environ Med. 2011 Feb;68(2):134-9. doi: 10.1136/oem.2010.055962.
14. Robroek SJ, van Lenthe FJ, Burdorf A. The role of lifestyle, health, and work in educational inequalities in sick leave and productivity loss at work. Int Arch Occup Environ Health. 2013 Aug;86(6):619-27. doi: 10.1007/s00420-012-0793-1.
15. Meerding WJ, IJzelenberg W, Koopmanschap MA, Severens JL, Burdorf A. Health problems lead to considerable productivity loss at work among workers with high physical load jobs. J Clin Epidemiol. 2005 May;58(5):517-23. doi: 10.1016/j.jclinepi.2004.06.016.
16. Alavinia SM, Molenaar D, Burdorf A. Productivity loss in the workforce: associations with health, work demands, and individual characteristics. Am J Ind Med. 2009 Jan;52(1):49-56. doi: 10.1002/ajim.20648.
17. Hafner M, van Stolk C, Saunders CL, Krapels J, Baruch B. Health, wellbeing and productivity in the workplace: A Britain's Healthiest Company summary report. Santa Monica, CA: RAND Corporation, 2015. [Internet]. Available from: https://www.rand.org/pubs/research_reports/RR1084.html
18. Brouwer WB, Koopmanschap MA, Rutten FF. Productivity losses without absence: measurement validation and empirical evidence. Health Policy. 1999 Jul;48(1):13-27. doi: 10.1016/s0168-8510(99)00028-7.
19. Strømholm T, Pape K, Ose SO, Krokstad S, Bjørngaard JH. Psychosocial working conditions and sickness absence in a general population: a cohort study of 21,834 workers in Norway (The HUNT Study). J Occup Environ Med. 2015 Apr;57(4):386-92. doi: 10.1097/JOM.0000000000000362.
20. Leijten FR, de Wind A, van den Heuvel SG, Ybema JF, van der Beek AJ, Robroek SJ, et al. The influence of chronic health problems and work-related factors on loss of paid employment among older workers. J Epidemiol Community Health. 2015 Nov;69(11):1058-65. doi: 10.1136/jech-2015-205719.
21. Niessen MA, Laan EL, Robroek SJ, Essink-Bot ML, Peek N, Kraaijenhagen RA, et al. Determinants of participation in a web-based health risk assessment and consequences for health promotion programs. J Med Internet Res. 2013 Aug 9;15(8):e151. doi: 10.2196/jmir.2387.
22. Tuomi K, Ilmarinen J, Jahkola A, Katajarinne L. Work Ability Index. 2nd revised edn. Helsinki: Finnish Institute of Occupational Health; 1998. [Internet]. Available from: https://eprovide.mapi-trust.org/instruments/wai
23. Van Nieuwenhuyse A, Somville PR, Crombez G, Burdorf A, Verbeke G, Johannik K, et al. The role of physical workload and pain related fear in the development of low back pain in young workers: evidence from the BelCoBack Study; results after one year of follow up. Occup Environ Med 2006;63(1):45-52. doi: http://dx.doi.org/10.1136/oem.2004.015693
24. Van Veldhoven M, Meijman T. Het meten van psychosociale arbeidsbelasting met een vragenlijst: de Vragenlijst Beleving en Beoordeling van de Arbeid (VBBA) (Dutch Questionnaire on psychosocial job demands and job stress). NIA, Amsterdam (Published in Dutch). 1994. ISBN: 906365085X. [Internet]. Available from: http://resolver.tudelft.nl/uuid:d231f2f3-8574-4e77-862b-4abe1ebd4df5
25. Reeuwijk KG, Robroek SJ, Niessen MA, Kraaijenhagen RA, Vergouwe Y, Burdorf A. The Prognostic Value of the Work Ability Index for Sickness Absence among Office Workers. PLoS One. 2015 May 27;10(5):e0126969. doi: 10.1371/journal.pone.0126969.
26. Richter M, Moor I, van Lenthe FJ. Explaining socioeconomic differences in adolescent self-rated health: the contribution of material, psychosocial and behavioural factors. J Epidemiol Community Health. 2012 Aug;66(8):691-7. doi: 10.1136/jech.2010.125500.
27. Lesuffleur T, Chastang JF, Sandret N, Niedhammer I. Psychosocial factors at work and sickness absence: results from the French national SUMER survey. Am J Ind Med. 2014 Jun;57(6):695-708. doi: 10.1002/ajim.22317.
28. Eng A, 't Mannetje A, McLean D, Ellison-Loschmann L, Cheng S, Pearce N. Gender differences in occupational exposure patterns. Occup Environ Med. 2011 Dec;68(12):888-94. doi: 10.1136/oem.2010.064097.
29. Laaksonen M, Mastekaasa A, Martikainen P, Rahkonen O, Piha K, Lahelma E. Gender differences in sickness absence--the contribution of occupation and workplace. Scand J Work Environ Health. 2010 Sep;36(5):394-403. doi: 10.5271/sjweh.2909.
30. Bryngelson A, Bacchus Hertzman J, Fritzell J. The relationship between gender segregation in the workplace and long-term sickness absence in Sweden. Scand J Public Health. 2011 Aug;39(6):618-26. doi: 10.1177/1403494811414242.
31. van den Heuvel SG, Geuskens GA, Hooftman WE, Koppes LL, van den Bossche SN. Productivity loss at work; health-related and work-related factors. J Occup Rehabil. 2010 Sep;20(3):331-9. doi: 10.1007/s10926-009-9219-7.
32. Hansen CD, Andersen JH. Going ill to work--what personal circumstances, attitudes and work-related factors are associated with sickness presenteeism? Soc Sci Med. 2008 Sep;67(6):956-64. doi: 10.1016/j.socscimed.2008.05.022.
33. Padkapayeva K, Chen C, Bielecky A, Ibrahim S, Mustard C, Beaton D, et al. Male-Female Differences in Work Activity Limitations: Examining the Relative Contribution of Chronic Conditions and Occupational Characteristics. J Occup Environ Med. 2017 Jan;59(1):6-11. doi: 10.1097/JOM.0000000000000906.
34. Gustafsson Sendén M, Schenck-Gustafsson K, Fridner A. Gender differences in Reasons for Sickness Presenteeism - a study among GPs in a Swedish health care organization. Ann Occup Environ Med. 2016 Sep 20;28:50. doi: 10.1186/s40557-016-0136-x.
35. Mechanic D. 1983. Illness behaviour: an overview. In: McHugh S, Vallis TM, editors. Illness Behavior: A Multidisciplinary Model. New York: Plenum Press. ISBN: 978-1-4684-5259-4.
36. Verstappen SM. Rheumatoid arthritis and work: The impact of rheumatoid arthritis on absenteeism and presenteeism. Best Pract Res Clin Rheumatol 2015;29(3):495-511. doi: http://dx.doi.org/10.1016/j.berh.2015.06.001
37. Lenssinck ML, Burdorf A, Boonen A, Gignac MA, Hazes JM, Luime JJ. Consequences of inflammatory arthritis for workplace productivity loss and sick leave: a systematic review. Ann Rheum Dis. 2013 Apr;72(4):493-505. doi: 10.1136/annrheumdis-2012-201998.
38. Tunceli K, Bradley CJ, Nerenz D, Williams LK, Pladevall M, Elston Lafata J. The impact of diabetes on employment and work productivity. Diabetes Care. 2005 Nov;28(11):2662-7. doi: 10.2337/diacare.28.11.2662.
39. Breton MC, Guénette L, Amiche MA, Kayibanda JF, Grégoire JP, Moisan J. Burden of diabetes on the ability to work: a systematic review. Diabetes Care. 2013 Mar;36(3):740-9. doi: 10.2337/dc12-0354.
40. Schuch JJ, Roest AM, Nolen WA, Penninx BW, de Jonge P. Gender differences in major depressive disorder: results from the Netherlands study of depression and anxiety. J Affect Disord. 2014 Mar;156:156-63. doi: 10.1016/j.jad.2013.12.011.
41. Duijts SF, van Egmond MP, Spelten E, van Muijen P, Anema JR, van der Beek AJ. Physical and psychosocial problems in cancer survivors beyond return to work: a systematic review. Psychooncology. 2014 May;23(5):481-92. doi: 10.1002/pon.3467.
42. IJzelenberg W, Molenaar D, Burdorf A. Different risk factors for musculoskeletal complaints and musculoskeletal sickness absence. Scand J Work Environ Health. 2004 Feb;30(1):56-63. doi: 10.5271/sjweh.765.
43. Cho SS, Lee DW, Kang MY. The Association between Shift Work and Health-Related Productivity Loss due to Either Sickness Absence or Reduced Performance at Work: A Cross-Sectional Study of Korea. Int J Environ Res Public Health. 2020 Nov 16;17(22):8493. doi: 10.3390/ijerph17228493.

44. Voglino G, Savatteri A, Gualano MR, Catozzi D, Rousset S, Boietti E, et al. How the reduction of working hours could influence health outcomes: a systematic review of published studies. BMJ Open. 2022 Apr 1;12(4):e051131. doi: 10.1136/bmjopen-2021-051131.
45. Hartner-Tiefenthaler M, Zedlacher E, El Sehity TJ. Remote workers' free associations with working from home during the COVID-19 pandemic in Austria: The interaction between children and gender. Front Psychol. 2022 Aug 4;13:859020. doi: 10.3389/fpsyg.2022.859020.
46. Nixon P, Ebert DD, Boß L, Angerer P, Dragano N, Lehr D. The Efficacy of a Web-Based Stress Management Intervention for Employees Experiencing Adverse Working Conditions and Occupational Self-efficacy as a Mediator: Randomized Controlled Trial. J Med Internet Res. 2022 Oct 20;24(10):e40488. doi: 10.2196/40488.
47. Engels M, Boß L, Engels J, Kuhlmann R, Kuske J, Lepper S, et al. Facilitating stress prevention in micro and small-sized enterprises: protocol for a mixed method study to evaluate the effectiveness and implementation process of targeted web-based interventions. BMC Public Health. 2022 Mar 26;22(1):591. doi: 10.1186/s12889-022-12921-7.
48. Robroek SJ, Coenen P, Oude Hengel KM. Decades of workplace health promotion research: marginal gains or a bright future ahead. Scand J Work Environ Health. 2021 Nov 1;47(8):561-564. doi: 10.5271/sjweh.3995.
49. Boot CRL, Schelvis RMC, Robroek SJW. Ways to study changes in psychosocial work factors. Scand J Work Environ Health. 2023 Mar 1;49(2):95-98. doi: 10.5271/sjweh.4081.