RESEARCH ARTICLE

Job Characteristics Associated With Self-Rated Fair or Poor Health Among U.S. Workers

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Introduction: Approximately 60% of the U.S. adult population is employed. Many aspects of a person's job may influence health, but it is unclear which job characteristics are most strongly associated with health at a population level. The purpose of this study was to identify important associations between job characteristics and workers' self-rated health in a nationally representative survey of U.S. workers.

Methods: Data from the 2010 National Health Interview Survey were used to calculate weighted prevalence rates for self-reported fair/poor health for five categories of job characteristics: occupation; pay/benefits (economic); work organization; chemical/environmental hazards; and psychosocial factors. Backward elimination methods were used to build a regression model for self-reported health with the significant job characteristics, adjusting for sociodemographic variables and health behaviors. Data were collected in 2010 and analyzed in 2012–2016.

Results: After adjusting for covariates, workers were more likely to have fair/poor health if they were employed in business operations occupations (e.g., buyers, human resources workers, event planners, marketing specialists; adjusted prevalence ratio [APR]=1.85, 95% CI=1.19, 2.88); had no paid sick leave (APR=1.35, 95% CI=1.11, 1.63); worried about becoming unemployed (APR=1.43, 95% CI=1.22, 1.69); had difficulty combining work and family (APR=1.23, 95% CI=1.01, 1.49); or had been bullied/threatened on the job (APR=1.82, 95% CI=1.44, 2.29).

Conclusions: Occupation, lack of paid sick leave, and multiple psychosocial factors were associated with fair/poor health among U.S. workers at the population level in 2010. Public health professionals and employers should consider these factors when developing interventions to improve worker health.
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INTRODUCTION

Both Healthy People 2020 and the National Prevention Strategy recognize work as an important determinant of health.[1,2] Several relevant conceptual models have been described.[3–5] For example, Landsbergis et al.[5] describe the influence of work on health as a multidimensional process influenced by employment conditions (e.g., part-time/full-time employment); organizational factors (e.g., subcontracting/temporary work); and job- or task-specific factors (e.g., physical, chemical, and biomechanical hazards, long work hours, shift work, psychosocial job stressors). Proposed mechanisms for this relationship include physiologic, psychological, and behavioral processes. Horowitz[6] describes multiple aspects of job quality (task discretion, monetary compensation, job security, low work intensity, and safe work conditions) that are associated with subjective well-being, through pathways that include physical health and other mediators. Specific theories proposed to explain associations between work characteristics and health have included the job demand–control,[7] job demand–control–support,[8] effort–reward,[9] and organizational justice models.[10] Many studies in the U.S. and Europe

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have supported aspects of these models, but rarely include nationally representative samples or multiple categories of job characteristics.[11–24]

Self-rated health (SRH) is a commonly used summary measure of general health, combining information on physical health, general physical functioning, mental health, and health behaviors.[25,26] SRH has been shown to predict future health outcomes, including mortality.[27,28] The measure of SRH, in the National Health Interview Survey (NHIS), is used as an indicator for Healthy People 2020 to monitor the general health status of the U.S. population.[29]

The core NHIS questionnaires include basic questions about employment status and job characteristics, including industry and occupation of employment. Arheart and colleagues[30] used multiple years (1986–2004) of NHIS data to examine differences in SRH and overall mortality risk by industry and occupation. Although they found differences in the prevalence of fair/poor health by industry sector, they found greater variability between different occupations within each industry sector.

In 2010, NHIS included additional occupational health questions.[31] The goal of the present study was to use data derived from these supplemental questions, as well as the core questions, to examine associations between various job characteristics and SRH in a national sample of U.S. workers. Job characteristics included were occupation, type of pay and job benefits, work organization factors, chemical/environmental hazards, and workplace psychosocial factors.

METHODS

Study Sample

The 2010 NHIS, a nationally representative household survey of the non-institutionalized civilian U.S. population, included 27,157 total sample adults (response rate, 60.8%).[31] The study sample consisted of employed adults (aged ≥18 years), excluding those with missing data for occupation/industry or employed in military-specific occupations, as well as respondents with missing or proxy-reported data for SRH. The Research Ethics Review Board of the National Center for Health Statistics (Protocol No. 2009-16) and the U.S. Office of Management and Budget (Control No. 0920-0214) both approved the questionnaires. In lieu of written consent, respondents provided oral consent before participating. Data were collected in 2010 and analyzed in 2012–2016.

Measures

The main outcome for this study, self-rated fair/poor health, was defined as a response of *fair* or *poor* to the question *Would you say [your] health in general is excellent, very good, good, fair, or poor?*

The NHIS collects narrative responses to questions about industry and occupation, which were coded according to the Census classification system, and collapsed into 23 simple recodes in the public use data set. For this study, occupation recodes were

collapsed further into 19 categories with ten or more respondents with fair/poor health. As industry and occupation are often highly correlated, industry was not included in the analyses.

Hourly pay was defined by the question *Are you paid by the hour at [your] main job or business?* Paid sick leave was defined by *Do you have paid sick leave on [your] main job or business?*

A non-standard work arrangement was defined as being employed in any of the following ways: (1) *an independent contractor, independent consultant, or freelance worker*; (2) *on-call and work/worked only when called to work*; (3) *paid by a temporary agency*; (4) *work/worked for a contractor who provides workers and services to others under contract*; and (5) *other [work arrangement]*. In addition, all respondents who answered *yes* to a separate question (*Is/Was your job temporary?*) were also classified as having non-standard work arrangements.

Non-standard shift was defined as *a regular evening shift, a regular night shift, a rotating shift,* or *some other schedule*. Work hours were categorized as part-time (<35 hours/week); standard (35–47 hours/week); and long (≥48 hours/week).

Workers who answered *yes* to the questions: *During the past 12 months… did you regularly handle or were you in skin contact with chemical products or substances at work twice a week or more? … were you regularly exposed to tobacco smoke from other people at work twice a week or more? …did you regularly work outdoors twice a week or more?* were defined as having frequent occupational skin contact with chemicals, exposure to secondhand smoke at work, and exposure to outdoor work, respectively.

Hostile work environment was defined as answering *yes* to the question *During the past 12 months, were you threatened, bullied, or harassed by anyone while you were on the job?* Worry about becoming unemployed was defined as a response of *strongly agree* or *agree* with the statement *I am worried about becoming unemployed*. Work–family imbalance was defined as a response of *strongly disagree* or *disagree* with the statement *It is easy for me to combine work with family responsibilities*.

Sociodemographic factors included as confounders in all regression models were sex; age; race/ethnicity; education; marital status; family income to poverty ratio; health insurance (from any source); and region of residence. In a final model, health behaviors associated with subjective health status[17,25] and associated with job characteristics in NHIS included current smoking status[32]; insufficient sleep (≤6 hours per 24 hour/average)[33]; and whether Centers for Disease Control and Prevention recommendations for aerobic exercise based on hours of moderate/vigorous physical activity were met (www.cdc.gov/physicalactivity/everyone/guidelines/adults.html).[34] The presence of children aged <18 years in the family and heavy alcohol use were evaluated as potential confounders, but neither were significantly associated with SRH and were omitted from regression models.

Statistical Analysis

Data analysis was conducted using survey procedures in SAS, version 9.3, and SUDAAN, version 11. Prevalence estimates were weighted using NHIS individual sample adult record weights. Wald chi-square tests were used for comparison of proportions of workers with fair/poor health by demographic characteristics. Each job characteristic was entered into a model with all sociodemographic factors listed above as independent variables and SRH as the dependent variable to calculate adjusted prevalence

ratios (APRs). The reference for each occupation category was set as the prevalence among all other occupation groups. Job characteristics that were significant at an alpha level of 0.10 in initial models were then added to a second model from which backward elimination methods were used to arrive at a set of job characteristics that remained significantly associated with SRH at a level of 0.05. A final model included adjustment for health behaviors listed above. Residual collinearity was assessed by checking pairwise phi coefficients for all job characteristics in the final model.[35]

RESULTS

The sample included 10,998 employed adults who answered the family questionnaire. Exclusions included 211 missing occupation or industry, 16 due to military-specific occupations, and four missing data for SRH, leaving a final sample of 10,767. The overall prevalence of fair/poor health was 6.1% (95% CI=5.6%, 6.7%). Respondents who were missing data on covariates were excluded from some analyses. No respondents were missing values for sex, age, or region. Imputed values for race/ethnicity provided by the National Center for Health Statistics were used when responses were missing. The number (%) of respondents with missing data for other covariates ranged from six (0.06%) for work arrangements and outdoor work to 296 (2.7%) for meeting exercise recommendations.

The highest prevalence of fair/poor health in their respective categories included workers aged ≥65 years; non-Hispanic of other races; less than high school education; a family income to poverty ratio of <1.0; living in the South; widowed/divorced/separated; no health insurance; smokers; having insufficient sleep; and workers who did not meet exercise recommendations (Table 1).

Compared with workers employed in all other occupation categories, workers employed in production occupations had the highest prevalence of fair/poor health, but business and financial operations was the only occupation category with a significantly elevated APR (Table 2). This finding was explored further by dividing this NHIS simple recode category into two component categories: business operations specialists and financial specialists. Only the former subcategory was significantly associated with fair/poor health, so this narrower category was used in subsequent analyses.

In models with job characteristics entered individually, workers who were paid by the hour and those who did not have paid sick leave had significantly higher prevalence rates of fair/poor health. The only work organization characteristic that was found to have a significant association with SRH was work hours, with part-time workers reporting worse health than those working standard hours. Worry about becoming unemployed, work–family imbalance, and hostile work environments were all strongly associated with SRH, as was workplace exposure to secondhand smoke.

Job characteristics significantly associated with SRH after adjustment for sociodemographic variables were entered into an initial multivariate model. Six job characteristics were retained in the model after backward elimination. Five of these remained statistically significant after addition of health behaviors to the final model (Table 3). Compared with workers employed in jobs without these characteristics, workers were more likely to report having fair or poor health if they were employed in business operations occupations (APR=1.85, 95% CI=1.19, 2.88); had no paid sick leave (APR=1.35, 95% CI=1.11, 1.63); worried about becoming unemployed (APR=1.43, 95% CI=1.22, 1.69); had difficulty combining work and family responsibilities (APR=1.23, 95% CI=1.01, 1.49); or had experienced a hostile work environment (APR=1.82, 95% CI=1.44, 2.29).

All absolute values of phi coefficients for pairs of job characteristics in the final model were ≤0.12, suggesting that multicollinearity between these variables was minor.[36]

DISCUSSION

This study found significant bivariate associations between SRH and job characteristics from each of five considered categories (occupation, type of pay and job benefits, work organization, chemical/environmental hazards, and workplace psychosocial factors) in a nationally representative sample of U.S. workers. These associations persisted after adjustment for sociodemographic characteristics. In the final multivariate model, one occupation category (business operations specialists); one indicator of potentially unhealthy jobs with regard to type of pay and job benefits (lack of paid sick leave); and all three workplace psychosocial factors (worry about becoming unemployed, work–family imbalance, and hostile work environment) remained significantly associated with SRH after adjustment for job characteristics and health behaviors.

Occupation categories with the highest unadjusted prevalence rates of fair/poor health (production, building and ground cleaning and maintenance, and healthcare support) were blue collar and service, consistent with previous studies[30]; however, the finding that business and financial operations (and specifically, business operations specialists) was the only occupational group significantly associated with SRH in the final model was somewhat surprising. The authors are unaware of any previous

Table 1. Prevalence of Self-Rated Fair or Poor Health Among Employed Adults by Demographic Characteristics and Health Behaviors, 2010 National Health Interview Survey

Characteristic	n (unweighted)	Weighted prevalence, % (95% CI)	p-value[a]
Total	10,767	6.1 (5.6, 6.7)	
Sex			
Male	4,841	5.8 (5.0, 6.6)	0.3
Female	5,926	6.4 (5.7, 7.0)	
Age (years)			
18–29	2,268	3.7 (2.9, 4.5)	**<0.0001**
30–44	3,708	5.3 (4.5, 6.1)	
45–64	4,199	7.8 (6.8, 8.9)	
≥65	592	7.9 (5.5, 10.3)	
Race/ethnicity			
Non-Hispanic white	6,184	5.0 (4.4, 5.6)	**<0.0001**
Non-Hispanic black	1,725	9.7 (8.0, 11.4)	
Non-Hispanic Asian	666	4.4 (2.6, 6.2)	
Non-Hispanic other race	227	12.6 (4.4, 20.8)	
Hispanic	1,965	8.8 (7.3, 10.4)	
Education			
Less than high school (HS)	1,117	14.0 (11.5, 16.6)	**<0.0001**
HS diploma/GED	2,458	9.0 (7.7, 10.4)	
Some college	3,494	5.8 (4.8, 6.7)	
College degree or more	3,683	2.8 (2.3, 3.4)	
Family income/poverty ratio			
<1.0	1,319	12.3 (10.0, 15.2)	**<0.0001**
1.0–2.99	3,716	8.4 (7.5, 9.4)	
≥3.0	5,732	4.0 (3.5, 4.6)	
Region			
Northeast	1,659	5.5 (4.3, 6.7)	**0.01**
Midwest	2,479	5.3 (4.4, 6.2)	
South	3,987	7.4 (6.4, 8.4)	
West	2,642	5.5 (4.4, 6.6)	
Marital status			
Married/partner	4,612	5.2 (4.5, 5.9)	**<0.0001**
Widowed/divorced/separated	2,871	9.2 (7.8, 10.5)	
Never married	3,266	5.9 (5.0, 6.8)	
Health insurance coverage			
Yes	8,692	5.6 (5.0, 6.1)	**<0.0001**
No	2,064	8.9 (7.3, 10.6)	
Current smoker			
Yes	2,116	9.5 (8.2, 10.9)	**<0.0001**
No	8,586	5.2 (4.7, 5.8)	
Insufficient sleep (≤6 hours)			
Yes	3,377	9.1 (8.0, 10.2)	**<0.0001**
No	7,259	4.6 (4.0, 5.2)	
Meets exercise recommendations			
Yes	5,279	3.2 (2.7, 3.7)	**<0.0001**
No	5,192	9.5 (8.6, 10.4)	

Note: Boldface indicates statistical significance (*p*<0.05).
[a]From Wald χ^2 tests for differences in prevalence rates of fair/poor health between strata of demographic characteristics and health behaviors.
GED, General Educational Development test.

studies identifying this group of white collar workers as at increased risk of poor health. The elevated APR for this group increased as additional job characteristics and health behaviors were added to the model, suggesting that the association may be moderated by white collar job characteristics not included in this study, but previously

Table 2. Prevalence of Self-Rated Fair or Poor Health Among Employed Adults by Job Characteristics, 2010 National Health Interview Survey

Characteristic	n (unweighted)	Weighted prevalence, % (95% CI)	Adjusted prevalence ratio[a]
Occupation category[b]			
Management	955	3.9 (2.4, 5.5)	0.86 (0.58, 1.28)
Business and financial operations	566	6.0 (3.8, 8.2)	**1.45 (1.00, 2.10)**
Business operations specialists[c]	311	6.7 (3.7, 9.8)	**1.58 (1.00, 2.50)**
Financial specialists[c]	255	4.9 (1.8, 8.1)	1.22 (0.66, 2.26)
Computer and mathematical	325	3.6 (1.7, 5.6)	1.10 (0.66, 1.85)
Community and social service	222	7.5 (3.5, 11.5)	1.52 (0.90, 2.58)
Education, training, and library	747	3.8 (2.3, 5.2)	0.96 (0.65, 1.43)
Art, design, entertainment, sports, and media	251	4.7 (1.8, 7.5)	1.05 (0.58, 1.92)
Healthcare practitioners and technical	589	2.6 (1.1, 4.0)	0.61 (0.35, 1.07)
Other white collar[d]	433	3.5 (1.8, 5.3)	1.06 (0.64, 1.74)
Healthcare support	332	8.1 (5.1, 11.0)	1.02 (0.71, 1.47)
Protective service	230	5.3 (2.1, 8.5)	0.87 (0.48, 1.60)
Food preparation and serving related	601	7.6 (5.3, 9.8)	0.89 (0.67, 1.20)
Building and ground cleaning and maintenance	458	8.9 (5.9, 11.8)	0.83 (0.58, 1.18)
Personal care and service	449	7.5 (4.9, 10.0)	0.91 (0.62, 1.33)
Sales and related	1,035	6.2 (4.5, 7.8)	1.04 (0.78, 1.38)
Office and administrative support	1,570	7.4 (5.7, 9.1)	1.17 (0.93, 1.48)
Farming, fishing, forestry, construction, and extraction	529	6.8 (4.2, 9.5)	0.81 (0.54, 1.22)
Installation, maintenance, and repair	340	6.6 (3.6, 9.6)	1.00 (0.62, 1.62)
Production	602	10.3 (7.3, 13.2)	1.26 (0.93, 1.70)
Transportation and material moving	533	7.6 (5.0, 10.2)	0.84 (0.58, 1.20)
Paid by hour			
Yes	6,275	7.6 (6.8, 8.3)	**1.23 (1.00, 1.52)**
No	4,483	4.3 (3.6, 5.0)	ref
Paid sick leave			
Yes	5,924	4.6 (4.1, 5.2)	ref
No	4,768	8.1 (7.1, 9.0)	**1.36 (1.13, 1.64)**
Non-standard work arrangement (including temporary positions)			
Yes	2,170	7.1 (5.7, 8.5)	1.03 (0.83, 1.28)
No	8,591	5.9 (5.3, 6.5)	ref
Non-standard shift			
Yes	2,960	7.1 (6.2, 8.1)	1.14 (0.96, 1.36)
No	7,800	5.8 (5.1, 6.4)	ref
Weekly work hours			
Part-time (1–34)	2,600	7.8 (6.5, 9.1)	**1.28 (1.05, 1.55)**
Standard (35–47)	5,974	5.5 (4.9, 6.1)	ref
Long (≥48)	2,024	5.1 (3.9, 6.3)	1.08 (0.83, 1.40)
Worried about becoming unemployed			
Yes	3,606	9.4 (8.3, 10.5)	**1.67 (1.43, 1.95)**
No	7,119	4.6 (4.0, 5.1)	ref
Work-family imbalance			
Yes	1,756	8.0 (6.6, 9.3)	**1.39 (1.14, 1.69)**
No	8,958	5.7 (5.2, 6.3)	ref
Hostile work environment/bullying			
Yes	884	11.7 (9.2, 14.1)	**2.05 (1.63, 2.58)**
No	9,862	5.6 (5.1, 6.2)	ref

(continued on next page)

Table 2. Prevalence of Self-Rated Fair or Poor Health Among Employed Adults by Job Characteristics, 2010 National Health Interview Survey *(continued)*

Characteristic	*n* (unweighted)	Weighted prevalence, % (95% CI)	Adjusted prevalence ratio[a]
Potential skin hazards			
Yes	2,001	7.6 (6.1, 9.0)	1.13 (0.90, 1.43)
No	8,752	5.8 (5.2, 6.4)	ref
Workplace second-hand smoke			
Yes	1,512	8.7 (7.1, 10.3)	**1.26 (1.01, 1.57)**
No	9,247	5.7 (5.2, 6.3)	ref
Outdoor work			
Yes	2,372	7.1 (5.8, 8.4)	1.03 (0.84, 1.27)
No	8,389	5.8 (5.3, 6.4)	ref

[a]Adjusted for sociodemographic variables (age, sex, race/ethnicity, education, family income/poverty ratio, region, marital status, and health insurance); boldface indicates estimates with CIs with a lower bound ≥1.0.
[b]The reference group for each occupation group is workers in all other occupation groups.
[c]Subset of the occupation category Business and Financial Operations.
[d]Includes architecture and engineering; life, physical, and social science; and legal occupations.

shown to be associated with adverse health, such as high time pressure, low social support, or status inconsistency.[21]

The detailed occupation recode business operations specialists consists of 16 individual 2010 Census codes. Examples of specific occupations represented by these codes include buyers, human resources workers, event planners, and marketing specialists. According to the Occupation Information Network (www.onetonline.org) some of the most important work activities of these jobs include obtaining and processing information, interacting with people inside and outside the organization, solving problems, and interacting with computers. These characteristics suggest that workers in these occupations often have complex jobs. Although there is a great deal of research on job complexity suggesting that it is a positive feature of work, it may also be a stressor, particularly in cases where job autonomy is low.[37] However, this result may also have arisen by chance. Specific conditions affecting health within these occupations should be explored further in more targeted studies.

The association between SES and health is well established.[16,18,19,26] For this study, two job characteristics related to type of pay and job benefits that may affect SES were considered: being paid by the hour and lack of paid sick leave. Both of these factors have previously been reported to be associated with increased nonfatal occupational injuries.[38] In the current study, both of these factors were independently associated with SRH, and the lack of paid sick leave remained significant after adjustment for all other variables. This suggests that these two job characteristics may have an effect on health beyond their influence on monetary resources and access to health care, and is consistent with Grzywacz and

Dooley's[11] finding that jobs that are "economically good" as well as "psychologically good" are associated with the lowest prevalence of fair/poor health along an employment continuum, even with adjustment for household income.

The three workplace psychosocial factors included in this study are broad, but have been previously linked to SRH, and are amenable to organization-level interventions. Work–life imbalance has also been found to be associated with health in French, Swiss, and multinational studies,[20–23] and can be addressed by organizational interventions that increase work-time flexibility.[39] Ray et al.[40] have previously reported that workplace mistreatment is associated with many different measures of health-related quality of life. Potential approaches for addressing hostile work environments include organizational anti-bullying initiatives, organizational support, and constructive leadership.[41,42] Finally, job insecurity has also been linked to SRH in American, Swiss, and British studies.[6,13,21,43] Although there is less empirical evidence for the effectiveness of interventions to reduce job insecurity in improving health, some strategies have been suggested as ways to reduce the exposure or reduce vulnerability.[5] Examples include training programs to broaden workers' skill sets or facilitate return to work from injury or illness or incorporating financial planning resources into employee assistance programs.

Similar to the studies by Hämmig and colleagues[23] and Warren et al.,[16] significant associations between job characteristics and SRH persisted after adjustment for personal health behaviors in the current study. In fact, adding health behaviors to the model had little effect on the results.

Table 3. Job Characteristics Associated With Self-Rated Fair or Poor Health Among Employed Adults in Multivariate Models, 2010 National Health Interview Survey

Characteristic	Adjusted prevalence ratio, Model 1[a] (*n*=10,560)	*p*-value, Model 1	Adjusted prevalence ratio, Model 2[b] (*n*=10,228)	*p*-value, Model 2
Occupational category		**0.03**		**0.01**
Business operations specialists	1.70 (1.07, 2.71)		1.85 (1.19, 2.88)	
All other categories	ref		ref	
Pay type		**0.03**		0.06
By the hour	1.25 (1.02, 1.54)		1.21 (0.99, 1.49)	
Salaried	ref		ref	
Paid sick leave		**0.003**		**0.002**
No	1.34 (1.11, 1.63)		1.35 (1.11, 1.63)	
Yes	ref		ref	
Worried about becoming unemployed		**<0.001**		**<0.001**
Yes	1.51 (1.28, 1.78)		1.43 (1.22, 1.69)	
No	ref		ref	
Work–family imbalance		**0.02**		**0.04**
Yes	1.27 (1.04, 1.55)		1.23 (1.01, 1.49)	
No	ref		ref	
Hostile work environment/bullying		**<0.001**		**<0.001**
Yes	1.85 (1.46, 2.34)		1.82 (1.44, 2.29)	
No	ref		ref	

Note: Boldface indicates statistical significance ($p < 0.05$).
[a]Model 1 adjusted for sociodemographic variables (age, sex, race/ethnicity, education, family income/poverty ratio, region, marital status, and health insurance).
[b]Model 2 adjusted for sociodemographic variables and health behaviors (smoking, insufficient sleep, and leisure-time physical activity).

There was a wide range in the prevalence of fair/poor health by occupation category, which is consistent with the previous NHIS study by Arheart and colleagues[30] and some studies of occupational categories based on other surveys.[18,19] However, all occupational categories except for one became statistically nonsignificant once adjustment was made for demographic characteristics. This suggests that job-level characteristics likely have a stronger effect on health than occupation, which is consistent with Warren and Kuo's[16] conclusions based on the Wisconsin Longitudinal Study. Job-level characteristics should be included in epidemiologic studies whenever possible. When occupation is the only job-related variable collected for a study, analyzing the data at the most detailed level of occupation possible may most closely approximate individual job-level characteristics.

Similarly, broadly defined dermal exposures, exposure to secondhand smoke at work, and part-time work were all associated with SRH when analyzed independent of other job characteristics. However, these associations also became nonsignificant in the final model, contrary to previous studies that found significant effects of both chemical/environmental and psychosocial occupational factors on health when included in the same model.[17,20–23] These negative findings may reflect that these potential risk factors were defined too broadly, or that previously reported effects of these job characteristics were

confounded by other unmeasured job characteristics such as poor benefits (e.g., lack of paid sick leave).

Unlike several previous studies, this study did not demonstrate significant associations between non-standard work arrangements or work shifts and SRH prior to adjustment for other job characteristics.[20,23] However, similar to the current study, several studies that have included both work schedule characteristics and other occupational psychosocial exposures have also found that only the latter type of variables remained in their final models.[21,22]

Limitations

The strength of this study lies in its large, nationally representative sample of U.S. workers from many occupations, along with the availability of an extensive set of risk factors including demographic factors, health behaviors, occupational exposures, and type of pay and job benefits. An important limitation of this study is that all data are self-reported and cross-sectional. The cross-sectional design limits making inferences regarding the direction of the association with health (e.g., there may be self-selection into some jobs based on pre-existing fair/poor health). Prospective studies are needed to help confirm these findings.

Although SRH is a widely used measure with evidence of predictive validity, the measure's test–retest reliability

is less than ideal, and is especially low among U.S. adults with less education and nonwhite race/ethnicity.[44] In addition, as described by Alterman et al.,[45] single questions were used to measure complex constructs such as exposure to a hostile work environment and worry about becoming unemployed. On the other hand, Fisher and colleagues[46] have listed several single-item measures that perform acceptably in organizational research, including one item that is very similar to the 2010 NHIS question about work–life balance. Also, work–family imbalance was treated as a job characteristic, although this imbalance may originate from work or family demands. Although the 2010 NHIS included many variables, it did not include all job characteristics that have previously been found to be associated with health.

CONCLUSIONS

After adjustment for sociodemographic factors and health behaviors, SRH was associated with job characteristics from three of five studied categories: occupation, type of pay and job benefits, and workplace psychosocial factors. Specific significant job characteristics included organizational-level factors such as paid sick leave, as well as micro-level factors such as worry about becoming unemployed, work–family imbalance, and bullying. One occupation category, business operations specialists, was also significantly associated with SRH in a model that included these specific job characteristics. This suggests that there are additional characteristics of this occupation associated with SRH that were not measured in this study. Public health professionals and employers should consider job characteristics when developing interventions to improve worker health. Workplace or occupation-specific interventions, developed with worker participation, may be warranted.

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