Within-Occupation and Industry Sex, Race, and Educational Differences in Exposures to Workplace Hazards

Julia A. Rivera Drew, PhD†
Minnesota Population Center
University of Minnesota, Twin Cities

Carrie Henning-Smith, MPH, MSW
Health Policy and Management and Minnesota Population Center
University of Minnesota, Twin Cities

June 2014

Working Paper No. 2014-3
https://doi.org/10.18128/MPC2014-3

†Correspondence should be directed to:
Julia A. Rivera Drew
Minnesota Population Center, University of Minnesota, Twin Cities
50 Willey Hall, 225 19th Avenue S., Minneapolis, MN 55455, USA
e-mail: jrivdrew@umn.edu

All work performed at the Minnesota Population Center, University of Minnesota, Twin Cities
The authors report no conflicts of interest.

Abstract

Background

Potentially harmful workplace conditions have been linked to occupationally-related illness and injury, costing billions of dollars in health care and lost wages. This study compares workers in the same jobs to see whether demographic differences in exposures persist.

Methods

Data were from the 2010 National Health Interview Survey. Descriptive analyses and logistic regression models controlling for job assessed differences in three exposures: 1) skin contact with chemicals, 2) vapors, gas, dust, and fumes, and 3) second-hand smoke among non-smokers.

Results

Comparing workers in the same jobs, women and college graduates experienced a lower risk of exposure. White workers experienced the highest risks of exposure, except for the heightened risk of second-hand smoke exposure faced by black non-smokers.

Conclusion

Disparities in exposure to chemicals, vapors, and second-hand smoke persist by sex, race/ethnicity, and educational attainment, even within the same jobs. Workplace policies should ensure safety equally for all employees.

Keywords

health disparities; occupational exposures; race/ethnicity; sex; education

Introduction

The U.S. Bureau of Labor Statistics (BLS) estimates that, in 2012, there were more than 4,000 work-related fatalities and almost 3 million nonfatal work-related illnesses and injuries among private industry employees (BLS, 2013). Exposure to potentially harmful workplace conditions, such as handling hazardous chemicals and breathing toxic vapors and second-hand smoke is significantly associated with a higher risk of occupationally-related illnesses. For example, approximately nine percent of all adult asthma cases in the U.S. are attributable to occupational exposures (Blanc and Toren, 1999) totaling $1.6 billion in direct and indirect costs from health care and lost earnings (Leigh et al., 2002). Apart from deaths occurring on the job, others have estimated that approximately 55,000 additional deaths per year result from occupational disease or injury (Steenland et al., 2003). Further, exposure to occupational hazards has been linked to decreased health for employees' family members, such as in the case of risk of birth defects in children (Desrosiers et al., 2012).

A small body of research examines whether there are group differences in the risk of exposure to workplace hazards. Calvert and colleagues (2013) found statistically significant differences by sex, race/ethnicity, and educational attainment in self-reports of frequent exposure at work to hazards such as skin contact with chemicals in a sample of U.S. adults. For example, 33% of working men report frequent exposure to vapors, gas, dust, or fumes at work, compared to 16% of working women. Using a sample of workers in New Zealand, Eng et al. (2011) also found substantial sex differences in exposures to workplace hazards, where men were significantly more likely to be exposed to toxic chemicals and vapors than women, although women were more likely to be exposed to other types of workplace hazards, such as working on repetitive tasks and at high speeds.

In general, group differences in exposure to hazardous workplace conditions have been ascribed to working in different types of jobs. However, previous research provides little insight into whether group differences would persist if we compared workers employed in the same types of workplaces. An extensive literature has consistently found that the distribution of workers across occupations varies systematically by characteristics like sex and race (Leicht, 2008; Grodsky and Pager, 2001), leading us to believe that the observed associations between individual characteristics and risk of exposure to workplace hazards may change if we look at workers employed within the same jobs. In one of the few studies we could locate that examined within-occupation differences in exposure to workplace hazards, Eng and colleagues (2011) found that gender differences were reduced by comparing men and women employed within the same occupations, but remained statistically significant. Within the same occupation, men were still more likely than women to experience exposure to a variety of fumes and chemicals, as well as to non-standard hours and night shifts. Women remained more likely than men in the same occupations to experience repetitive and high-speed tasks and awkward or tiring postures (Eng et al., 2011). The authors did not consider whether the remaining difference was attributable to working in different industries despite identical occupational titles, although Calvert and colleagues (2013) did find that potentially hazardous exposures varied substantially across industry. We have no information on whether other group differences disappear if we compare only those working within the same jobs. Further, we have not found any studies that examine within-occupation and within-industry differences in exposure by race/ethnicity and educational attainment, both socio-demographic characteristics that have well-documented associations with health disparities in other areas (Williams et al., 1997; Centers for Disease Control and Prevention, 2013; Adler & Rehkopf, 2008; Kawachi et al., 2005).

With this study, we address gaps in the literatures on health disparities and occupational health by investigating whether sex, race/ethnicity, and educational differences in exposures to workplace hazards persist within the same job, as measured by occupation and industry. Specifically, we examine group differences in 1) regular skin contact with chemicals in the workplace; 2) frequent (twice a week or more) exposure to vapor, gas, dust, or fumes on the job; and 3) regular exposure of non-smokers to second-hand smoke in the workplace. We begin by describing the distribution of exposures, socio-demographic and other characteristics in the U.S. population. Second we describe the distribution of exposures by occupational title. Third, we use binary logistic regression models to estimate sex, racial/ethnic, and educational differences in workplace exposures, then consider whether any observed group-level differences remain after adjusting for occupation, industry, and other individual-level characteristics.

Materials and Methods

Data and Sample

Data used in this study were from the 2010 Integrated Health Interview Series (IHIS), an integrated, harmonized, online version of the National Health Interview Surveys (NHIS) data created to facilitate analysis of the health of the U.S. population (Minnesota Population Center and State Health Access Data Assistance Center, 2012). Although the NHIS is conducted annually, we used the 2010 data because it included an Occupational Health Supplement (OHS), focused on occupational conditions and exposures. The OHS was asked of sample adults aged 18 and older who were currently employed or had been employed at some time during the previous 12 months (n=17,524). For the current study, we limited the analytic sample to respondents between the ages of 25 and 64 who held a job during the week prior to the survey, and excluded

respondents with missing information on occupational exposures or any covariates from analyses. These limitations resulted in a final analytic sample size of 12,608.

Analysis and Measures

Univariate and bivariate analyses were used to show the distribution of population-weighted sample characteristics and the mean exposure to potentially hazardous occupational conditions by simple occupational classification. We then ran logistic regressions separately for each of the three types of occupational hazards considered in this study: 1) regular skin contact with chemicals, 2) regular exposure to vapors, gas, dust, or fumes, and 3) regular exposure to second-hand smoke in the workplace. Models first adjusted only for sex, race/ethnicity, or educational attainment, respectively, and then added controls for detailed occupation, detailed industry, and a series of control variables that may also be related to the risk of exposure. Models predicting exposure to second-hand smoke in the workplace were limited to current non-smokers, reducing the sample size to 10,122 for those analyses. Results were presented as odds ratios of exposure to each of three types of potentially hazardous occupational conditions.

Dependent Variables

We looked at three potentially harmful occupational exposures. The first of these was regular skin contact with chemical substances. Respondents were asked whether, during the past 12 months, they regularly handled or were in contact with chemical products or substances at work twice a week or more. The second potentially harmful occupational exposure we examined was frequent exposure to vapor, gas, dust, or fumes. Respondents were asked if they were regularly exposed to vapors, gas, dust, or fumes at work twice a week or more. The third outcome we examined was whether respondents were regularly exposed to second-hand smoke.

Respondents were asked if, during the past 12 months, they were regularly exposed to tobacco smoke from other people at work twice a week or more.

Independent Variables

Our key independent variables were sex (male vs. female), race/ethnicity (Hispanic; non-Hispanic black; non-Hispanic other race, including Asian and American Indian; and non-Hispanic white), and educational attainment (less than a high school degree, high school graduate, some college, and a four-year college degree or more). In descriptive analyses, we use simple occupational groupings, measured as 23 categories in the NHIS, based on a modified version of the Standard Occupational Classification (SOC) codes. For the purposes of multivariate models, we measure jobs as occupation-industry combination. Multivariate models use detailed occupational groupings, also based on a modified version of the SOC codes, measured as 94 categories. Industry was measured with 79 categories in the NHIS, based on a modified version of the North American Industrial Classification System (NAICS) codes. Some occupations and industries perfectly predicted success or failure. We grouped these occupation and industry categories in with the reference category in order to retain these observations in the model. This recategorization exercise reduced the number of detailed occupation categories to 89 and the number of detailed industry categories to 76. Covariates included age, age squared, citizenship (U.S. citizen vs. not), worked part-time (between 1 and 34 hours per week), worked non-standard hours (regular work hours took place at any time other than weekdays), and region (Northeast, Midwest, South and West).

Results

Descriptive Results

Table 1 presents the distribution of sample characteristics for the analytic sample. The table presents unweighted sample sizes for each cell and weighted population percentages or means. Roughly 20% of all workers aged 25-64 experienced regular skin contact with chemicals on the job, 25% reported regular exposure to vapors, gas, dust, or fumes in the workplace, and 9% of currently non-smoking workers in this age range reported frequent exposure to second-hand smoke in the work setting. Forty-seven percent of workers were female, 14% were Hispanic, 10.5% were black, 6% were some other race, and 69% were white. Of workers 25-64, 7.6% had completed less than a high school education, one-quarter were high school graduates, 30% had some college education, and 37% were college graduates. On average, workers were around 43 years of age, and 91% were U.S. citizens. Nineteen percent of workers were employed part-time, 23% worked non-standard working hours, 17.5% lived in the Northeast region, nearly 24% lived in the Midwest, 35% lived in the South, and 24% lived in the West.

[Table I about here]

There was considerable variation between simple occupational groupings in the share experiencing potentially hazardous workplace exposures (see Table 2). For example, only about 1% of workers employed in legal occupations (including lawyers, judges, and legal support workers) reported regular skin contact with chemicals, 9.5% reported regular exposure to vapors, gas, dust, or fumes, and 3% of non-smokers in those occupations reported frequent exposure to second-hand smoke on the job. In contrast, 50% of workers employed in installation, maintenance, and repair occupations reported regular skin contact with chemicals, 60% reported

regular exposure to vapors, gas, dust, or fumes, and 19.5% of non-smokers employed in those occupations experienced frequent exposure to second-hand smoke in the workplace.

[Table II about here]

Multivariate Results

Table 3 displays the results of logistic regression models predicting self-reported exposure to each of the three substances we consider in the current study, separately by sex, race/ethnicity, and educational attainment. Without controlling for other factors, women were about 30% less likely relative to men to experience regular skin contact with chemicals in the workplace, 62% less likely to be exposed to vapors, gas, dust, or fumes, and non-smoking women were 55% less likely to face frequent exposure to second-hand smoke in the workplace relative to non-smoking men. Hispanic workers were equally as likely as white workers to experience skin contact with chemicals or exposure to vapors, gas, dust, or fumes. Relative to white non-smokers, however, Hispanic non-smokers were 39% more likely to be exposed to frequent second-hand smoke in the workplace. Black workers were 20% less likely than white workers to experience regular skin contact with chemicals, equally as likely to experience vapors, gas, dust, or fumes, and black non-smokers were 78% more likely to experience frequent second-hand smoke at the workplace relative to white non-smokers. Relative to white workers, other race workers were 44% less likely to experience frequent skin contact with chemicals at work, 49% less likely to experience regular exposure to vapors, gas, dust, or fumes, and non-smoking other race workers were equally as likely as non-smoking white workers to experience second-hand smoke in the workplace.

Relative to high school graduates, those with less than a high school education were equally as likely to experience all three potentially hazardous occupational exposures considered in the current study. Workers with some college education were 23% less likely to experience regular skin contact with chemicals, 31% less likely to be exposed to vapors, gas, dust, or fumes in the workplace, and non-smokers with some college education were equally as likely as non-smokers with a high school education to experience regular exposure to second-hand smoke in the work setting. College graduates were significantly less likely to face all three exposures in the workplace: they were 66% less likely to have skin contact with chemicals, 75% less likely to have exposure to vapors, gas, dust, or fumes, and college-educated non-smokers were 68% less likely to experience second-hand smoke.

[Table III about here]

Multivariate results indicate that, even when considering workers employed in the same jobs, and adjusting for other individual-level factors, sex and educational differences in hazardous exposures persist. Comparing workers employed in the same jobs, relative to men, women were still 27% less likely to experience regular skin contact with chemical substances, 62% less likely to be frequently exposed to vapors, gas, dust, or fumes, and non-smoking women were 49% less likely to have regular exposure to second-hand smoke. After adjusting for individual characteristics and relative to high school graduates working the same jobs, those with less than a high school degree still demonstrated no difference in their probability of exposure to any of the three potentially hazardous conditions considered here. Workers with some college education were 18% less likely to be exposed to regular skin contact with chemicals and 23%

less likely to be exposed to vapors, gas, dust, or fumes in the workplace, but had a risk of exposure to second-hand smoke that was no different than that faced by high school graduates. College graduates retained their large advantage in exposure risk: relative to high school graduates employed in the same jobs, they were 56% less likely to experience regular skin contact with chemicals, 69% less likely to be exposed to vapors, gas, dust, or fumes, and non-smoking college graduates were 57% less likely to have frequent exposure to second-hand smoke in the workplace.

Results for racial differences in hazardous workplace exposures changed somewhat after including individual characteristics and job fixed effects. The unadjusted odds ratio for Hispanic workers indicated that Hispanic workers experienced identical risks of exposures to white workers in chemicals and vapors, gas, dust, or fumes, but a heightened risk of exposure to second-hand smoke. In contrast, after adjusting for individual characteristics, Hispanic workers were less likely than white workers employed in the same jobs to have regular skin contact with chemicals on the job (OR = 0.747) and less likely to report exposure to vapors, gas, dust, or fumes (OR = 0.762). Further, the full model results also indicated that non-smoking Hispanic workers faced no statistically significant difference in the risk of frequent second-hand smoke exposure in the workplace relative to white workers in the same jobs. Black workers remained less likely to experience regular skin contact with chemicals (OR = 0.669) and black non-smokers remained more likely to experience exposure to second-hand smoke (OR = 1.544). The association between other race and experience with potentially hazardous occupational exposures was similar to the association between Hispanic ethnicity and risk of exposure: other race workers were 34% less likely, relative to white workers in the same jobs, to experience regular skin contact with chemicals and 34% less likely to be exposed to vapors, gas, dust, or fumes.

Non-smoking other race workers were equally as likely as white workers in the same jobs to be exposed to second-hand smoke in the workplace.

[Table IV about here]

Discussion

In this study, we find that there is non-random allocation of workplace exposures to potentially hazardous conditions across occupations. A large literature has found that workers also tend to cluster in certain occupations systematically by characteristics like sex and race (e.g., Grodsky and Pager, 2001; Leicht 2008), suggesting that exposure to potentially harmful workplace conditions by sociodemographic characteristics may be partly explained by working in different jobs. We find that sex, race/ethnicity, and educational attainment are each independently associated with risk of occupational exposure. In unadjusted models, women were less likely to experience any of the exposures than men. Black respondents were less likely to experience chemical exposure, but more to experience second-hand smoke exposure than white respondents. Those from other racial groups were less likely to experience exposure to chemicals or to vapors, gas, dust, or fumes than white respondents. Respondents with a college degree had lower odds of all three exposures than high school graduates and workers with some college had lower odds of exposure to chemicals or to vapors, gas, dust, or fumes. After accounting for occupation and industry, results remained consistent for women and those with some college or higher. After adjusting for within-occupation and industry differences, black non-smoking workers had higher odds of second-hand smoke exposure than white non-smoking workers. In contrast, Hispanic respondents had lower odds of exposure to chemicals and to vapors, gas, dust,

or fumes than white respondents, indicating that their within-job risk of exposure is lower. Our unadjusted model results are nearly identical to the results of bivariate analyses in Calvert and colleagues' (2013) study using the same data to examine group differences in exposure to potentially hazardous occupational conditions. Any differences in results may be partially explained by differences in sample inclusion criteria: Calvert et al. included all workers age 18 and older. We limited our sample to workers aged 25-64 in an attempt to capture workers who had completed their education and to restrict our sample to non-elderly adults.

Disparities in potentially-hazardous exposure to chemicals, vapors, and second-hand smoke persist by sex, race/ethnicity, and educational attainment, even within the same jobs and controlling for other characteristics associated with the risk of exposure. Addressing these inequities is key to reducing subsequent health disparities caused by such exposures. Within the same occupations, men and those without any college education are more likely to be exposed to each of the three outcomes studied. Black non-smoking workers are more likely to be exposed to second-hand smoke than white non-smoking workers, whereas white respondents are more likely than Hispanic and "other" racial groups to be exposed to chemicals and to vapors, gas, dust, or fumes. Workplace policies should ensure safety for all employees, regardless of gender, race/ethnicity, and educational attainment. Further, policies designed to increase access to college education may help individuals obtain jobs with fewer exposure risks.

ACKNOWLEDGEMENTS

Grant sponsor: National Institutes of Health; Grant numbers: R01HD046697 and R24HD041023.

REFERENCES

Adler NE, Rehkopf DH. 2008. U.S. disparities in health: Descriptions, causes, and mechanisms. 2008. Annu Rev Public Health 29:253-252.

Blanc PD, Toren K. 1999. How much adult asthma can be attributed to occupational factors? Am J Med 107:580-587.

BLS. 2013. Injuries, illnesses, and fatalities. Washington, DC: U.S. Department of Labor Bureau of Labor Statistics. Available at: http://www.bls.gov/iif/. [Accessed May 7, 2014].

Calvert GM, Luckhaupt SE, Sussell A, Dahlhamer JM, Ward BW. 2013. The prevalence of selected potentially hazardous workplace exposures in the US: Findings from the 2010 National Health Interview Survey. Am J Ind Med 56:635-646.

Centers for Disease Control and Prevention. 2013. CDC health disparities and inequalities report – United States, 2013. MMWR 62(Suppl 3):1-187.

Desrosiers TA, Herring AH, Shapira SK, Hooiveld M, Luben TJ, Herdt-Losvavio ML, Lin S, Olshan AF. 2012. Paternal occupation and birth defects: Findings from the National Birth Defects Prevention Study. J Occup Environ Med 69(8):534-542.

Grodsky E, Pager D. 2001. The structure of disadvantage: Individual and occupational determinants of the black-white wage gap. Am Sociol Rev 66(4):542-567.

Eng A, Mannetje A, McLean D, Ellison-Loschmann L, Cheng S, Pearce N. 2011. Gender differences in occupational exposure patterns. J Occup Environ Med 68:888-894.

Kawachi I, Daniels N, Robinson DE. 2005. Health disparities by race and class: Why both matter. Health Affair 24(2):343-352.

Leicht KT. 2008. Broken down by race and gender? Sociological explanations of new sources of earnings inequality. Ann Rev Sociol 34:237-255.

Leigh JP, Romano PS, Schenker MB, Kreiss K. 2002. Costs of occupational COPD and asthma. Chest 121:264-272.

Minnesota Population Center and State Health Access Data Center. 2012. Integrated Health Interview Series: Version 5.0. Minneapolis, Minnesota: University of Minnesota. Available at: http://www.ihis.us.

Steenland K, Burnett C, Lalich N, Ward E, Hurrell J. 2003. Dying for work: The magnitude of US mortality from selected causes of death with occupation. Am J Ind Med 43:461-482.

Williams DR, Mohammed SA. 2009. Discrimination and racial disparities in health: Evidence and needed research. J Behav Med 32(1):20-47.

TABLES AND FIGURES

Table I. Weighted Sample Characteristics: Workers Aged 25-64 in the 2010 NHIS

	Cases (unweighted)	% or mean	95% CI
Dependent Variables			
Regular skin contact with chemical substances on the job[a]	2,484	20.3	(19.4-21.1)
Exposed to vapors, gas, dust, or fumes at work, twice a week or more[b]	3,127	25.2	(24.2-26.1)
Regular exposure to second-hand smoke at work, for current non-smokers[a, c]	961	9.1	(8.4-9.8)
Key Independent Variables			
Female	6,429	47.0	(46.0-48.1)
Race/Ethnicity			
Hispanic	2,466	14.0	(13.2-14.8)
Black	1,836	10.5	(9.8-11.2)
Other	1,003	6.3	(5.7-6.9)
White	7,303	69.2	(68.1-70.4)
Education			
Less than HS	1,181	7.6	(7.1-8.2)
HS graduate	3,174	25.4	(24.4-26.3)
Some college	3,789	29.8	(28.8-30.8)
College graduate	4,464	37.2	(36.1-38.4)
Control Variables			
Age	12,608	43.2	(43.0-43.5)
U.S. Citizen	11,102	91.1	(90.5-91.7)
Works part-time	2,473	19.3	(18.4-20.1)
Works non-standard hours	3,073	23.3	(22.4-24.2)
Region			
Northeast	1,963	17.5	(16.3-18.6)
Midwest	2,799	23.7	(22.5-25.0)
South	4,640	35.2	(33.8-36.6)
West	3,206	23.6	(22.3-24.9)
N (unweighted)		12,608	

Data: Integrated National Health Interview Survey (IHIS), 2010.
All figures are population weighted and adjusted for complex survey design unless otherwise noted.
[a]Refers to most recent job.
[b]Refers to longest-held job.
[c]Numbers in this row refer only to current non-smokers.

Table II. Mean Hazard Exposure by Occupation

Occupations	Skin Contact with Chemicals[a] % (9.5% CI)	Vapor, Gas, Dust or Fumes[b] % (95% CI)	Second-Hand Smoke[a, c] % (95% CI)
Management	13.3 (11.1-15.6)	17.6 (15.0-20.3)	7.5 (5.6-9.4)
Business and Financial Operations	2.7 (1.5-3.8)	7.6 (5.5-9.7)	3.5 (1.7-5.3)
Computer and Mathematical	2.2 (0.1-4.3)	8.4 (4.9-11.8)	4.2 (2.3-6.1)
Architecture and Engineering	13.8 (9.1-18.4)	17.4 (12.5-22.2)	5.5 (2.2-8.8)
Life, Physical, and Social Science	31.2 (22.9-39.5)	25.0 (16.1-34.0)	3.7 (0.5-6.9)
Community and Social Services	8.2 (4.5-11.9)	6.9 (3.8-10.0)	8.1 (4.0-12.3)
Legal	0.9 (-0.5-2.3)	9.5 (2.2-16.8)	3.3 (0.2-6.4)
Education, Training, and Library	11.0 (8.5-13.5)	12.5 (9.7-15.2)	1.2 (0.4-2.0)
Arts, Design, Entertainment, Sports and Media	6.7 (3.9-9.6)	11.8 (7.8-15.8)	7.0 (4.1-9.9)
Healthcare Practitioners and Technical	34.1 (29.9-38.2)	15.0 (12.0-17.9)	6.1 (4.2-8.1)
Healthcare Support	26.6 (20.4-32.9)	16.2 (11.4-20.9)	8.8 (4.9-12.7)
Protective Service	16.9 (10.9-22.8)	29.4 (23.3-35.5)	19.8 (13.6-25.9)
Food Preparation and Serving Related	29.6 (25.3-33.9)	19.6 (15.8-23.3)	14.4 (10.0-18.7)
Building and Grounds Cleaning and Maintenance	57.7 (52.8-62.7)	49.1 (43.9-54.4)	13.7 (9.9, 17.5)
Personal Care and Service	34.2 (28.5-39.9)	30.9 (25.4-36.5)	11.0 (6.6-15.3)
Sales and Related	13.8 (11.0-16.6)	17.1 (14.5-19.7)	7.2 (5.0-9.5)
Office and Administrative Support	5.7 (4.3-7.2)	15.8 (13.8-17.8)	5.4 (4.1-6.7)
Farming, Fishing, and Forestry	28.0 (18.0-38.0)	50.0 (35.8-64.3)	6.8 (1.0-12.6)
Construction and Extraction	34.1 (30.0-38.1)	58.7 (54.5-65.5)	27.2 (22.1-32.3)
Installation, Maintenance, and Repair	49.9 (44.8-55.0)	60.3 (55.2-65.5)	19.5 (14.5-24.5)
Production	37.0 (33.2-40.8)	48.2 (44.2-52.3)	13.7 (10.2-17.2)
Transportation and Material Moving	22.4 (18.9-26.0)	47.4 (42.6-52.2)	15.9 (12.1-19.6)
Military Specific	29.1 (-2.8-61.0)	47.0 (15.6-78.5)	19.3 (-0.5-39.1)
N (unweighted)	12,608	12,608	10,122

Data: Integrated National Health Interview Survey (IHIS), 2010.
All figures are population weighted and adjusted for complex survey design unless otherwise noted.
[a]Refers to most recent job.
[b]Refers to longest-held job.
[c]Numbers in this column refer only to current non-smokers.

Table III. Unadjusted Differences in Exposure to Occupational Hazards, by Sex, Race/Ethnicity, and Education

	Skin Contact with Chemicals[a]	Vapors, Gas, Dust or Fumes[b]	Second-Hand Smoke[a,c]
	Odds Ratio (S.E.)	Odds Ratio (S.E.)	Odds Ratio (S.E.)
Adjusting only for female	0.706*** (0.034)	0.375*** (0.019)	0.451*** (0.039)
Adjusting only for race/ethnicity			
Hispanic	1.029 (0.071)	1.097 (0.075)	1.394** (0.169)
Black	0.802** (0.063)	1.093 (0.087)	1.783*** (0.177)
Other	0.564*** (0.085)	0.507*** (0.057)	0.738 (0.150)
White	Ref.	Ref.	Ref.
Adjusting only for education			
Less than HS	0.981 (0.092)	1.057 (0.085)	0.980 (0.149)
HS graduate	Ref.	Ref.	Ref.
Some college	0.766*** (0.051)	0.694*** (0.044)	0.838 (0.081)
College graduate	0.342*** (0.025)	0.245*** (0.017)	0.319*** (0.035)
N (unweighted)	12,608	12,608	10,122

Data: Integrated National Health Interview Survey (IHIS), 2010.
All figures are population weighted and adjusted for complex survey design unless otherwise noted.
Coefficients statistically significant at: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.
[a]Refers to most recent job.
[b]Refers to longest-held job.
[c]Numbers in this column refer only to current non-smokers.

Table IV. Multivariate Results from Models Predicting Exposure to Occupational Hazards

	Skin Contact with Chemicals[a]	Vapors, Gas, Dust or Fumes[b]	Second-Hand Smoke, among Non-Smokers[a,c]
	Odds Ratio (S.E.)	Odds Ratio (S.E.)	Odds Ratio (S.E.)
Female	0.725*** (0.039)	0.376*** (0.023)	0.512*** (0.051)
Race/Ethnicity			
Hispanic	0.747** (0.064)	0.762** (0.073)	1.099 (0.162)
Black	0.669*** (0.056)	1.001 (0.085)	1.544*** (0.162)
Other	0.655** (0.105)	0.662*** (0.078)	0.946 (0.193)
White	Ref.	Ref.	Ref.
Education			
Less than HS	0.974 (0.106)	1.055 (0.098)	1.071 (0.179)
HS graduate	Ref.	Ref.	Ref.
Some college	0.820** (0.062)	0.769*** (0.053)	0.880 (0.087)
College graduate	0.436*** (0.037)	0.306*** (0.026)	0.433*** (0.057)
Age	1.045* (0.023)	1.067** (0.022)	0.972 (0.031)
Age^2	0.999* (0.000)	0.999** (0.000)	1.000 (0.000)
US Citizen	1.005 (0.113)	1.300* (0.139)	1.856** (0.330)
Works part-time	1.048 (0.076)	0.983 (0.068)	0.697** (0.087)
Works non-standard hours	1.367*** (0.090)	1.154** (0.066)	1.203 (0.115)
Region			
Northeast	0.899 (0.095)	0.799* (0.079)	0.835 (0.123)
Midwest	1.171* (0.092)	1.027 (0.084)	0.992 (0.140)
South	1.102 (0.087)	1.014 (0.078)	1.155 (0.157)
West	Ref.	Ref.	Ref.
N	12,608	12,608	10,122

Data: Integrated National Health Interview Survey (IHIS), 2010.
All models control for occupation and industry (not shown, but results available upon request).
All figures are population weighted and adjusted for complex survey design unless otherwise noted.
Coefficients statistically significant at: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.
[a]Refers to most recent job.
[b]Refers to longest-held job.
[c]Numbers in this column refer only to current non-smokers.