Blue-collar work and women's health: A systematic review of the evidence from 1990 to 2015

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Contents lists available at ScienceDirect
SSM - Population Health

journal homepage: www.elsevier.com/locate/ssmph

ARTICLE INFO

Keywords:
Women's health
Occupational health
Blue-collar
Systematic review

ABSTRACT

Despite the implications of gender and sex differences for health risks associated with blue-collar work, adverse health outcomes among blue-collar workers has been most frequently studied among men. The present study provides a “state-of-the-field” systematic review of the empiric evidence published on blue-collar women's health. We systematically reviewed literature related to the health of blue-collar women published between January 1, 1990 and December 31, 2015. We limited our review to peer-reviewed studies published in the English language on the health or health behaviors of women who were presently working or had previously worked in a blue-collar job. Studies were eligible for inclusion regardless of the number, age, or geographic region of blue-collar women in the study sample. We retained 177 studies that considered a wide range of health outcomes in study populations from 40 different countries. Overall, these studies suggested inferior health among female blue-collar workers as compared with either blue-collar males or other women. However, we noted several methodological limitations in addition to heterogeneity in study context and design, which inhibited comparison of results across publications. Methodological limitations of the extant literature, alongside the rapidly changing nature of women in the workplace, motivate further study on the health of blue-collar women. Efforts to identify specific mechanisms by which blue-collar work predisposes women to adverse health may be particularly valuable in informing future workplace-based and policy-level interventions.

1. Introduction

The term “blue-collar work” is frequently used to describe working class jobs that require manual labor. These jobs are often both physically and psychologically demanding, and have been linked with various adverse health outcomes. Evidence suggests, however, that men's and women's exposures and health outcomes in blue-collar jobs may vary considerably. Differences in mortality are consistently noted between men and women in the general population, whereby women outlive men in almost every country in the world and with lower mortality rates observed among women throughout the lifecourse (Catalano and Bruckner, 2006; Cullen, Baioocchi, Egleston, Lofus, & Fuchs, 2015; Rieker and Bird, 2005). Yet women on average exhibit higher rates of morbidity, report inferior self-rated health, and use more health services as compared with men (Case and Paxson, 2005).

Theories explaining the “gender paradox” in morbidity and mortality suggest that biological characteristics and social pressures operating across the lifecourse—both independently and synergistically—contribute to inequalities in men and women's health (Krieger, 2003; Rieker and Bird, 2005). Within the context of the relationship between work and health, differences in biological susceptibility to workplace hazards can result from differences in toxicokinetic responses (i.e., absorption, metabolism, and excretion) to occupational chemicals, dust, and other hazardous substances (Arbuckle, 2006). The consequences of nontraditional work hours (e.g., swing shifts, night shifts) can also manifest differently in men and women due to differences in circadian rhythms (Santhi et al., 2016). Lastly, anthropometric differences between men and women can mediate the effects of blue-collar work on health risks: spaces, equipment, and tools that are optimized for the average male worker may be ill-suited for female workers (Blue, 1993; Courville, Vézina, & Messing, 1991; Messing and Stevenson, 1996).
Non-biological differences in susceptibility to health risks include behavioral differences, such as in smoking habits, diet, and use of medications, as well as differences in psychosocial stressors. Women in blue-collar workplaces, for example, are especially vulnerable to experiencing gender discrimination, sexual harassment, social isolation, and work-life conflict (Clougherty, Souza, & Cullen, 2010; Frankenhaeuser, Lundberg, Fredrikson, Toumisto, & Myrsten, 1989; Frone, 2000; Hoeschl and Machung, 2012; Lederer, 1981; Messing and Ostlin, 2018; Zahm, Pottern, Lewis, Ward, & White, 1994).

Despite the implications of gender and sex differences for health risks associated with blue-collar work, adverse health outcomes among blue-collar workers has been most frequently studied among men (Clougherty et al., 2010; House, 1980; Karasek, 1979). The present study provides a “state-of-the-field” systematic review of the empirical evidence published on blue-collar women’s health from 1990 to 2015. This 25-year period captures major trends in the global economy that may be salient to the health and well-being of contemporary working women, including industry deregulation, computerization and automation of working-class jobs, union decline and weakened institutional protections for workers, and the rise in production in lower income countries (Arnold and Bongiov, 2012; Berman, Bound, & Griliches, 1994; Kalleberg, 2009; Kalleberg, 2012; Navarro, 1982).

Our specific objectives were to assess: the extent and strength of the existing empirical evidence on the health of blue-collar women; discernable patterns in publication over time, across countries, and among various health outcomes; and the degree to which study findings converge. Our review includes studies that evaluated specific risk factors for morbidity and mortality among blue-collar women, as well as studies that compared the health of blue-collar women with women in other industries or men in blue-collar jobs. Although we provide some analysis of the studies by place, time, and health outcome, differences in study design and specific exposures/outcomes studied inhibited us from offering a quantitative synthesis of the direction and magnitude of associations between work and health. We discuss instead general trends and themes, as well as general methodological limitations of the extant literature. We conclude with future directions for research.

2. Materials and methods

2.1. Identification of papers

In the present study, we systematically reviewed the peer-reviewed literature related to the health of blue-collar women published between January 1, 1990 and December 31, 2015. We conducted our preliminary search across three major research databases (Google Scholar, Web of Science, and PubMed) for literature relevant to blue-collar women's health, using combinations of the terms “blue-collar,” “health,” and “women” or “female.”

We subsequently employed a second, more flexible, targeted search strategy among these same three databases that integrated synonyms and related terms (e.g. MeSH terms). We additionally expanded our second search to incorporate findings from several smaller research databases from the biomedical, social science, and humanities fields, including: Medline (PubMed), Scopus (Elsevier), Gender Watch (ProQuest), Social Sciences Citation Index (Clarivate), LGBT Life Full Text (EBSCO), CINAHL (EBSCO), Cochrane Library of Systematic Reviews (Cochrane), SafetyLit (SafetyLit Foundation), and Women's Studies Quarterly. Search algorithms were developed specifically for each database by a medical librarian. A complete list of search terms used for identification of papers is provided in Appendix A.

2.2. Selection criteria

We initially identified articles for full-text review based on the contents of the abstract. Studies were deemed eligible for inclusion if they met the following criteria: the study was peer-reviewed and published in the English language; the dependent variable was a health outcome or health behavior (e.g., diet, physical activity, smoking and other substance use); the study population included women who were presently working or had previously worked in a blue-collar job; and the results included a multivariate-adjusted point estimates specific to female blue-collar workers. We defined blue-collar work, consistent with the United States Bureau of Labor Statistics, to include precision production, craft, and repair occupations; machine operators and inspectors; transportation and moving occupations; and handlers, equipment cleaners, helpers, and laborers (U.S. Bureau of Labor Statistics, 2018). Studies were eligible for inclusion regardless of the number, age, or geographic region of blue-collar women in the study sample.

Studies were excluded if there was no empirical quantitative analysis (i.e. qualitative research), if only descriptive and summary statistics were presented (i.e. not multivariate adjusted), if they were not peer reviewed, or if the outcome was deemed unrelated to health. We additionally excluded studies that included blue-collar women in the overall study population but failed to specify results or an exposure unique to blue-collar women. Lastly, we excluded those studies for which we were unable to discern whether blue-collar women were grouped with office and clerical workers in their analyses (Applebaum et al., 2013; Gold et al., 2006).

2.3. Data extraction

Two researchers independently assessed and extracted data from the selected articles. The first researcher examined studies published between 1990 and 2002 (A.F.), while the second examined studies published between 2003 and 2015 (H.E.). The researchers cross-checked a random subset of each other's studies in order to ensure that selection criteria were consistently and accurately applied.

We extracted and recorded the following study characteristics from each study: study author(s) and year of publication; title; country of the study subjects; years over which study data were collected; sample size, number of women, and number of blue-collar women; industry subsector; study design (cross-sectional, longitudinal, case-control, or quasi-experimental); independent variable(s); specific health outcome(s); the referent group (i.e., to whom authors compared blue-collar women); a summary of the study’s main findings; a brief description of the study population; and country classification.

We classified the country of origin for study subjects as high-, middle- or low-income based on World Bank Country and Lending Groups classification (World Bank, 2018). We classified industry subsector based on the North American Industry Classification System (NAICS). Where insufficient detail was provided to identify industry subsector, we list the industry supersector (e.g., manufacturing). If five or more industry subsectors were represented in the study population or if the study was population-based, we specified “Multiple Industries.” (US Census Bureau, 2017) For a subset of studies that compared the health of male and female blue-collar workers, gender was not considered as a main effect. Similarly, for a subset of studies that compared the health of blue-collar women and women in other industries or job types, occupational class was not considered as a main effect. We use superscripts in the “referent group” column in Table 2 to identify these papers, and we also note which papers were exploratory in nature and considered several independent variables simultaneously.

We organized studies by the following health outcome categories: BMI and metabolism, cancer, cardiovascular disease, disability and absenteeism, health behaviors, mental health, mortality (all-cause and cause-specific), musculoskeletal disorders, reproductive and sexual health, respiratory diseases, self-rated health, and smoking and other substance use. Studies reporting on multiple health outcomes were listed under each relevant health outcome.

We did not attempt meta-analysis because the majority of studies...
either lacked raw data, used the same or similar data sources, and because substantial variability in study design precluded meaningful quantitative synthesis. We did not attempt a formal assessment of risk of bias due to heterogeneity in study design, analytic method, and scientific question. Data extracted and summarized in Table 2 (e.g. sample size and study design), however, provides a preliminary indication of whether study findings may be subject to various biases.

**Fig. 1. PRISMA flow diagram.** The first search (Panel A) was conducted between January and June 2016 in three major databases (Google Scholar, Web of Science, and Pub Med) with combinations of the terms “blue-collar,” “health,” and “women” or “female.” The second search (Panel B) was conducted between March and June of 2017 using integrated synonyms and related terms of major concepts. This search was expanded to include several additional databases: Medline (PubMed); Scopus (Elsevier); Gender Watch (ProQuest); Social Sciences Citation Index (Clarivate); LGBT Life Full Text (EBSCO); CINAHL(EBSCO); Cochrane Library of Systematic Reviews (Cochrane); SafetyLit (SafetyLit Foundation); and Women's Studies Quarterly.

**Fig. 2. Number of studies published per year, 1990–2015.**
3. Results

We identified 3327 records through our first search, assessed 394 full articles, and retained and extracted data from 104 studies. We identified 1522 records through our second search, assessed 346 full articles and retained and extracted data from 73 studies. (Fig. 1) We included 177 articles in our review in total and note an increase in the number of articles published each year between 1990 and 2015 (Fig. 2).

Two patterns related to the publication of studies are worth noting. First, the study of specific cohorts occasionally predominated findings from a given country. For example, of the 14 studies from Australia, five were studies on children. Of the 11 studies from South Korea, five used data from KNHANES, and four recruited study participants from the City of Incheon. Of the five studies from Israel, four used data from the CORDIS study and were published prior to 2001. Both studies from Mexico evaluated the health of female maquiladoras in Tijuana. Of the 16 studies on smoking and other substance use, 10 were from the U.S. and four of these studies used baseline data from the MassBUILT study. Of the seven U.S. studies on musculoskeletal disorders, six used data from the American Manufacturing Cohort.

Second, although studies were included from 40 different countries across North and South America, Europe, Asia, and Australia (Table 1A), these were primarily from high-income nations (N = 24, 60.0%). The majority of studies were based either in the United States (N = 45, 25.4%) or in Scandinavian Countries (N = 52, 29.4%). Only 6 (3.4%) were based in low-income nations and 25 (14.3%) or in low-middle income countries. With the exception of one quasi-experimental study, all studies were observational in design. The most commonly studied health outcomes were musculoskeletal disorders, and mental health outcomes.

Summary statistics related to study design and analysis are reported in Table 1A. Approximately half of studies were cross-sectional (N = 286, 203.8 – 671.8) relative to the studies from high-income countries. With the exception of one quasi-experimental study, all studies conducted in low- and middle-income countries were cross-sectional in design. The most commonly studied health outcomes were those related to sexual and reproductive health, and mental health outcomes.

### Table 1A
Descriptive Statistics for Study Sample (N = 177)

| Country Classification – N (%) | N |
|-------------------------------|---|
| High-Income                   | 24 (60.0) |
| Low-Middle Income             | 11 (27.5) |
| Low-Income                    | 4 (10.0)  |
| Most frequently studied countries – N (%) | |
| United States                 | 45 (25.4) |
| Sweden                        | 23 (13.0) |
| Finland                       | 16 (9.0)  |
| Australia                     | 12 (6.8)  |
| Japan                         | 10 (5.6)  |
| Health outcomes                | |
| BMI & metabolism              | 13 (7.3)  |
| Cancer                        | 12 (6.8)  |
| Cardiovascular diseases       | 19 (10.7) |
| Disability & absenteeism      | 13 (7.3)  |
| Health behaviors              | 16 (9.0)  |
| Mental health                 | 17 (9.6)  |
| Mortality                     | 20 (11.3) |
| MSK                            | 30 (16.9) |
| Other                         | 15 (8.5)  |
| Reproductive & sexual health  | 14 (7.9)  |
| Respiratory                   | 14 (7.9)  |
| Self-Rated health             | 5 (2.8)   |
| Smoking & other substance use | 16 (9.0)  |
| Study design                  | |
| Cross-sectional               | 85 (48.0) |
| Case-Control                  | 18 (10.2) |
| Longitudinal                  | 71 (40.1) |
| Quasi-Experimental            | 3 (1.7)   |
| Type of point estimate presented – N (%) | |
| Blue-collar women vs. blue-collar men | 31 (17.5) |
| Blue-collar women vs. other women | 91 (51.4) |
| Exposure-outcome among blue-collar women | 55 (31.1) |
| Number of women included – Median (IQR) | 946 (305-4,580) |
| Number of blue-collar women included – Median (IQR) | 422.5 (100-1,196) |

### Table 1B
Descriptive Statistics for Lower and Middle-Income Countries (N = 21).

| Countries included in study sample – N (%) | N |
|-------------------------------------------|---|
| China                                     | 5 (23.8) |
| Mexico                                    | 2 (9.5)  |
| Turkey                                    | 2 (9.5)  |
| Vietnam                                   | 2 (9.5)  |
| Health outcomes                           | |
| BMI & metabolism                          | 1 (4.8)  |
| Cancer                                    | 3 (14.3) |
| Cardiovascular                            | 1 (4.8)  |
| Disability & absenteeism                  | 1 (4.8)  |
| Health behaviors                          | 3 (14.3) |
| Mental health                             | 1 (4.8)  |
| MSK                                       | 5 (23.8) |
| Other                                     | 3 (14.3) |
| Reproductive & sexual health              | 5 (23.8) |
| Respiratory                               | 2 (9.5)  |
| Self-Rated health                         | 2 (9.5)  |
| Smoking and other substance use           | 1 (4.8)  |
| Study design                              | |
| Cross-sectional                           | 19 (90.5) |
| Case-Control                              | 1 (4.8)  |
| Quasi-Experimental                        | 1 (4.8)  |
| Type of point estimate presented – N (%)  | |
| Blue-collar women vs. blue-collar men      | 4 (19.0) |
| Blue-collar women vs. other women          | 6 (28.6) |
| Exposure-outcome among blue-collar women   | 11 (52.3) |
| Number of women included – Median (IQR)    | 360 (263.1-1,058) |
| Number of blue-collar women included – Median (IQR) | 286 (203.8-671.8) |

* Percentages are calculated based on the number of unique countries.
* Percentages are calculated based on the number of studies.
* Percentages do not sum to 100% because several studies report for multiple health outcomes.
* Missing for 25 studies.

(Table 1B). Fourteen of these studies were in middle income countries. Upper-middle income countries included China, the Dominican Republic, Iran, Mexico, Peru, Romania, Russia, Serbia, Thailand, Turkey; and lower-middle income countries included Bangladesh, India, Vietnam, and Sri Lanka. One low-income country, Nepal, was included as well. These studies generally included fewer blue-collar women (Median = 286, 203.8 – 671.8) relative to the studies from high-income countries. With the exception of one quasi-experimental study, all studies conducted in low- and middle-income countries were cross-sectional in design. The most commonly studied health outcomes were those related to sexual and reproductive health, musculoskeletal disorders, and mental health outcomes.

3.1. Study design and analysis

Summary statistics related to study design and analysis are reported in Table 1A. Approximately half of studies were cross-sectional (N = 85, 48.0%). The remainder employed a longitudinal, case-control, or quasi-experimental study design. The median number of blue-collar women included across studies was 422.5 (IQR 100-1,196).

Across studies, authors characterized the health of blue-collar women to one or more of three different referent groups: (1) studies compared the health of blue-collar women and blue-collar men; (2) studies compared the health of blue-collar women to women in other industries or job types, including white-collar women, office and clerical workers, and women in the general population; (3) studies examined independent risk factors for disease among blue-collar women. The minority of studies included in this review compared the health of blue-collar women and blue-collar men (N = 31, 17.5%). Approximately half of studies compared the health of blue-collar women to a female referent group, and nearly one-third of studies reported a specific exposure-outcome association among blue-collar women (N = 55, 31.1%).
### Table 2

| Year | Sample Size (N) | Women (N) | Blue-Collar Women (N) | Industry Subsector |
|------|-----------------|-----------|-----------------------|-------------------|
| 1985-1997 | 1276 | 363 | 363 | Manufacturing |
| 1992 | 258 | 92 | 92 | Computer and Electronic Product Manufacturing |
| 2001-2002 | 1576 | 573 | 573 | Multiple Industries |
| 1998-2001 | 1759 | 584 | 584 | Multiple Industries |
| 1999-2002 | 86 | 5 | 5 | Multiple Industries |
| 2002-2003 | 57 | 4 | 4 | Multiple Industries |
| 2003-2004 | 78 | 36 | 36 | Multiple Industries |
| 2004-2005 | 51 | 18 | 18 | Multiple Industries |
| 2005-2006 | 102 | 33 | 33 | Multiple Industries |
| 2006-2007 | 156 | 52 | 52 | Multiple Industries |
| 2007-2008 | 195 | 64 | 64 | Multiple Industries |
| 2008-2009 | 139 | 46 | 46 | Multiple Industries |
| 2009-2010 | 94 | 32 | 32 | Multiple Industries |
| 2010-2011 | 78 | 27 | 27 | Multiple Industries |
| 2011-2012 | 58 | 20 | 20 | Multiple Industries |
| 2012-2013 | 40 | 14 | 14 | Multiple Industries |
| 2013-2014 | 30 | 10 | 10 | Multiple Industries |
| 2014-2015 | 22 | 8 | 8 | Multiple Industries |
| 2015-2016 | 17 | 6 | 6 | Multiple Industries |
| 2016-2017 | 13 | 5 | 5 | Multiple Industries |
| 2017-2018 | 10 | 4 | 4 | Multiple Industries |
| 2018-2019 | 8 | 3 | 3 | Multiple Industries |
| 2019-2020 | 6 | 2 | 2 | Multiple Industries |
| 2020-2021 | 4 | 1 | 1 | Multiple Industries |

(Continued on next page)
| Outcome Category | Table 2 (continued) |
|------------------|--------------------|
| Cardiovascular disease | | |
| Author (Year) | Title | Country | Years Observed | Sample Size (N) | Women (N) | Blue-Collar Women (N) | Industry Subsector |
| Zhao et al. (1991) | A dose-response relation for noise-induced hypertension | China | 1985–1991 | 5921 | NR | NR | Manufacturing |
| Hall, Johnson, and Tsou (1993) | Women, occupation, and risk of cardiovascular morbidity and mortality | Sweden | 1977–1985, 1981–1985, 1976–1984, 1975–1984 | 10102 | 3642 | 662 | Multiple Industries |
| Jousilahti et al. (1996) | Symptoms of chronic bronchitis and the risk of coronary disease | Finland | 1972–1985, 1988–1991 | 19444 | 10102 | 951 | Multiple Industries |
| Melamed et al. (1995) | Objective and subjective work monotony: effects on job satisfaction, psychological well-being, and social support | Israel | 1985–1987 | 1279 | NR | 94 | Multiple Industries |
| Wamala et al. (1997) | Lipid profile and socioeconomic status in health middle-aged women in Sweden | Sweden | 1991–1994 | 2079 | 1164 | 435 | Multiple Industries |
| Östlin et al. (1998) | Myocardial infarction in male and female dominated occupations | Sweden | 1969–1970, 1970–1990, 1971–1992, 1976–1984 | 140520 | 36708 | NR | Multiple Industries |
| Baigi, Marklund, and Fridlund (2001) | The association between socio-economic status and chest pain focusing on self-rated health in a primary health care area of Sweden | Sweden | 1991–1994 | 1145 | 492 | 343 | Multiple Industries |
| Tsutsumi et al. (2001) | Association between socio-economic status and chest pain focusing on self-rated health in a primary health care area of Sweden | Japan | 1992–2005 | 6511 | 2016 | 1931 | Multiple Industries |
| Wamala, Lynch, and Kaplan (2001) | Women's exposure to early and later life socioeconomic disadvantage and coronary heart disease risk among Japanese community residents: The Jichi Medical School Cohort Study | Sweden | 1991–1994 | 585 | 177 | 177 | Multiple Industries |
| Gallo et al. (2003) | Occupation and subclinical carotid artery disease in women: are clerical workers at greater risk? | United States | 1983–1985 | 362 | 27 | 335 | Multiple Industries |
| Honjo et al. (2010) | Socioeconomic indicators and cardiovascular disease among Japanese community residents: The Jichi Medical School Cohort Study | Japan | 1992–2005 | 3383 | 1467 | 1931 | Multiple Industries |
| Clougherty et al. (2011) | Gender and sex differences in job stress and hypertension | United States | 1988–2000 | 3283 | 241 | 384 | Multiple Industries |
| Fujishiro et al. (2015) | Occupational characteristics and the progression of carotid artery intima-media thickness and plaque over time: the Multi-Ethnic Study of Atherosclerosis (MESA) | United States | 2000–2011 | 2016 | 1931 | 150 | Multiple Industries |
| Arber (1991) | Class, paid employment and family roles: making sense of structural disadvantage, gender and health status | United Kingdom | 1985–1990 | 2000 | 2000 | 2000 | Multiple Industries |
| Guendelman and Silberg (1993) | The health consequences of maquiladora work: women on the US-Mexican border | Mexico | 1997–1998 | 490 | 490 | 490 | Multiple Industries |
| Vahtera et al. (1999) | The health consequences of maquiladora work: women on the US-Mexican border | Mexico | 1997–1998 | 490 | 490 | 490 | Multiple Industries |
| Strong & Zimmerman (2005) | The health consequences of maquiladora work: women on the US-Mexican border | Mexico | 1997–1998 | 490 | 490 | 490 | Multiple Industries |

Note: The table continues on the next page.
| Outcome Category | Author (Year) | Title | Country | Years Observed | Sample Size (N) | Women (N) | Blue-Collar Women (N) | Industry Subsector |
|------------------|--------------|-------|---------|----------------|----------------|-----------|----------------------|-------------------|
| Health behaviors | Christensen et al. (2008) | Explaining the social gradient in long-term sickness absence: a prospective study of Danish employees | Denmark | 2000-2002 | 5221 | 2562 | 671 | Multiple Industries |
|                  | Niedhammer et al. (2008) | The contribution of occupational factors to social inequalities in health: findings from the national French SUMER survey | France | 2003 | 2468 | 10245 | 1409 | Multiple Industries |
|                  | Viäätinen et al. (2008) | Work-family characteristics as determinants of sickness absence: a large-scale cohort study of three occupational grades | Finland | 2000-2002 | 18366 | 13971 | 1802 | Multiple Industries |
|                  | von Bonsdorff et al. (2011) | Work ability in midlife as a predictor of mortality and disability in later life: a 28-year prospective follow-up study | Finland | 1981-2009 | 5971 | 3261 | 1692 | Multiple Industries |
|                  | Gupta et al. (2014) | Face validity of the single work ability item: comparison with objectively measured heart rate reserve over several days | Denmark | NR | 127 | 53 | 53 | Multiple Industries |
|                  | Heo et al. (2015) | Job stress as a risk factor for absences among manual workers: a 12-month follow-up study | South Korea | 2009-2010 | 2349 | 542 | 542 | Manufacturing |
|                  | Burton and Turrell (2000) | Occupation, hours worked, and leisure-time physical activity | Australia | 1995 | 24454 | 11029 | 1972 | Multiple Industries |
|                  | Wu and Porell (2000) | Job characteristics and leisure physical activity | United States | 1992 | 6443 | 2881 | 871 | Multiple Industries |
|                  | Gang et al. (2002) | Physical activity during leisure and commuting in Tianjin, China | China | 1996 | 3976 | 1974 | 809 | Multiple Industries |
|                  | Takao et al. (2003) | Occupational class and physical activity among Japanese employees | Japan | 1996-1998 | 20,604 | 3,017 | 1548 | Multiple Industries |
|                  | McCormack, Giles-Corti, and Milligan (2006) | Demographic and individual correlates of achieving 10,000 steps/day: use of pedometers in a population-based study | Australia | NR | 428 | 223 | 19 | Multiple Industries |
|                  | Ericson et al. (2007) | Dietary intake of heterocyclic amines in relation to socioeconomic, lifestyle, and other dietary factors: estimates in a Swedish population | Sweden | 1991-1994 | 490 | 490 | 43 | Multiple Industries |
|                  | Kuwabara, Irving, and Faulkner (2007) | Occupation, hours worked, caregiving, and leisure time physical activity | Canada | 2000 | 490 | 490 | 43 | Multiple Industries |
|                  | Harley et al. (2010) | Multiple health behavior changes in a cancer prevention intervention for construction workers, 2001 - 2003 | United States | 2002-2003 | 582 | 17 | 17 | Construction of Buildings |
|                  | Malikinen et al. (2010) | Occupational class differences in leisure-time physical inactivity - contribution of past and current physical workload and other working conditions | Finland | 2000 | 3355 | 1788 | 273 | Multiple Industries |
|                  | Cleland et al. (2011) | Correlates of pedometer-measured and self-reported physical activity among young Australian adults | Australia | 2004-2006 | 2017 | 923 | NR | Multiple Industries |
|                  | Cho and Lee (2012) | The relationship between cardiovascular disease risk factors and gender | South Korea | 2005 | 4556 | 2596 | NR | Multiple Industries |
|                  | Miura and Turrell (2014) | Reported consumption of takeaway food and its contribution to socioeconomic inequalities in body mass index | Australia | 2009 | 903 | 480 | 40 | Multiple Industries |
|                  | Oliveira, Maia, and Lopes (2014) | Determinants of inadequate fruit and vegetable consumption amongst Portuguese adults | Portugal | 1999-2003 | 2362 | 1455 | NR | Multiple Industries |
|                  | Ugidewilligen et al. (2014) | Biological, socio-demographic, work and lifestyle determinants of sitting in young adult women: a prospective cohort study | Australia | 2000, 2003, 2006, 2009 | 11676 | 11676 | NR | Multiple Industries |
|                  | Hwang et al. (2015) | Predictors of health-promoting behavior associated with cardiovascular diseases among Korean blue-collar workers | South Korea | NR | 234 | 80 | 80 | NR |
|                  | Ugidewilligen et al. (2015) | Determinants of physical activity in a cohort of young adult men. Who is at risk of inactive behavior? | Australia | 2000, 2003, 2006, 2009 | 11695 | 11695 | NR | Multiple Industries |
| Mental health    | Loscosco & Spitzer (1990) | Working conditions, social support, and the well-being of female and male factory workers | United States | 1982 | 2222 | 649 | 649 | Multiple Industries |
|                  | Parkinson et al. (1990) | Health effects of long-term solvent exposure among women in blue-collar occupations | United States | NR | 567 | 567 | 567 | Multiple Industries |
|                  | Bromet et al. (1992) | Effects of occupational stress on the physical and psychological health of women in a microelectronics plant | United States | NR | 552 | 552 | 552 | Multiple Industries |
|                  | Guendelman and Silberg (1993) | The health consequences of maquiladora work: women on the US-Mexican border | Mexico | 1990 | 480 | 480 | 241 | Multiple Industries |

(continued on next page)
| Outcome Category | Author (Year) | Title | Country | Years Observed | Sample Size (N) | Women (N) | Blue-Collar Women (N) | Industry Subsector |
|------------------|---------------|-------|---------|----------------|-----------------|-----------|----------------------|------------------|
|                   | Melamed et al. (1995) | Objective and subjective work monotony: effects on job satisfaction, psychological distress, and absenteeism in blue-collar workers | Israel | 1985–1987 | 1278 | 393 | 393 | Manufacturing |
|                   | Kivimäki and Kalimo (1996) | Self-esteem and the occupational stress process: testing two alternative models in a sample of blue-collar workers | Finland | NR | 5450 | 927 | 927 | NR |
|                   | Goldenhar et al. (1998) | Stressors and adverse outcomes for female construction workers | United States | NR | 211 | 211 | 211 | Construction of Buildings |
|                   | Rydstedt, Johansson, and Evans (1998) | A longitudinal study of workload, health and well-being among male and female urban drivers | Sweden | 1991–1992 | 56 | 32 | 32 | Transit and Ground Passenger Transportation |
|                   | Soares, Grossi, and Sundin (2007) | Burnout among women: associations with demographic/socioeconomic, work, life-style and health factors | Sweden | NR | 6000 | 6000 | 745 | Multiple Industries |
|                   | Andrés, Collings, and Qin (2009) | Sex-specific impact of socio-economic factors on suicide risk: a population-based case-control study in Denmark | Denmark | 1981–1997 | 3286.08 | 1094.10 | 1992.2 | Multiple Industries |
|                   | Cobodon et al. (2009) | Mental health of workers in Toulouse 2 years after the industrial AZF disaster: first results of a longitudinal follow-up of 3,000 people | France | 2003–2008 | 2847 | 1514 | 53 | Multiple Industries |
|                   | Azatalos et al. (2009) | Specific associations between types of physical activity and components of mental health | Belgium | 2002–2004 | 1919 | 901 | 140 | Multiple Industries |
|                   | Brunette, Smith, and Panett (2011) | Perceptions of working and living conditions among industrial male and female workers in Perú | Perú | 2002 | 1066 | 305 | 305 | Multiple Industries |
|                   | Moon and Park (2011) | Risk factors for suicidal ideation in Korean middle-aged adults: the role of socio-demographic status | South Korea | 2005 | 7301 | 4087 | 991 | Multiple Industries |
|                   | Ahlgren, Olsson, and Brulin (2012) | Gender analysis of musculoskeletal disorders and emotional exhaustion: interactive effects from physical and psychosocial work exposures and engagement in domestic work | Sweden | 2008 | 1373 | 515 | 253 | Food Manufacturing; Professional, Scientific and Technical Services Leather and Allied Product Manufacturing |
|                   | Minh (2014) | Work-related depression and associated factors in a shoe manufacturing factory in Haiphong City, Vietnam | Vietnam | 2012 | 420 | 327 | 227 | Multiple Industries |
|                   | Yoon et al. (2014) | Occupational noise annoyance linked to depressive symptoms and suicidal ideation: a result from nationwide survey of Korea | South Korea | 2007–2009 | 10020 | 4610 | 1934 | Multiple Industries |
|                   | Hall, Johnson, and Tsou (1993) | Women, occupation, and risk of cardiovascular morbidity and mortality | Sweden | 1977, 1979, 1980, 1981, 1997, 1998, 1999 | 5921 | 5921 | NR | Multiple Industries |
|                   | Pekkanen et al. (1995) | Social class, health behaviour, and mortality among men and women in Eastern Finland | Finland | 1970, 1972, 1975, 1977–1987 | 10661 | 9694 | 6376 | Multiple Industries |
|                   | Chemet et al. (1998) | Deaths from alcohol and violence in Moscow: socio-economic determinants | Russia | 1994–1995 | 86121 | 22619 | NR | Multiple Industries |
|                   | Arena et al. (1999) | Issues and findings in the evaluation of occupational risk among women high nickel alloys workers | United States | 1948–1988 | 2877 | 2877 | 2877 | Primary Metal Manufacturing |
|                   | Kareholt (2001) | The relationship between heart problems and mortality in different social classes | Sweden | 1968, 1974, 1981, 1991, 1992, 1996–1996, 1998–1990 | 3247211 | 1592467 | 1250828 | Multiple Industries |
|                   | Haltom et al. (2002) | Cardiovascular mortality focusing on socio-economic influence: the low-risk population f Halland compared to the population of Sweden as a whole | Sweden | 1976, 1978, 1981–1983, 1992–1993, 1996–1999 | 29092 | 13992 | NR | Multiple Industries |
|                   | Prescott et al. (2003) | Social position and mortality from respiratory diseases in males and females | Denmark | 1976, 1978, 1981–1983, 1992–1993, 1994–1996, 1997–1999 | 13992 | 4163 | 4163 | Multiple Industries |
|                   | Akerstedt, Becklund, and Johansson (2004) | Shift work and mortality | Sweden | 1979–2000 | 22411 | 8401 | 4163 | Multiple Industries |
|                   | Mamo et al. (2005) | Factors other than risks in the workplace as determinants of socioeconomic differences in health in Italy | Italy | 1981–2001 | 377828 | 136212 | NR | Multiple Industries |
|                   | Bentley et al. (2007) | Area disadvantage, individual socio-economic position, and premature cancer mortality in Australia 1998 to 2000: a multi-level analysis | Australia | 1998–2000 | 5999861 | 2602424 | 382266 | Cross-Sectional |
|                   | Hein et al. (2007) | Follow-up study of chrysotile textile workers: cohort mortality and exposure-response | United States | 1916–2001 | 3072 | 1265 | 1256 | Textile Product Mills |
|                   | Lipton, Cunradi, and Chen (2008) | Smoking and all-cause mortality among a cohort of urban transit operators | United States | 1983–2000 | 1785 | 161 | 161 | Transit and Ground Passenger Transportation |
|                   | Brockmann, Müller, and Helmert (2009) | Time to retire - time to die? A prospective cohort study of the effects of early retirement on long-term survival | Germany | 1990–2004 | 1296.75 | 4127.6 | 26803 | Multiple Industries |
|                   | von Bonsdorff et al. (2011) | Work ability in midlife as a predictor of mortality and disability in later life: a 28 year prospective follow-up study | Finland | 1981–2009 | 5971 | 3261 | 1692 | Multiple Industries |

(continued on next page)
Table 2 (continued)

| Outcome Category | Author (Year)                  | Title                                                                 | Country            | Years Observed | Sample Size (N) | Women (N) | Blue-Collar Women (N) | Industry Subsector          |
|------------------|-------------------------------|----------------------------------------------------------------------|--------------------|----------------|-----------------|-----------|-----------------------|-----------------------------|
|                  | Dasaugta et al. (2012)        | Multilevel determinants of breast cancer survival: association with geographic remoteness and area-level socioeconomic disadvantage | Australia         | 1997-2006      | 18568           | 18568     | 715                   | Multiple Industries         |
|                  | von Bonsdorff et al. (2012)   | Job strain among blue-collar and white-collar employees as a determinant of total mortality: a 28-year population-based follow-up | Finland           | 1981-2009      | 5731            | 3261      | 1688                  | Multiple Industries         |
|                  | Hirokawa et al. (2013)        | Mortality risks in relation to occupational category and position among the Japanese working population: the Jichi Medical School (JMS) cohort study | Japan             | 1992-2005      | 6929            | 3596      | 1524                  | Multiple Industries         |
|                  | Mattisson, Horstmann, and Bogren (2014) | Relationship of SOC with sociodemographic variables, mental disorders, and mortality | Sweden            | 1947, 1975, 1972, 1997-2011 | 1164            | 625       | 325                   | Multiple Industries         |
|                  | Costello et al. (2014)        | Social disparities in heart disease risk and survivor bias among autoworkers: an examination based on survival models and g-estimation | United States     | 1941-1995      | 39412           | 4797      | 4797                  | Transportation Equipment Manufacturing |
|                  | Zhang et al. (2015)           | Occupation and risk of sudden death in a United States community: a case-control analysis | United States     | 2006-2013      | 1268            | 332       | 62                    | Multiple Industries         |
|                  | Dasgupta et al. (2012)        | Multilevel determinants of breast cancer survival: association with geographic remoteness and area-level socioeconomic disadvantage | Australia         | 1997-2006      | 18568           | 18568     | 715                   | Multiple Industries         |
|                  | von Bonsdorff et al. (2012)   | Job strain among blue-collar and white-collar employees as a determinant of total mortality: a 28-year population-based follow-up | Finland           | 1981-2009      | 5731            | 3261      | 1688                  | Multiple Industries         |
|                  | Hirokawa et al. (2013)        | Mortality risks in relation to occupational category and position among the Japanese working population: the Jichi Medical School (JMS) cohort study | Japan             | 1992-2005      | 6929            | 3596      | 1524                  | Multiple Industries         |
|                  | Mattisson, Horstmann, and Bogren (2014) | Relationship of SOC with sociodemographic variables, mental disorders, and mortality | Sweden            | 1947, 1975, 1972, 1997-2011 | 1164            | 625       | 325                   | Multiple Industries         |
|                  | Costello et al. (2014)        | Social disparities in heart disease risk and survivor bias among autoworkers: an examination based on survival models and g-estimation | United States     | 1941-1995      | 39412           | 4797      | 4797                  | Transportation Equipment Manufacturing |
|                  | Zhang et al. (2015)           | Occupation and risk of sudden death in a United States community: a case-control analysis | United States     | 2006-2013      | 1268            | 332       | 62                    | Multiple Industries         |
|                  | Dasgupta et al. (2012)        | Multilevel determinants of breast cancer survival: association with geographic remoteness and area-level socioeconomic disadvantage | Australia         | 1997-2006      | 18568           | 18568     | 715                   | Multiple Industries         |
|                  | von Bonsdorff et al. (2012)   | Job strain among blue-collar and white-collar employees as a determinant of total mortality: a 28-year population-based follow-up | Finland           | 1981-2009      | 5731            | 3261      | 1688                  | Multiple Industries         |
|                  | Hirokawa et al. (2013)        | Mortality risks in relation to occupational category and position among the Japanese working population: the Jichi Medical School (JMS) cohort study | Japan             | 1992-2005      | 6929            | 3596      | 1524                  | Multiple Industries         |
|                  | Mattisson, Horstmann, and Bogren (2014) | Relationship of SOC with sociodemographic variables, mental disorders, and mortality | Sweden            | 1947, 1975, 1972, 1997-2011 | 1164            | 625       | 325                   | Multiple Industries         |
|                  | Costello et al. (2014)        | Social disparities in heart disease risk and survivor bias among autoworkers: an examination based on survival models and g-estimation | United States     | 1941-1995      | 39412           | 4797      | 4797                  | Transportation Equipment Manufacturing |
|                  | Zhang et al. (2015)           | Occupation and risk of sudden death in a United States community: a case-control analysis | United States     | 2006-2013      | 1268            | 332       | 62                    | Multiple Industries         |

(continued on next page)
### Table 2 (continued)

| Category | Outcome | Country | Years Observed | Sample Size (N) | Author (Year) Title | Sample Size (N) | Sex | Industry Subsector |
|----------|---------|---------|----------------|-----------------|---------------------|----------------|-----|-------------------|
|          |         |         |                |                 | Ahlgren, Olsson, and Brulin (2012) Gender analysis of musculoskeletal disorders and emotional exhaustion interactive work systems among women and men. | Sweden 2008–2012 | 1373 | Multiple Industries |
|          |         |         |                |                 | Andersen et al. (2012) Cumulative years in occupation and the risk of knee osteoarthritis: a register-based follow-up study | Denmark 1981–2006 | 21173 | Manufacturing |
|          |         |         |                |                 | Lombardo et al. (2012) Musculoskeletal symptoms among female garment factory workers in Sri Lanka | Sri Lanka 2008 | 1058 | Multiple Industries |
|          |         |         |                |                 | Kubo et al. (2013) Associations between employee and manager gender: impacts on gender-specific risk of acute occupational injury | United States 2002–2007 | 2645 | Manufacturing |
|          |         |         |                |                 | Lipscomb, Schoenfisch, and Cameron (2013) Work-related injuries involving a hand or fingers among union carpenters in Washington state, 1989–2008 | United States 1989–2008 | 24,830 | Manufacturing |
|          |         |         |                |                 | Hanklang et al. (2014) Musculoskeletal disorders among Thai women in construction-related work | Thailand 2011 | 272 | Manufacturing |
|          |         |         |                |                 | Tessier-Sherman (2014) Occupational injury risk by sex in a manufacturing cohort | United States 2001–2010 | 23956 | Manufacturing |
|          |         |         |                |                 | Cantley et al. (2015) Expert ratings of job demand and job control as predictors of injury and musculoskeletal disorder risk in a manufacturing cohort | United States 2004–2005 | 9260 | Manufacturing |
|          |         |         |                |                 | Hallman et al. (2015) Association between objectively measured sitting time and neck-shoulder pain among blue-collar workers | Denmark 2011–2012 | 202 | Multiple Industries |
|          |         |         |                |                 | Parkinson et al. (1990) Health effects of long-term solvent exposure among women in blue-collar occupations | United States | NR | Manufacturing |
|          |         |         |                |                 | Bromet et al. (1992) Effects of occupational stress on the physical and psychological health of women in a microelectronics plant | United States | NR | Manufacturing |
|          |         |         |                |                 | Grimmer (1993) Relationship between occupation and episodes of headache that match cervical origin pain patterns | Australia | NR | Manufacturing |
|          |         |         |                |                 | Tsai et al. (1997) Neurobehavioral effects of occupational exposure to low-level organic solvents among Taiwanese workers in paint factories | Taiwan 1992–1993 | 206 | Manufacturing |
|          |         |         |                |                 | Goldenhar, Swanson, & Hurrell (1998) Stressors and adverse outcomes for female construction workers | United States 1991–1992 | 552 | Manufacturing |
|          |         |         |                |                 | Nguyen et al. (1998) Noise levels and hearing ability of female workers in a textile factory | Vietnam | NR | Manufacturing |
|          |         |         |                |                 | Rydstedt, Johansson, and Evans (1998) A longitudinal study of workload, health and well-being among male and female urban transports | Sweden 1991–1992 | 60 | Manufacturing |
|          |         |         |                |                 | Juutilainen et al. (2000) Nocturnal 6-hydroxymelatonin sulfate excretion in female workers exposed to magnetic fields | Finland | NR | Manufacturing |
|          |         |         |                |                 | Shirom, Melamed, and Nir-Dotan (2000) The relationship among objective and subjective environmental stress levels and health among female urban transport workers | Israel | 69 | Manufacturing |
|          |         |         |                |                 | Korda et al. (2002) The Health of the Australian workforce: 1998–2001 | United States | NR | Manufacturing |
|          |         |         |                |                 | Parkes et al. (2004) Tooth attrition in workers exposed to noise in the Montenegrin Textile Industry | Montenegro | NR | Manufacturing |
|          |         |         |                |                 | Lin et al. (2005) The prevalence of fibromyalgia among textile workers in the city of Dhaka in Bangladesh | Bangladesh | NR | Manufacturing |
|          |         |         |                |                 | Choi et al. (2013) Factors associated with sleep quality among operating engineers | United States 2005 | 498 | Manufacturing |
|          |         |         |                |                 | Lin et al. (2015) Risk for work-related injury among the employees on semiconductor manufacturing lines | Taiwan | NR | Manufacturing |

**Note:** The table continues on the next page.
| Outcome Category | Author (Year) | Title | Country | Years Observed | Sample Size | Women | Blue-Collar Women | Industry Subsector |
|------------------|---------------|-------|---------|----------------|-------------|-------|------------------|-------------------|
|                  | Evans et al. (2003) | Predictors of seropositivity to herpes simplex virus type 2 in women | United Kingdom | 1992 | 520 | 520 | 88 | Multiple Industries |
|                  | Gisler et al. (2009) | Trends in socioeconomic differences in Finnish perinatal health 1991 - 2006 | Finland | 1991-2006 | 931285 | NR | 154359 | Multiple Industries |
|                  | Jakobson and Miloczy (2009) | Reproductive outcome in a cohort of male and female rubber workers: a registry study | Sweden | 1973-2001 | NR | NR | NR | Plastics and Rubber Products Manufacturing, Food Manufacturing |
|                  | Lalive & Zweimüller (2009) | How does parental leave affect fertility and return to work? Evidence from two natural experiments | Austria | 1985, 1987, 1990, 1993, 1996 | 6180 | 6180 | NR | Multiple Industries |
|                  | Saker et al. (2010) | Reproductive outcomes among male and female workers at an aluminum smelter | United States | 2006 | 419 | 76 | 38 | Primary Metal Manufacturing |
|                  | Sayem et al. (2010) | An assessment of risk behaviours for HIV/AIDS among young female garment workers in Bangladesh | Bangladesh | 2007 | 300 | 300 | 300 | Apparel Manufacturing |
|                  | Yingxing, Smith, and Suiming (2011) | Changes and correlates in multiple sexual partnerships among Chinese adult women-population based surveys in 2000 and 2006 | China | 2000, 2006 | 4525 | 4525 | 922 | Multiple Industries |
|                  | del Bono, Weber, and Winter-Ehresr (2012) | Clash of career and family: fertility decisions after job displacement | Austria | 1990-1998 | 227199 | 227199 | NR | Multiple Industries |
|                  | Pant et al. (2013) | Knowledge of and attitude towards HIV/AIDS and condom use among construction workers in the Kathmandu Valley, Nepal | Nepal | 2013 | 317 | 33 | 33 | Construction of Buildings |
|                  | Rässänen et al. (2014) | Influence of delivery characteristics and socioeconomic status on giving birth by caesarean section - a cross sectional study during 2000-2010 in Finland | Finland | 2000-2010 | 620463 | 620463 | 90032 | Multiple Industries |
|                  | von Ehrenstein et al. (2014) | Preterm birth and prenatal maternal occupation: the role of Hispanic ethnicity and nativity in a population-based sample in Los Angeles, California | United States | 2003 | 2543 | 2543 | 186 | Multiple Industries |
| Respiratory      | Wang et al. (2015) | Sulfur dioxide exposure and other factors affecting age at natural menopause in the Jinhuachuan cohort | China | 2012 | 3167 | 3167 | 2657 | Primary Metal Manufacturing |
|                  | Kongerud and Søyseth (1991) | Methacholine responsiveness, respiratory symptoms, and pulmonary function in aluminum potroom workers | Norway | 1988 | 337 | 38 | 38 | Primary Metal Manufacturing |
|                  | Love et al. (1991) | The characteristics of respiratory ill health of wool textile workers | United Kingdom | NR | 620 | 145 | 145 | Textile Mills |
|                  | Raza et al. (1999) | Ventilatory function and personal breathing zone dust concentrations in Lancashire textile workers | United Kingdom | NR | 302 | NR | NR | Textile Mills |
|                  | Seldén et al. (2001) | Exposure to tremolite asbestos and respiratory health in Swedish dolomite workers | Sweden | 1996 | 130 | 16 | 16 | Mining (except oil and gas); Nonmetallic Mineral Product Manufacturing |
|                  | Takezaki et al. (2001) | Dietary factors and lung cancer risk in Japanese: with special reference to fish consumption and adenoarcinomas | Japan | 1988-1997 | 5198 | 1486 | 178 | Multiple Industries |
|                  | Bakirci et al. (2007) | Natural history and risk factors of early respiratory responses to exposure to cotton dust in newly exposed workers | Turkey | NR | 157 | 74 | 74 | Textile Mills |
|                  | Heikkinä et al. (2008) | Asthma incidence in wood-processing industries in Finland in a register based population study | Finland | 1986-1998 | 170963 | 25148 | 16937 | Wood Product Manufacturing, Forestry and Logging |
|                  | Thilsing et al. (2012) | Chronic rhinosinusitis and occupational risk factors among 20- to 75-year-old Danes—a GA2LEN-based study | Denmark | 2008 | 2531 | 1331 | 550 | Multiple Industries |
|                  | Storaas et al. (2015) | Incidence of rhinitis and asthma related to welding in Northern Europe | Iceland, Norway, Sweden, Denmark, Estonia | 1990-1994, 1999-2001 | 16191 | 8398 | 219 | Fabricated Metal Product Manufacturing |
|                  | Wang et al. (2015) | Synergistic impaired effect between smoking and manganese dust exposure on pulmonary ventilation function in Guangxi Manganese-Exposed Workers Healthy Cohort (GXMEWHC) | China | 2011-2012 | 1658 | 620 | 620 | Primary Metal Manufacturing |
| Self-Rated health | Korda et al. (2002) | The Health of the Australian workforce: 1998-2001 | Australia | 1998-2001 | 9167 | 4107 | 595 | Multiple Industries |
|                  | Niedhammer et al. (2008) | The contribution of occupational factors to social inequalities in health: findings from the national French SUMER survey | France | 2003 | 2468 | 10245 | 1459 | Multiple Industries |
|                  | Brunette, Smith, and Punnett (2011) | Perceptions of working and living conditions among industrial male and female workers in Peru | Peru | 2002 | 1066 | 305 | 305 | Multiple Industries |
|                  | Hammarström, Stenlund, and Jandert (2011) | Mechanisms for the social gradient in health: results from a 14-year follow-up of the Northern Swedish Cohort | Sweden | 1981-1995 | 1083 | 495 | NR | Multiple Industries |
|                  | Landefeld et al. (2014) | The association between a living wage and subjective social status and self-rated health: a quasi-experimental study in the Dominican Republic | Dominican Republic | 2011 | 204 | 134 | 134 | Apparel Manufacturing |
| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|--------------|--------------------------|------------------|----------------|----------------------------|----------------------------------------|-------------------------|----------|
| **BMI & metabolism** | Cross-Sectional | Age, sex, education, ethnic origin, repetitive work (short, medium, and long-cycle), work underload, subjective monotony | Serum glucose levels | Exposure-outcome among blue-collar women | Among blue-collar women, short-cycle repetitive work was associated with higher serum glucose (p = 0.05) levels. | Cardiovascular Occupational Risk Factors Determination in Israel Study (CORDIS) | High-Income | (Melamed et al., 1995) |
|                   | Cross-Sectional | Occupational class, marital status | Waist circumference, waist-to-hip ratio | Blue-collar women vs. other women | Among blue-collar women, waist circumference (ß = -2.40, SE = 8.19) and waist to hip ratio (ß = -0.0294, SE = 0.0065) were lower as compared with white-collar women. | Employees from a single Japanese computer and printing manufacturing company | High-Income | (Nakamura et al., 2000) |
|                   | Cross-Sectional | Age, education, occupational class, marital status, smoking status, regular physical exercise, physical activity tertiles, total energy intake quartiles | Obesity | Blue-collar women vs. other women | The odds of obesity among blue-collar women were increased as compared with white-collar women (OR = 3.5, 95% CI 2.21–5.55). | Adults living in Porto, Portugal recruited with random digit-dialing | High-Income | (Santos & Barron, 2003) |
| **Longitudinal** | Education, log-income, occupational class | Type 2 Diabetes | Blue-collar women vs. other women | The hazard of type 2 diabetes among blue-collar women was increased as compared with white-collar women (HR = 0.86, 95% CI 0.53–1.41). | | Alameda County Study | High-Income | (Maty et al., 2005) |
**Table 2**

| Country Category | Citation | Specific Outcome Referent Group | Summary of Study Findings | Brief Description of Study Population | Study Design | Independent Variables |
|------------------|----------|----------------------------------|---------------------------|---------------------------------------|--------------|-----------------------|
| **Outcome** | **Study Design** | **Weight Change** | **Exposure-outcome** | **Independent Variable(s)** | **Population Group** | **Description** |
| Longitudinal | Parental occupation; childhood household deprivation (public assistance, no plumbing, no electricity) | Blue-collar women | Among blue-collar women, retirement was inversely associated with a weight loss of 5% or greater (OR = 0.79, 95% CI 0.63–0.99). | Retirement (OR = 0.79, 95% CI 0.63–0.99). | High-Income Pitt County Study (Bennett et al., 2007) | High-Income (Forman-Hoffman et al., 2008) |
| Longitudinal | Education; occupational class | Blue-collar women vs. other women | Among blue-collar women, recent retirement was inversely associated with a weight loss of 5% or greater (OR = 0.88, 95% CI 0.57–1.37). | Recent Retirement (OR = 0.88, 95% CI 0.57–1.37). | High-Income Health and Retirement Study | High-Income National Longitudinal Study of Adolescent Health (Kaiser et al., 2007) |
| Longitudinal | Age, female, white, high school or less education | Blue-collar women vs. other women | Among blue-collar women, the odds of obesity were increased as compared with white-collar women (OR = 2.08, 95% CI 1.43–3.05). | Obesity (OR = 2.08, 95% CI 1.43–3.05). | High-Income National Health Examination Survey (KNHANES III) (Cho and Lee, 2012) | High-Income National Health Examination Survey (KNHANES III) (Cho and Lee, 2012) |
| Cross-Sectional | Age, individual education, parental education, occupation, occupational class, BMI, Marital status | Blue-collar women vs. other women | Among blue-collar women, low BMI was inversely associated with type 2 diabetes (OR = 0.32, 95% CI 0.14–0.74). | Diabetes Mellitus (OR = 0.32, 95% CI 0.14–0.74). | High-Income Blue-collar workers recruited from occupational health centers or worksites during annual health course | High-Income (Miura and Turrell, 2014) |
| Cross-Sectional | Age, female, white, high school or less education, depression, smoking, alcohol problems, vegetable intake, fruit intake, fast food intake, physical activity | Blue-collar women vs. other women | Among blue-collar women, there was no significant association between work stress and BMI. | Metabolic Syndrome (OR = 0.12, 95% CI 0.06–0.25). | High-Income Blue-collar workers recruited from occupational health centers or worksites during annual health course | High-Income (Gower and Lion, 2014) |
| Cross-Sectional | Age, female, white, high school or less education, depression, smoking, alcohol problems, vegetable intake, fruit intake, fast food intake, physical activity | Blue-collar women vs. other women | Among blue-collar women, low BMI was inversely associated with type 2 diabetes (OR = 0.00, 95% CI 0.00–0.00). | Metabolic Syndrome (OR = 0.00, 95% CI 0.00–0.00). | High-Income Blue-collar workers recruited from occupational health centers or worksites during annual health course | High-Income (Gower and Lion, 2014) |

(continued on next page)
| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome Referent Group | Summary of Study Findings | Brief Description of Study |
|------------------|-------------|--------------------------|---------------------------------|--------------------------|---------------------------|
| Cancer           | Case-Control | Occupation Cancer of the CNS Blue-collar women vs. other women | Increased risk for cancer of the CNS by gender and race included textile mills, paper mills, printing and publishing industries, petroleum refining, motor vehicles manufacturing, department stores, health care services, elementary and secondary schools, and colleges and universities. | Increased cancer risk among female rubber workers exposed to suspected carcinogens versus those unexposed (OR = 2.2, 95% CI 1.1–4.4); among female glass workers exposed to suspected carcinogens versus those unexposed (OR = 2.8, 95% CI 0.4–20); and among laundry and dry cleaners exposed to suspected carcinogens versus those unexposed (OR = 2.9, 95% CI 0.8–10). | Exposure-outcome study among blue-collar rubber workers. |
| Lung Cancer      | Case-Control | Occupation Lung Cancer Blue-collar women vs. other women | Increased lung cancer risk among blue-collar women | Increased lung cancer risk among blue-collar women (OR = 2.2, 95% CI 1.1–4.4); among female glass workers exposed to suspected carcinogens versus those unexposed (OR = 2.8, 95% CI 0.4–20); and among laundry and dry cleaners exposed to suspected carcinogens versus those unexposed (OR = 2.9, 95% CI 0.8–10). | Exposure-outcome study among blue-collar rubber workers. |
| Breast Cancer    | Case-Control | Occupation Cancer of the CNS Blue-collar women vs. other women | Increased breast cancer risk among blue-collar women | Increased breast cancer risk among blue-collar women (OR = 2.2, 95% CI 1.1–4.4); among female glass workers exposed to suspected carcinogens versus those unexposed (OR = 2.8, 95% CI 0.4–20); and among laundry and dry cleaners exposed to suspected carcinogens versus those unexposed (OR = 2.9, 95% CI 0.8–10). | Exposure-outcome study among blue-collar rubber workers. |
| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|--------------|--------------------------|------------------|----------------|-------------------------|----------------------------------------|------------------------|----------|
| Longitudinal     | Metalworking fluid (MWF) | Cervical Cancer | Exposure-outcome among blue-collar women | There was no difference in cervical cancer risk among blue-collar women exposed or not exposed to straight MWF (RR = 1.0, 95% CI 0.46–2.19). Risk of cervical cancer among blue-collar women exposed to soluble MWF increased as compared with unexposed workers (RR = 1.55, 95% CI 0.66–3.61). Risk of cervical cancer among blue-collar women exposed to synthetic MWF increased as compared with unexposed women (RR = 1.14, 95% CI 0.50–2.60). | Female hourly automobile production workers from three large manufacturing plants in Michigan | High-Income | (Betenia et al., 2012) |
| Case-Control     | Duration of Employment | Breast Cancer | Exposure-outcome among blue-collar women | The odds of breast cancer among women with 20+ years of employment versus those with 0 to 4 years of employment were increased in the iron and steel industry (OR = 1.22, 95% CI 0.72–2.07); mechanical manufacturing (OR = 1.11, 95% CI 0.92–1.34); electrical manufacturing (OR = 1.37, 95% CI 1.10–1.71); the food industry (OR = 1.13, 95% CI 0.83–1.51); the textile industry (OR = 1.13, 95% CI 0.96–1.29); the garment industry (OR = 1.16, 95% CI 1.01–1.34); the wood industry (OR = 1.22, 95% CI 0.60–1.85); the rubber industry (OR = 2.71, 95% CI 1.25–5.87); the building industry (OR = 1.45, 95% CI 0.29–7.59); the transport industry (OR = 1.15, 95% CI 0.34–3.93); the chemical industry (OR = 1.52, 95% CI 0.96–2.42); the alcoholic beverages and wine production industry (OR = 1.46, 95% CI 0.26–8.10); the pharmaceutical industry (OR = 1.31, 95% CI 0.70–2.43); and the dry-cleaning sector (OR = 2.29, 95% CI 0.97–5.41) but not for women in healthcare and veterinarian services, the plastic industry, the pottery industry, agriculture, the paper industry, the leather and shoe industry, or the press industry. | Incident cases of female breast cancer and population controls in Lombardy, Italy | High-Income | (Oddone et al., 2013) |
| Longitudinal     | Occupational class in 1993 and 1975; high job authority in 1975; adiposity in 1957; reproductive history in 1975 and 1993; job characteristics in 1975; healthy behaviors in 1993; work under pressure of time, responsibility outside control, high job autonomy; job satisfaction; high job authority; life-course estrogen cycle; family history of breast cancer | Breast Cancer | Blue-collar women vs. other women | The risk of breast cancer was increased among female crafts/operatives laborers as compared with housewives (HR = 0.87, 95% CI 0.51–1.48). | Wisconsin Longitudinal Survey (WLS) | High-Income | (Pudrovska et al., 2013) |
| Case-Control     | Exposure to lead and lead alloys, chlorinated solvents, lubricant oils, non-ionizing radiation, epoxy resins, and job title | Breast Cancer | Blue-collar women vs. other women | The odds of breast cancer were increased among blue-collar women exposed to chlorinated solvents as compared with unexposed women (OR 1.65, 95% CI 1.04–2.62). There was a two-fold increase among blue-collar women exposed for at least 10 years as compared with unexposed women (OR 2.10, 95% CI 1.21 – 3.66). | Incident cases of female breast cancer and controls selected from a single, large electrical manufacturing plant near Milan, Italy. Female workers in a textile mill in Beijing, China. | High-Income | (Oddone et al., 2014) |
| Cardiovascular disease | Sound pressure level, age, working years, salt (high), salt (normal), family history | Hypertension | Exposure-outcome among blue-collar women | Among female textile mill workers, sound pressure levels (SPL) were associated with the prevalence of hypertension (β = 0.03, SE = 0.015). | Survey of Living Conditions | Upper-Middle-Income | (Zhao et al., 1991) |
| Longitudinal     | Occupational class, work control, work social support, psychological job demand, physical job demand | Cardiovascular morbidity | Exposure-outcome among blue-collar women | Among blue-collar women, cardiovascular morbidity was more prevalent among those with low work social support (OR = 1.19, 95% CI 1.01–1.14) and high physical job demand (OR = 1.20, 95% CI 1.01–1.43). | Female workers in a textile mill in Beijing, China. Survey of Living Conditions | High-Income | (Hall et al., 1993) |

(continued on next page)
| Country                                      | Citation                                                                 | Specific Outcome Referent Group | Summary of Study Findings                                                                                                                                                                                                 |
|---------------------------------------------|--------------------------------------------------------------------------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High-Income                                 | Hammar et al., 1994                                                      | High-Income (High-Income)       | Among blue-collar women, increased risk of first MI was associated with monotony (RR = 0.3, 95% CI 0.1–0.8), few possibilities to learn new things (RR = 2.1, 95% CI 0.9–4.9), long working hours (RR = 1.1, 95% CI 0.8–1.7), and noise (RR = 1.4, 95% CI 0.9–2.1). Decreased risk of MI was associated with high psychological job demand (OR = 0.76, 95% CI 0.60–0.97). There was no association between work control and cardiovascular morbidity (OR = 1.02, 95% CI 0.87–1.20). |
| High-Income                                 | Melamed et al., 1995                                                    | High-Income (High-Income)       | Among blue-collar women, short-cycle repetitive work was associated with higher mean systolic (p = 0.003) and diastolic (p = 0.01) blood pressure; and increased risk of first MI was associated with hectic work (RR = 0.7, 95% CI 0.5–1.1) and low influence on work tempo (RR = 0.7, 95% CI 0.4–1.3). |
| High-Income                                 | Jousilahti et al., 1996                                                  | High-Income (High-Income)       | Among blue-collar women with high noise-exposure and high noise-annoyance, the mean-adjusted cholesterol level was 207 mg/dl (SE = 9.4); LDL levels were 125 mg/dl (SE = 8.6); HDL levels were 57 mg/dl (SE = 3.1); the ratio of Cholesterol to HDL was 4.1 (SE = 0.3) and the mean-adjusted Apolipoprotein B to apolipoprotein A1 ratio (ApoB/ApoA1) was 0.36 (SE = 0.06). Increased risk of MI was found among blue-collar women (RR = 1.41, 95% CI 1.15–1.73) in jobs where men predominate as compared with other women. |
| High-Income                                 | Wamala et al., 1997                                                    | High-Income (High-Income)       | Among blue-collar women, increased risk of first coronary event was increased among those with Grade 1 symptoms (RR = 1.98, 95% CI 0.56–7.01) and those with Grade 2 symptoms (RR = 1.93, 95% CI 0.69–5.39) as compared with blue-collar women. |
| High-Income                                 | Ostlin et al., 1998                                                    | High-Income (High-Income)       | Among blue-collar women, increased risk of MI was associated with female-dominated occupation in Stockholm, Female offices and factories were associated with higher mean total cholesterol (p = 0.03). |
| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|-------------|-------------------------|-----------------|----------------|--------------------------|---------------------------------------|------------------------|----------|
| Cross-Sectional  | Job strain  | Hypertension            | Heart rate      | Heart rate     | There was no association between job strain and heart rate (OR = 0.99, 95% CI 0.71–1.38). | The Jichi Medical School Cohort Study (JMS) | High-Income            | (Tsutsumi et al., 2001) |
| Case-Control     | Short stature, early life socioeconomic disadvantage (large early life family size, singletons, born last, low education), adult life socioeconomic disadvantage (occupational class at labor force entry, blue-collar occupation at examination, economic hardship prior to CHD event). | Coronary heart disease | Blue-collar women vs. other women | The odds of CHD were increased among women whose occupation at labor force entry was blue-collar compared with women whose occupation at labor force entry was white-collar (OR = 1.80, 95% CI 1.12–3.12). The odds of CHD among women whose occupation at examination was blue-collar as compared to women whose occupation at examination was white-collar (OR = 1.69, 95% CI 0.95–2.88). | The Stockholm Female Coronary Risk Study (FemCorRisk) | High-Income            | (Wamala et al., 2001)  |
| Cross-Sectional  | Age, behavioral risk factors, occupational class | Average carotid intima-media thickness | Blue-collar women vs. other women | Carotid intima-media thickness was reduced among blue-collar women as compared with female clerical workers (ß = -0.064, SE = 0.027). | Healthy Women Study (HWS) | High-Income            | (Gallo et al., 2003)  |
| Longitudinal     | Occupational class | Total stroke, intraparachymal hemorrhage, subarachnoid hemorrhage, ischemic stroke, coronary heart disease | Blue-collar women vs. other women | As compared with blue-collar women, white-collar women had lower risk of total stroke (HR = 0.93, 95% CI 0.56–1.51), intraparachymal hemorrhage (HR = 0.34, 95% CI 0.09–1.21), ischemic stroke (HR = 0.72, 95% CI 0.36–1.47), and coronary heart disease (HR = 0.66, 95% CI 0.20–2.21). Risk of subarachnoid hemorrhage was increased among white-collar women compared with blue-collar women (HR = 2.68, 1.03–6.94). | The Jichi Medical School Cohort Study (JMS) | High-Income            | (Honjo et al., 2010)  |
| Longitudinal     | Occupational class | Hypertension              | Blue-collar women vs. other women | Among women, there was an association between hourly (i.e. blue-collar) status and hypertension among those predicted to be hourly workers based on propensity scores (OR = 1.78, 95% CI 1.34–2.35). | The American Manufacturing Cohort Study (AMC) | High-Income            | (Cougherty et al., 2011) |
| Longitudinal     | Job characteristics | Stroke                   | Exposure-outcome among blue-collar women | Among blue-collar women, there was no association between risk of incident stroke among women with active jobs (HR = 0.9, 95% CI 0.3–24), passive jobs (HR = 1.0, 95% CI 0.4–2.4), or high strain jobs (HR = 1.0, 95% CI 0.4–2.5) as compared to those with low-strain jobs. | The Jichi Medical School Cohort Study (JMS) | High-Income            | (Tsutsumi et al., 2011) |
| Cross-Sectional  | Occupational class, education, poverty-income ratio | Hypertension, non-HDL Cholesterol | Blue-collar women vs. other women | The odds of hypertension among blue-collar women were increased (OR = 1.30, 95% CI 1.04–1.61) and the odds of non-HDL were decreased (OR = 0.74, 95% CI = 0.51–1.09) as compared with white-collar women. | Third Korean National Health and Nutrition Examination Survey (KNHANES III) | High-Income            | (Cho and Lee, 2012)  |
| Longitudinal     | Cumulative noise exposure, duration of exposure, first year of exposure | Hypertension              | Blue-collar women vs. other women | The risk of hypertension among female industrial workers is increased as compared with female financial workers (RR = 1.17, 95% CI 1.09–1.26). | Workers employed in one of 625 companies in the industrial trades and 100 companies in the financial services in Aarhus County, Denmark. | High-Income            | (Stokholm et al., 2013) |
| Cross-Sectional  | Age, gender, education, knowledge of CVD risk, CVD risk perception, waist-to-hip ratio, social support, BMI ratio (job stress), exposure to chemicals or noise, shift work, overtime work | Actual CVD Risk | Male vs. female blue-collar workers | Actual cardiovascular disease risk among blue-collar women was decreased as compared with blue-collar men (ß = -0.092, p = 0.709). | Blue-collar workers from companies with fewer than 300 employees | High-Income            | (Won et al., 2013)  |

(continued on next page)
| Outcome Category | Study Design | Independent Variable(s) | Study Details | Summary of Study Findings | Brief Description of Study |
|------------------|--------------|--------------------------|---------------|---------------------------|---------------------------|
| Disability & Absenteeism | Longitudinal | Occupational class | Blue-collar women vs. other women | Compared with professional women at baseline, the common carotid IMT was increased (0.005, 95% CI: 0.026 to 0.035), the carotid plaque score was decreased (-0.04, 95% CI: -22.7 to 28.3) and the prevalence of carotid plaque showing was increased (12.6, 95% CI: -41.7 to 31.2) in blue-collar women. Compared with professionals, the annual change in common carotid IMT was smaller (-0.001, 95% CI: -0.003 to 0.002), the annual change in carotid plaque score was greater (0.03, 95% CI: -2.0 to 2.7) and the annual change in the prevalence of carotid plaque showing was greater (2.0, 95% CI: -1.39, 0.03) | Limited Long-Standing Illness | Blue-collar women vs. other women | The odds of having a long-term condition (OR = 0.80, 95% CI: 0.62–1.04), a short-term condition (OR = 0.89, 95% CI: 0.62–1.04), reduced activity days (OR = 0.87, 95% CI: 0.66–1.15), and time off work (OR = 0.95, 95% CI: 0.66–1.39) were decreased among blue-collar women. 

*Note: *Table continues on next page. |
| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|-------------|--------------------------|------------------|----------------|---------------------------|---------------------------------------|------------------------|---------|
| Longitudinal     | Race/ethnicity, age, education, occupation, shift worked, tenure, hourly rate of pay, full-time employment, having 2 jobs | sickness absence; very long sickness absence | Exposure-outcome among blue-collar women | climate were 1.6 times the rate of short absence spells for those with a favorable organizational climate (HR = 1.6, 95% CI 1.0–2.3). | corporation in Finland | National Longitudinal Survey of Youth 1979 (NLSY) | High-Income | Strong and Zimmerman, 2005 |
| Longitudinal     | Occupational class | Sickness absence | Blue-collar women vs. other women | Among women, the odds of reporting a lost-worktime injury or illness were decreased among machine operators (OR = 0.73, 95% CI 0.38–1.41) and craftswomen (OR = 0.57 (0.24, 1.33) as compared with laborers. The rates of lost-worktime injury or illness were increased among machine operators (RR = 2.41, 95% CI 0.86-6.74) and decreased among craftswomen (RR = 0.58, 95% CI 0.19–1.78) as compared with laborers. | Danish Work Environment Cohort Study (DWECS) | High-Income | Christensen et al., 2008 |
| Cross-Sectional  | Occupational class | Long sickness absence | Blue-collar women vs. other women | Odds of long-term sickness absence (OR = 2.45, 1.90-3.15) and work injury (OR = 5.63, 3.13-10.16) were higher among blue-collar women as compared to professionals/managers. | SUMER Study | High-Income | Niedhammer et al., 2008 |
| Longitudinal     | Family type, domestic responsibilities, negative work-family spillover | Sickness absence | Exposure-outcome among blue-collar women | Among blue-collar women, the rates of sickness were increased for those with no children (RR = 1.11, 95% CI 0.96–1.30) and those with children 0-6 years old (RR = 1.11 (0.95-1.3) as compared to those with children 7–18 years old. Rates of sickness absence were increased if domestic responsibilities were the woman's duty alone (RR = 1.09, 0.93-12.6) or shared equally (RR = 1.15, 1.00–1.33) as compared to when they were somebody else's. Rates of sickness absence were increased for high negative work-family spillover (RR = 1.44, 1.25-1.66) and moderate work-family spillover (RR = 1.10, 0.95-1.27) as compared to low work-family spillover. | Finnish 10-Town Study | High-Income | Väänänen et al., 2008 |
| Longitudinal     | Work ability in midlife | Disability | Blue-collar women vs. other women | As compared with white-collar women in excellent health, the odds of disability were increased among blue-collar women with excellent health (OR = 1.40, 95% CI 0.96–2.05), moderate health (OR = 2.41, 95% CI 1.78–3.26), and poor health (OR = 3.91, 95% CI 2.68–5.70). | Finnish Longitudinal Study on Municipal Employees (FLAME) | High-Income | von Bonsdorff et al., 2011 |
| Cross-Sectional  | Heart rate reserve | Reduced work ability | Exposure-outcome among blue-collar women | Among blue-collar women, reduced work ability was inversely associated with increased heart rate reserve (OR = 0.30, 95% CI 0.04–2.30). | New method for Objective Measurements of Physical Activity in Daily Living (NOMAD) study | High-Income | Gupta et al., 2014 |
| Longitudinal     | Job demand, job control, social support, job insecurity, organizational injustice, lack of reward, discomfort in occupational climate | Absence due to Accident | Exposure-outcome among blue-collar women | Among blue-collar women, the odds of absence due to accidents were increased for women with insufficient job control (OR = 1.93, 95% CI 0.63-6.11), high job insecurity (OR = 1.55, 95% CI 0.48-5.10), high organizational injustice (OR = 1.79, 95% CI 0.54-5.87), lack of reward (OR = 1.54, 95% CI 0.48-4.95), and discomfort in occupational climate (OR = 1.79, 95% CI 0.10–2.5). | Workers at 23 manufacturing companies in the Incheon area of South Korea registered for health examinations | High-Income | Lee et al., 2015 |
| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|--------------|--------------------------|------------------|----------------|--------------------------|---------------------------------------|-----------------------|----------|
| Health Behaviors | Cross-Sectional | Occupational class, hours worked per week, living arrangement, smoking status, MI, self-reported health | Insufficient physical activity for health | Blue-collar women vs. other women | 0.54-5.87. The odds of absence due to accidents among blue-collar women were decreased among those with high job demand (OR = 0.41, 95% CI 0.32-1.39) and high levels of inadequate social support (OR = 0.81, 95% CI 0.22-2.92). The odds of insufficient physical activity for health among blue-collar women were 1.55 times the odds of insufficient physical activity for health among professional women (OR = 1.55, 95% CI 1.4-1.8). | the department of occupational and environmental medicine at a university hospital. | High-Income | Burton and Turrell, 2000 |
|                  | Cross-Sectional | Physical requirement, stress level, age, education, gender, race (white or black), drinking, smoking, self-reported health, workhours, any children younger than 18, have spouse, spouse working, spouse exercise level | Vigorous Physical Activity | Male vs. female blue-collar workers | Male blue-collar workers were more likely to engage in vigorous physical activity than female blue-collar workers (β = 0.03, p > 0.05). Male blue-collar workers were significantly more likely to engage in vigorous physical activity as compared with female blue-collar workers (β = 0.11, p < 0.001). | Health and Retirement Study (HRS) | High-Income | Wu and Porell, 2000 |
|                  | Cross-Sectional | Age, education, income, married, occupation, current smoker, commuting physical activity | Leisure-time physical activity | Blue-collar women vs. other women | Blue-collar women were less likely to engage in leisure-time physical activity (OR = 0.52, 95% CI = 0.38-0.73), engage in commuting time physical activity (OR = 0.93, 95% CI 0.69-1.26) as compared with blue-collar women. | Residents of Tianjin, China randomly selected using local population registers for 14 randomly selected communities. | Upper-Middle-Income | Gang et al., 2002 |
|                  | Cross-Sectional | Age, Education, Occupation | Daily energy expenditure (DIE); weekly physical activity (WPA); leisure-time physical activity (LTPA) | Blue-collar women vs. other women | Among female laborers and machine operators, daily energy expenditures were lower and weekly physical activity was higher as compared with female managers and professionals. Leisure time physical activity was similar in female laborers, machine operators, and managers. | Workers at nine companies or factories located in the east (Kanto) and central (Chubu) areas of Japan. | High-Income | Tskao et al., 2003 |
|                  | Cross-Sectional | Age, education, occupational class, geographical location, BMI, workplace activity, physical activity level | Achieving 10,000 Steps per Day | Blue-collar women vs. other women | Odds of reaching 10,000 steps among blue-collar women are 0.81 times the odds among female managers and professionals (OR = 0.81, 95% CI 0.21-3.06). | Adults in Western Australia randomly selected from the White Pages telephone directory using proportional sampling. | High-Income | McCormack et al., 2006 |
| Longitudinal     | Age, education, occupational class, smoking status, leisure-time physical activity, BMI | Heterocyclic Amine (HCA) Intake | Blue-collar women vs. other women | As compared to blue-collar women, the likelihood of falling in the highest quintile of HCA intake was lower among medium-status white-collar women (OR = 0.81, 95% CI 0.69-0.96), high-status white-collar women (OR = 0.76, 95% CI 0.59-0.97) and among self-employed women (OR = 0.97, 95% CI 0.78-1.21). No differences were found between low-status white-collar women and blue-collar women (OR = 1.00, 95% CI 0.89-1.14). | The Malmö Diet and Cancer (MDC) Study | High-Income | Ericson et al., 2007 |
|                  | Cross-Sectional | Occupational class, hours at job, hours on unpaid care, dependents (< 18 years) in the home, smoking status, weight status, perceived physical health | Physical activity | Blue-collar women vs. other women | The odds of leisure-time physical activity among blue-collar women were 2.25 times the odds of leisure-time physical activity among women in professional jobs (OR = 2.25, 95% CI 0.92-5.50). Female construction workers participating in the Tools for Health cancer prevention intervention decreased their fruit and vegetable consumption (β = -0.36, 95% CI -2.18 to1.46) over the course of follow-up. | 2000 Kings County Genuine Progress Indicators Survey | High-Income | Kujaic et al., 2007 |
| Longitudinal     | Sex, education, native language, eating at work to cope with stress, intention to change fruit and vegetable intake, smoking status | Change in fruit and vegetable consumption | Exposure-outcome among blue-collar women | As compared to blue-collar women, the likelihood of falling in the highest quintile of HCA intake was lower among medium-status white-collar women (OR = 0.81, 95% CI 0.69-0.96), high-status white-collar women (OR = 0.76, 95% CI 0.59-0.97) and among self-employed women (OR = 0.97, 95% CI 0.78-1.21). No differences were found between low-status white-collar women and blue-collar women (OR = 1.00, 95% CI 0.89-1.14). | The Malmö Diet and Cancer (MDC) Study | High-Income | Ericson et al., 2007 |

(continued on next page)
| Country                      | Citation                        | Specific Outcome Referent Group | Summary of Study Findings                                                                                                                                                                                                 |
|------------------------------|---------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Finland                      | High-Income (Mäkinen et al., 2010) | Blue-collar women engaged in leisure-time physical activity vs. other women | The odds of a secondhand smoke exposure among blue-collar workers were 1.20 times the odds of secondhand smoke exposure among white-collar workers (OR = 1.20, 95% CI 1.07–1.34). |
| Finland                      | High-Income (Cleland et al., 2011) | Blue-collar women engaged in leisure-time physical activity vs. other women | The odds of a secondhand smoke exposure among blue-collar workers were 1.20 times the odds of secondhand smoke exposure among white-collar workers (OR = 1.20, 95% CI 1.07–1.34). |
| Finland                      | High-Income (Cho and Lee, 2012)   | Blue-collar women engaged in leisure-time physical activity vs. other women | The odds of a secondhand smoke exposure among blue-collar workers were 1.20 times the odds of secondhand smoke exposure among white-collar workers (OR = 1.20, 95% CI 1.07–1.34). |
| Finland                      | High-Income (Miura and Turrell, 2014) | Blue-collar women engaged in leisure-time physical activity vs. other women | The odds of a secondhand smoke exposure among blue-collar workers were 1.20 times the odds of secondhand smoke exposure among white-collar workers (OR = 1.20, 95% CI 1.07–1.34). |
| Finland                      | High-Income (Oliveira et al., 2014) | Blue-collar women engaged in leisure-time physical activity vs. other women | The odds of a secondhand smoke exposure among blue-collar workers were 1.20 times the odds of secondhand smoke exposure among white-collar workers (OR = 1.20, 95% CI 1.07–1.34). |
| Finland                      | High-Income (Uijtdewilligen et al., 2015) | Blue-collar women engaged in leisure-time physical activity vs. other women | The odds of a secondhand smoke exposure among blue-collar workers were 1.20 times the odds of secondhand smoke exposure among white-collar workers (OR = 1.20, 95% CI 1.07–1.34). |
| Finland                      | High-Income (Hwang et al., 2015)   | Blue-collar women engaged in leisure-time physical activity vs. other women | The odds of a secondhand smoke exposure among blue-collar workers were 1.20 times the odds of secondhand smoke exposure among white-collar workers (OR = 1.20, 95% CI 1.07–1.34). |
| Finland                      | High-Income (Loscocco and Spitze, 1990) | Blue-collar women engaged in leisure-time physical activity vs. other women | The odds of a secondhand smoke exposure among blue-collar workers were 1.20 times the odds of secondhand smoke exposure among white-collar workers (OR = 1.20, 95% CI 1.07–1.34). |

(Continued on next page)
### Table 2 (continued)

| Study Design | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Country Classification | Citation |
|--------------|-------------------------|------------------|----------------|---------------------------|------------------------|----------|
| Cross-Sectional | Age, education, marriage, income, smoking, obesity, major illness, life events, solvent exposure, job demands, job conflict, co-worker support, supervisor support, friend/relative support | Depression | Exposure-outcome among blue-collar women | The odds of depression were increased among blue-collar women who smoked ($\beta = 0.21, p > 0.05$); had a major illness ($\beta = 0.46, p < 0.05$); had a life event ($\beta = 0.44, p < 0.001$) were exposed to solvents ($\beta = 0.27, p < 0.05$); or experienced increased job demands ($\beta = 0.19, p > 0.05$) or job conflict ($\beta = 0.62, p < 0.001$). Odds of depression were decreased among blue-collar women who were obese ($\beta = -0.31, p < 0.05$); and among those with support from co-workers ($\beta = -0.35, p < 0.05$, supervisors ($\beta = -0.02, p > 0.05$), or friends and relatives ($\beta = -0.50, p < 0.01$). | High-Income | (Tron et al., 1992) |
| Cross-Sectional | Occupation, months on the job, decision latitude, social supports at work, work dissatisfaction, does not have enough money, economic tensions, family tensions, negative self-image, perceived health status, age, education, number of children < 15 years, number of utilities | Depression, nervousness, sense of control | Blue-collar women vs. other women | The odds of depression were increased among garments workers as compared with service workers ($\beta = 0.77, 95\% CI -0.93 to 2.44$) and decreased among electronic workers as compared with service workers ($\beta = 0.88, 95\% CI -2.57, 0.81$). | Upper-Middle-Income | (Gendelman and Silberg, 1993) |
| Cross-Sectional | Age, sex, education, ethnic origin, subjective monotony | Psychological Distress | Exposure-outcome among blue-collar women | Among blue-collar women, psychological distress is associated with subjective monotony ($\beta = 0.49, p < 0.005$). | High-Income | (Melamed et al., 1995) |
| Cross-Sectional | Monotony, lack of control, self-esteem | Psychological Distress | Exposure-outcome among blue-collar women | Among blue-collar women ≤ 35 years, psychological distress was positively associated with monotony ($\beta = 0.23, p > 0.05$); lack of control ($\beta = 0.009, p > 0.05$) and self-esteem ($\beta = 0.006, p > 0.05$). Among blue-collar women > 35 years old, psychological distress was positively associated with monotony ($\beta = 0.050, p < 0.05$) and self-esteem ($\beta = 0.099, p < 0.05$), but inversely associated with lack of control ($\beta = -0.003, p > 0.05$). | High-Income | (Kivimäki and Kalimo, 1996) |
| Cross-Sectional | Responsibility for the safety of others, skill underutilization, sexual harassment and discrimination, overcompensation at work | Psychological symptoms | Exposure-outcome among blue-collar women | Among female construction workers, having responsibility for the safety of others ($\beta = 0.456, p < 0.001$), skill underutilization ($\beta = 0.399, p < 0.001$), experiencing sexual harassment and discrimination on the job ($\beta = 0.258, p < 0.001$), and having to overcompensate at work ($\beta = 0.254, p < 0.001$). Intake of stress-related drugs was less frequent among female bus-drivers as compared with male bus drivers ($\beta = -0.05, p > 0.05$) and there was a negative interaction between gender and workload. | High-Income | (Goldenhar et al., 1998) |
| Longitudinal | Gender, workload score | Psychosomatic complaints, intake of stress-related drugs | Male vs. female blue-collar workers | | High-Income | (Ryd et al., 1998) |
| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|-------------|-------------------------|------------------|---------------|---------------------------|---------------------------------------|-----------------------|----------|
| Specific Outcome | Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
| Score (ß = -0.03, p > 0.05). Psychosomatic complaints were less frequent among female bus-drivers as compared with male bus-drivers (ß = -0.08, p > 0.05), and there was a positive interaction between gender and workload (ß = 0.18, p > 0.05). | Odds of burnout among blue-collar women were 0.795 times the odds of burnout among women in | Adult women randomly selected from the general population resident in Stockholm County, Sweden. | High-Income | (Soares et al., 2007) |
| Burnout | Blue-collar women vs. other women | Odds of suicide were among skilled blue-collar women were 1.1 times the odds of suicide among salaried female employees (OR = 1.1, 95% CI 0.8-1.5) and the odds of suicide among unskilled blue-collar women were 0.9 times the odds of suicide among | Incident cases of suicide and population controls drawn from a 5% random subsample of the total Danish population in the IDA database. | High-Income | (Andrés et al., 2010) |
| Suicide | Blue-collar women vs. other women | The odds of psychological distress among female workers at the Toulouse industrial AZF disaster were | Workers in the metropolitan area of Toulouse, France | High-Income | (Cubidon et al., 2009) |
| Psychological distress | Blue-collar women vs. other women | Multiple associations reported between various measures of working hours and salary; safety and health; tasks and organizational aspects; extra-organizational factors and mental distress among blue-collar women. | | High-Income | (Asztalos et al., 2009) |
| Stress, distress | Exposure-outcome among blue-collar women | The risks of stress (RR = 2.661, 95% CI 1.098 - 6.447) and distress (RR = 2.911, 95% CI 1.055-8.031) were increased among blue-collar women engaging housework versus those not. The risks of stress (RR = 1.114, 95% CI 0.476-2.344) were increased among blue-collar women engaging in leisure active transport versus those not. The risk of distress was decreased (RR = 0.714, 95% CI 0.266-1.918) and the risk of distress was increased (RR = 2.366, 95% CI 0.863-6.487) among blue-collar women walking to and from work versus those not. The risks of stress (RR = 1.564, 95% CI 0.907-4.030) and distress (RR = 2.202, 95% CI 0.793-6.115) were increased among blue-collar women participating in sports versus those not. | Adults randomly selected from 46 randomly chosen Flemish municipalities. | Upper-Middle-Income | (Brunette et al., 2011) |
Table 2 (continued)

| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|--------------|--------------------------|---------------------------------|---------------------------|----------------------------------------|------------------------|----------|
|                  |              |                          |                                 |                           |                                        |                        |          |
|                  |              | Achievements, on-site    | Suicidal ideation               | Suicidal ideation was more  | Seoul Citizens Health and Social       | High-Income            | Moon and Park, 2012 |
|                  |              | training courses,        |                                | prevalent among middle-aged | Indicators Survey                      |                        |          |
|                  |              | resources/help and       |                                | women engaged in manual    |                                        |                        |          |
|                  |              | equipment availability,  |                                | labor (OR = 2.77, 95% CI 1.20-6.42) as compared |                        |                        |          |
|                  |              | supervisor-related,      |                                | with female non-manual     |                                        |                        |          |
|                  |              | discrimination -        |                                | workers.                   |                                        |                        |          |
|                  |              | intimidation or threats; |                                |                           |                                        |                        |          |
|                  |              | household income         |                                |                           |                                        |                        |          |
|                  |              | inadequacy, social and   |                                |                           |                                        |                        |          |
|                  |              | family working hours     |                                |                           |                                        |                        |          |
|                  |              | fit, adequate sanitary   |                                |                           |                                        |                        |          |
|                  |              | living conditions/potable |                                |                           |                                        |                        |          |
|                  |              | water, children under 18 |                                |                           |                                        |                        |          |
|                  | Cross-Sectional | Marital status,          | Blue-collar women vs. other     |                           | Employees at 9 companies in computer   | High-Income            | Ahlgren et al., 2012 |
|                  |              | occupational category,   | women                          |                           | science and 12 companies in the food    |                        |          |
|                  |              | household income,        |                                |                           | industry in Sweden.                     |                        |          |
|                  |              | alcohol use, functional  |                                |                           |                                        |                        |          |
|                  |              | limitations, level of    |                                |                           |                                        |                        |          |
|                  |              | stress, experience of    |                                |                           |                                        |                        |          |
|                  |              | depressed feelings       |                                |                           |                                        |                        |          |
|                  | Cross-Sectional | Age, smoking, company's  | Emotional exhaustion           | Multiple point estimates   | High-Income                            | Lowers - Middle-Income  | Minh, 2014 |
|                  |              | gender equality index,   |                                | reported for the association |                                        |                        |          |
|                  |              | employment hours,        |                                | between emotional exhaustion |                                        |                        |          |
|                  |              | occupational class, high  |                                | and exposure to engagement  |                                        |                        |          |
|                  |              | engagement in domestic   |                                | in domestic work and exposure|                                        |                        |          |
|                  |              | work, number of children |                                | to psychosocial and physical|                                        |                        |          |
|                  |              | < 18 years, work demands,|                                | work factors and work-home|                                        |                        |          |
|                  |              | work control, work       |                                | imbalance.                 |                                        |                        |          |
|                  |              | support, constrained     |                                |                            |                                        |                        |          |
|                  |              | physical heavy work load,|                                |                            |                                        |                        |          |
|                  |              | work-home imbalance      |                                |                            |                                        |                        |          |
|                  | Cross-Sectional | Psychological demand,   | Depression male vs. female      | The odds of depression were  | Third Korean National Health and        | High-Income            | Yoon et al., 2014   |
|                  |              | social support, sex,     | blue-collar workers vs. other    | increased among blue-collar  | Examination Survey (KNHANES III)        |                        |          |
|                  |              | marital status, age,     | women                          | women as compared with blue-collar |                                        |                        |          |
|                  |              | education level, duration |                                | workers (OR = 2.1, 95% CI 0.7-5.2). |                                        |                        |          |
|                  |              | of employment, perceived |                                |                            |                                        |                        |          |
|                  |              | work conditions, perceived|                                |                            |                                        |                        |          |
|                  |              | work protection materials,|                                |                            |                                        |                        |          |
|                  |              | work absenteeism         |                                |                            |                                        |                        |          |
|                  | Mortality    | Occupational class, work | Exposure-outcome among blue-collar | Among blue-collar women, odds of cardiovascular mortality were increased for those with high physical job demand (OR = 1.23, 95% CI 0.87-1.73) and decreased for those with high psychological demand (OR = 0.71, 95% CI 0.41-1.24). There was no association between work control (OR = 1.07, 95% CI 0.74-1.47) or work social support (OR = 1.04, 95% CI 0.74-1.47) and cardiovascular mortality among blue-collar women. | A random sample of the population of the eastern Finnish provinces of North Karelia and Kuopio. | High-Income          | Pekkanen et al., 1995 |
|                  |              | control, work social     | women                          |                            |                                        |                        |          |
|                  |              | support, psychological   |                                |                            |                                        |                        |          |
|                  |              | job demand, physical     |                                |                            |                                        |                        |          |
|                  |              | job demand               |                                |                            |                                        |                        |          |
|                  |              | Occupasional Class       | All-cause mortality, mortality  | As compared with white-collar women, the risks of CHD mortality were higher among skilled (HR = 1.25, 95% CI 0.73-2.13) and unskilled (HR = 1.85, 95% CI 1.11-3.09) blue-collar women. The risks of all-cause mortality were higher for skilled (HR = 1.34, 95% CI 1.04-1.73) and unskilled (HR = 1.50, 95% CI 1.15-1.94) blue-collar women. The risks for all-cause mortality were increased among skilled (HR = 1.34, 95% CI 1.04-1.73) and unskilled (HR = 1.50, 95% CI 1.15-1.94) blue-collar women. | Incident cases of (i) alcohol-related deaths and (ii) deaths from accidents or violence in Moscow, Russia and controls with Upper - Middle-Income | (Chenet et al., 1998) |
|                  |              | deaths from Accidents,    | Blue-collar women vs. other     | Alcohol-related deaths were more common in blue-collar women as compared with women in non-manual occupations (OR = 1.97, 2.86-5.52); deaths due to accidents and violence were more common in blue-collar women as compared with women in non-manual occupations (OR = 2.07, 95% CI 1.77-2.41). |                            |                        |          |
|                  |              | Violence, and Alcohol     | women                          |                            |                                        |                        |          |
|                  |              |                              |                                |                            |                                        |                        |          |
| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|-------------|--------------------------|------------------|----------------|--------------------------|--------------------------------------|-----------------------|----------|
| Longitudinal     | Occupational Class | All-cause mortality; mortality due to malignant neoplasms (various), diabetes mellitus, cerebrovascular disease, all heart disease, ischemic heart disease, nonmalignant respiratory disease, cirrhosis of the liver, and external causes | Blue-collar women vs. other women | Relative risks for all causes (0.98), all cancers (0.90), lung cancer (1.34), and breast cancer (0.96) were nonsignificant when mortality was compared to the US female population. No relationship between mortality and length of time employed in the industry or work area was identified. | Workers from 13 high nickel alloys plants located throughout the United States. | High-Income | (Anna et al., 1999) |
| Longitudinal     | Age, occupational class, heart problems | All-cause mortality | Blue-collar women vs. other women | The risk of mortality was increased among female workers as compared with female white-collar workers (RR = 1.16, p = 0.07). | Level of Living Survey (LLS) | High-Income | (Kåreholt, 2001) |
| Longitudinal     | Occupational class | Cardiovascular mortality | Blue-collar women vs. other women | The risk of observed mortality from cardiovascular disease was decreased among white-collar women as compared with blue-collar women (RR = 0.56, 95% CI 0.50–0.63). | All residents of Halland, Sweden registered in the Population and housing censuses (FoB) | High-Income | (Baigi et al., 2002) |
| Longitudinal     | Education, housing, occupational class, gross income, family type, smoking | Mortality due to respiratory disease | Blue-collar women vs. other women | As compared with blue-collar women, mortality from respiratory diseases was lower among white-collar women (HR = 0.68, 95% CI 0.47–0.99) and women outside of the workforce (HR = 0.94, 95% CI 0.63–1.39). | The Copenhagen City Heart Study (CCHS) and the Glostrup Population Studies (GPS) | High-Income | (Presor et al., 2003) |
| Longitudinal     | Shift work | All-cause mortality | Exposure-outcome among blue-collar women | Among blue-collar women, the risk of all-cause mortality was decreased among those exposed to shift work as compared with those working day shifts (HR = 0.79, 0.50–1.26). | National Survey of Living Conditions (ULF) | High-Income | (Åkerstedt et al., 2004) |
| Longitudinal     | Occupational class | All-cause mortality | Blue-collar women vs. other women | As compared with high and middle bourgeois women, the risk of all-cause mortality was increased among unskilled blue-collar women (RR = 1.14, 95% CI 1.08–1.21) and skilled blue-collar women (RR = 1.06, 95% CI 1.00–1.12). | Turin Longitudinal Study | High-Income | (Åkerstedt et al., 2005) |
| Cross-Sectional  | Occupational class | All-cause cancer mortality; lung cancer mortality | Blue-collar women vs. other women | There was no difference in cancer mortality risk among blue-collar women as compared with professional women (RR = 1.00, 95% CI 0.96–1.11). As compared with professional women, the risk of cancer mortality was increased among blue-collar women when breast cancer was excluded (RR = 1.12, 95% CI 1.02–1.22) and the risk of lung cancer mortality was increased among blue-collar women (RR = 1.12, 95% CI 1.02–1.22). | The adult population of Australia nested within Statistical Local Areas (SLA) | High-Income | (Bentley et al., 2003) |
| Longitudinal     | Gender, race, age, exposure to chrysotile fibers | Lung cancer mortality; Asbestos Mortality; Pneumococcosis and other | Exposure-outcome among blue-collar women | As compared with women whose cumulative exposure to chrysotile fibers was less than 1.5 fibre-years/ml, the risk of lung cancer mortality was decreased among those exposed to between 1.5 and 5 fibre-years/ml (RR = 0.59, 95% CI 0.22–1.61); but was increased among those exposed to between Workers exposed to chrysotile in a South Carolina asbestos textile plant. | High-Income | (Hein et al., 2007) |
| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|-------------|--------------------------|--------------------------------|---------------------------|----------------------------------------|------------------------|----------|
|                  | Longitudinal| Years smoked, drinks per week, age, male gender, race/ethnicity | All-cause mortality Male vs. female blue-collar workers | 5 and 15 fibre-years/ml (RR = 1.51, 95% CI 0.69-3.33), between 5 and 15 fibre-years/ml (RR = 3.46, 95% CI 1.52-7.60), and more than 120 fibre-years/ml (RR = 3.84, 95% CI 1.41-10.5). | San Francisco MUNI Health and Safety Study | High-Income | (Ippon et al., 2008) |
|                  | Longitudinal| Age of retirement for old-age pensioners, age of retirement for reduced earning capacity pensioners, year, age, family status, occupational class | All-cause mortality Blue-collar women vs. other women | As compared with blue-collar women, the all-cause mortality rate is lower among white-collar women (HR = 0.83, 95% CI 0.73-0.93). | All insured members of the Gmünder Erstattungskasse (GEK) compulsory health insurance fund who retired between the ages of 50 and 65 | High-Income | (Brockmann et al., 2009) |
|                  | Longitudinal| Work ability in midlife | All-cause mortality Blue-collar women vs. other women | As compared with white-collar women in excellent health, the rate of all-cause mortality was increased among blue-collar women with excellent health (HR = 1.30, 95% CI 0.97-1.74), moderate health (HR = 1.15, 95% CI 0.89-1.46), and poor health (HR = 1.44, 95% CI 1.01-1.99). | Finnish Longitudinal Study on Municipal Employees (FLAME) | High-Income | (von Bonsdorff et al., 2011) |
|                  | Longitudinal| Area-remoteness index of Australia, index of relative socio-economic disadvantage (BSD), time (years after diagnosis) and time squared, age, indigenous status, occupational class, marital status, cancer stage | Breast Cancer Mortality Blue-collar women vs. other women | The odds of breast cancer mortality were increased among blue-collar women as compared with professional women (OR = 1.27, 95% CI 1.08-1.51). | Queensland Cancer Registry (QCR) | High-Income | (Gagapits et al., 2012) |
|                  | Longitudinal| Job strain | All-cause mortality Exposure-outcome among blue-collar women | Among blue-collar women the odds of all-cause mortality were decreased for active work versus low strain work (OR = 0.77, 95% CI 0.56-1.07) and increased for passive work versus low strain work (OR = 1.17, 95% CI 0.89-1.50). There was no difference in the odds of all-cause mortality among blue-collar women engaged in high versus low-strain work (OR = 0.97, 95% CI 0.73-1.29). | Finnish Longitudinal Study on Municipal Employees (FLAME) | High-Income | (von Bonsdorff et al., 2012) |
|                  | Longitudinal| Occupational class, occupational position (manager vs. non-manager) | All-cause mortality; CVD mortality; Cancer mortality Blue-collar women vs. other women | The rates of all-cause mortality among blue-collar women were decreased as compared with white-collar women (HR = 0.78, 95% CI 0.22-2.81) and the rates of cardiovascular mortality were decreased among blue-collar women as compared with white-collar women (HR = 0.76, 95% CI 0.37-1.56). | The Jichi Medical School Cohort Study (JMS) | High-Income | (Hirokawa et al., 2013) |
|                  | Longitudinal| Age; marital status; occupational class; SOC (comprehensibility, manageability, meaningfulness); psychiatric diagnoses (organic disorder, psychotic, dementia, alcohol use disorder) | All-cause mortality Blue-collar women vs. other women | The rate of all-cause mortality among blue-collar women was 1.63 times the rate of all-cause mortality among white-collar women (HR = 1.63, 95% CI 1.06-2.52). | The Lundby Study Cohort | High-Income | (Mattsson et al., 2014) |
|                  | Longitudinal| Metalworking fluid | Ischaemic Heart Disease Mortality Exposure-outcome among blue-collar women | Among white female auto-workers, the risk of ischemic heart disease mortality was increased among those with cumulative exposure to soluble metalworking fluid of more than 3.44 mg/m³-year (HR = 1.89, 95% CI 0.74-4.86); between 1.81 and 3.44 mg/m³-year (HR = 2.44, 95% CI 0.96-6.22); between 0.77-1.80 mg/m³-year (HR = 2.40, 95% CI 0.97-5.9); and between 0-0.76 mg/m³-year (HR | Female hourly automobile production workers from three large manufacturing plants in Michigan | High-Income | (Costello et al., 2014) |

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| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|-------------|--------------------------|-----------------|----------------|-------------------------|----------------------------------------|-----------------------|----------|
| Case-Control     | Occupational class, current smoking, African American | | Sudden Cardiac Death | Blue-collar women vs. other women | Risk was increased among those with cumulative exposure to synthetic metalworking fluid greater than 0.65 mg/m³-year (HR = 1.37, 95% CI 0.82–2.29) and between 0–0.65 mg/m³-year (HR = 1.29, 95% CI 0.80–2.07) as compared with white female autoworkers with no exposure to synthetic metalworking fluids. Odds of sudden cardiac among blue-collar women were 1.49 times the odds of sudden cardiac death among blue-collar women (OR = 1.49, 95% CI 0.81–2.75). | Oregon Sudden Unexpected Death Study | High-Income | Zhang et al., 2015 |
| Musculoskeletal | Longitudinal | Physical Workload | Occupation and osteoarthrosis of the hip and knee | Exposure-outcome among blue-collar women | Among blue-collar women born in 1905–1924, the risks were increased for hospitalization due to osteoarthrosis of the hip (RR = 1.6, 95% CI 0.9–3.1) and knee (RR = 1.4, 95% CI 0.6–3.2) among those with high versus low exposure occupations. Among blue-collar women born in 1925–1945, the risk was increased for hospitalization for osteoarthrosis of the hip (RR = 1.1, 95% CI 0.9–1.3) and knee (RR = 1.9, 95% CI 1.3–2.9) among those with high versus low exposure occupations. The main individual risk factor identified was experience of previous similar symptoms in the same body region. Other individual factors were signs of psychological problems and tendency of muscle tension. | Residents of one of 13 Swedish counties who reported the same occupation in the 1960 and 1970 census. | High-Income | Vingård et al., 1991 |
| Cross-Sectional | Previous pain symptoms, muscle tension, age, psychological problems, working hours, family relationship | Pain symptoms of the head, neck, shoulders/upper arms, lower arms, low back, hip, thighs, knee and ankles | Exposure-outcome among blue-collar women | Blue-collar men were less likely to experience occupational injury than blue-collar women (ß = -0.29, p < 0.05). | Female production workers employed by a single Norwegian clothing manufacturing companies. | High-Income | Westgaard and Jansen, 1992 |
| Cross-Sectional | Positive affectivity, negative affectivity, age, sex, education, tenure, alcohol involvement, autonomy, routinization, job hazards, role ambiguity, role conflict, work overload, supervisory support, co-worker support | Occupational injury | Male vs. female blue-collar workers | Blue-collar women were less likely to experience occupational injury than blue-collar women (ß = -0.29, p < 0.05). | Blue-collar unionized employees at a single manufacturing plant in Victoria, Australia | High-Income | Verson and Erwin, 1997 |
| Longitudinal | High mental load at work, monotonous work, overtime work, dissatisfaction with leisure time, high mental load at work + dissatisfaction with leisure time | Disorders of the neck, disorders of the shoulder | Exposure-outcome among blue-collar women | Among blue-collar women, reported medical treatment or consultation for disorders of the shoulder were associated with high mental load at work (PR = 1.2, 95% CI 0.3–4.4), overtime work, (PR = 2.7, 95% CI 1.1–6.9) and high mental load at work with unsatisfactory leisure time (PR = 1.7, 95% CI 0.6–4.8) relative to potential risk factors in 1969. Unsatisfactory leisure time was associated with decreased reported medical treatment or consultation for disorders of the shoulder (PR = 0.7, 95% CI 0.3–1.7). | The RERBUS Study | High-Income | Fredriksson et al., 1999 |
| Longitudinal | Duration of exposure, age, smoking, BMI, living alone with children, job strain, social support, stress | Shoulder Disorders | Exposure-outcome among blue-collar women | Among female sewing machine operators, the risk of developing a shoulder disorder for those with high versus low shoulder support (RR = 3.72, 95% CI 1.22–11.30), increased neck-shoulder pain scores (RR = 1.02, 95% CI 1.00–1.05), smoking (RR = (continued on next page)) | Danish Project on Research and Intervention in Monotonous Work (PRIM Study) | High-Income | Kaergaard and Andersen, 2009 |

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Table 2 (continued)

| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|-------------|--------------------------|------------------|----------------|--------------------------|----------------------------------------|------------------------|----------|
| Longitudinal     | Job demand, job control, supervisor support, coworker support, age, work duration | Work injury | Exposure-outcome among blue-collar women | 3.93, 95% CI 1.33–11.58, and living alone with children (RR 3.56, 95% CI 0.87–14.68). The odds of work injury among blue-collar were increased among those with high job demand (OR = 1.30, SE = 0.08331). Odds of work injury were decreased among those with high job control (OR = 0.94, SE = 0.03650) and high coworker support (OR = 0.71, SE = 0.18003). There was no association between work injury and supervisor support (OR = 1.02, SE = 0.12049), age (OR = 1.02, SE = 0.04177), and working duration (OR = 1.00, SE = 0.05987). | Employees of a small aerosol products manufacturing plant in Japan | High-Income (Murata et al., 2000) |
| Case-Control     | Stature; body weight; sitting with neck bent forward; arms, hands at/above shoulder height; decision latitude index, precision movements required; fixed working postures; uncomfortable work postures; civil status | Neck and shoulder problems | Exposure-outcome among blue-collar women | Increased odds of neck and shoulder problems among blue-collar women were associated with the number of hours per day spent with the arms or hands at or above shoulder height (OR = 1.087, 95% CI 1.031–1.365), decision latitude index (OR = 1.175, 95% CI 1.090–1.327), required precision movement (OR = 1.714, 95% CI 0.589–4.949), fixed work postures (OR = 1.947, 95% CI 0.796–4.766), uncomfortable work postures (OR = 1.700, 95% CI 0.697–4.190), and partnership with children under 13 years (OR = 3.357, 95% CI 0.996–11.31), partnership with no children under 13 years (OR = 3.473, 95% CI 1.019–11.84), and being single with children under 13 years (OR = 4.278, 95% CI 0.823–22.25). Decreased odds of neck and shoulder problems were associated with increased stature (OR = 0.784, 95% CI 0.563–1.092), Body weight (OR = 0.991, 95% CI 0.817–1.202) and hours per day spent with arms or hands at or above shoulder height (OR = 1.039, 95% CI 1.009–1.229) were not associated with neck and shoulder problems. | Women employed at one of 26 companies in the metal and food industries from three Swedish counties. | High-Income (Björkstén et al., 2001) |
| Longitudinal     | Occupational class at age 30; parents’ occupational class, school grade, smoking, and physical activity at age 16; being single at age 21; job control and physical working condition at age 30. | Musculoskeletal Disorders | Blue-collar women vs. other women | The odds of a musculoskeletal disorder at age 21 among blue-collar women were 1.43 times the odds of a musculoskeletal disorder at age 21 among white-collar women (OR = 1.43, 95% CI 0.97–2.11). | Follow-up of a baseline survey of 16 year old pupils in their last year of compulsory schooling in the industrial Northern Swedish town of Luleå. | High-Income (Khatun et al., 2004) |
| Cross-Sectional  | Years of formal education, occupational class | Hospitalization because of back disorders | Blue-collar women vs. other women | The risk of hospitalization because of back disorders were increased among blue-collar women age 25-34 (RR = 1.6, 95% CI 1.2–2.2), age 35-44 (RR = 1.4, 95% CI 1.2–1.6), age 45-54 (RR = 1.3, 95% CI 1.1–1.4), and age 55-64 (RR = 1.3, 95% CI 1.1–1.5) as compared to their white-collar counterparts. | Population of Finland | High-Income (Kaila-Kangas et al., 2006) |
| Cross-Sectional  | Gender, age, smoking, insomnia symptoms, job type, industrial sector, work experience | Occupational injuries | Blue-collar women vs. other women | Odds of occupational injuries among female blue-collar manufacturers were 4.26 times the odds of occupational injury among female managers and clerical workers (OR = 4.26, 95% CI 2.238.13). | Workers of small-scale manufacturing factories (those with less than 50 workers) in Yanzhou | High-Income (Nakata et al., 2006) |

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| Study Design | Independent Variable(s) | Specific Outcome Referent Group | Summary of Study Findings | Brief Description of Study Findings |
|--------------|--------------------------|---------------------------------|---------------------------|-----------------------------------|
| Longitudinal | Sex, age category, education, time since hire, physical demand, race, plant type | Traumatic Injury; OSHA Recordable Injuries | Male vs. female blue-collar workers | The odds of traumatic injury among blue-collar women were increased as compared with blue-collar men (OR = 1.57, 95% CI 1.33–1.85). The odds of neck and shoulder pain were decreased among blue-collar men as compared with blue-collar women (OR = 0.5, 95% CI 0.28–0.90). The odds of distal upper extremity pain were decreased among blue-collar men as compared with blue-collar women (OR = 0.55, 95% CI 0.28–1.09). |
| Cross-Sectional | Gender, age group, ethnicity, education level, marital status, living with children, supporting families outside of household, BMI, physical activity, smoking behavior, physician diagnosed systemic illness, years of employment in garment industry | Neck, Shoulder, and Distal Upper Extremity Pain | Male vs. female blue-collar workers | The odds of neck and shoulder pain were decreased among blue-collar men as compared with blue-collar women (OR = 0.5, 95% CI 0.28–0.90). The odds of distal upper extremity pain were decreased among blue-collar men as compared with blue-collar women (OR = 0.55, 95% CI 0.28–1.09). |
| Longitudinal | Sex, age group, education level, time since hire, physical demand, race, plant type | Neck, Shoulder, and Distal Upper Extremity Pain | Male vs. female blue-collar workers | The odds of neck and shoulder pain were decreased among blue-collar men as compared with blue-collar women (OR = 0.5, 95% CI 0.28–0.90). The odds of distal upper extremity pain were decreased among blue-collar men as compared with blue-collar women (OR = 0.55, 95% CI 0.28–1.09). |
| Longitudinal | Depressive symptoms | Occupational injury | Exposures-outcome among blue-collar women | Among blue-collar women, risk of occupational injury was increased among those with depressive symptoms (RR = 2.04, 95% CI 1.41–2.95). |
| Longitudinal | Exposure-outcome among blue-collar women | Carpal tunnel syndrome | Surgically-treated CTS | The odds of surgically-treated carpal tunnel syndrome were increased among blue-collar women as compared to non-working women (OR = 3.0, 95% CI 2.5–3.6). Risk was increased among women in agriculture (OR = 2.5, 95% CI 2.0–3.2), construction (OR = 4.7, 95% CI 1.0–13.0) and manufacturing (OR = 2.1, 95% CI 1.7–2.5) as compared to non-working women. |
| Cross-Sectional | Occupational class | Occupational injury | Exposures-outcome among blue-collar women | Among blue-collar women, risk of occupational injury was increased among those with depressive symptoms (RR = 2.04, 95% CI 1.41–2.95). |
| Case-Control | Occupational class, BMI, height, parity | Carpal tunnel syndrome | Surgically-treated CTS | The odds of surgically-treated carpal tunnel syndrome among blue-collar women were increased as compared to non-working women (OR = 3.0, 95% CI 2.5–3.6). Risk was increased among women in agriculture (OR = 2.5, 95% CI 2.0–3.2), construction (OR = 4.7, 95% CI 1.0–13.0) and manufacturing (OR = 2.1, 95% CI 1.7–2.5). |

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|---------------------|
| **Outcome Category** | **Study Design** | **Independent Variable(s)** | **Specific Outcome** | **Referent Group** | **Summary of Study Findings** | **Brief Description of Study Population** | **Country Classification** | **Citation** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Longitudinal** | Occupational class, industrial sector | Carpal tunnel syndrome | Blue-collar women vs. other women | The risk of carpal tunnel syndrome (CTS) among blue-collar women was increased as compared with female farmers (RR = 2.9, 95% CI 2.5-3.4). The risk of CTS among women in construction was increased as compared with women in manufacturing (RR = 2.0, 95% CI 1.7-2.4). | Adult residents of the Maine and Loire (M&L) region in west-central France. | High-Income | (Roaquesure et al., 2009) |
| **Cross-Sectional** | Pain severity, weaver's selection of remedial measures, weaver's perception to the cause of pain, age, working hours, marital status, job tenure, literacy, psychosocial variables | Musculoskeletal Disorders | Exposure-outcome among blue-collar women | The odds of musculoskeletal disorders were increased among female handloom workers older than 25 (OR = 2.9, 95% CI 1.2-7.4), with more than 10 years of tenure (OR = 2.1, 95% CI 1.1-4.6), with mental overload (OR = 3.7, 95% CI 1.0-13.8) and among those who were literate (OR = 2.2, 95% CI 1.2-3.9). | Weavers working at handloom or powerloom units in the Ahmedabad district of India. | Lower-Middle-Income | (Nag et al., 2010) |
| **Cross-Sectional** | Work hours per day, overtime, salary; exposure to chemicals and toxic vapors/substances, exposure to vibration and dangerous equipment, high temperatures, physical dangers/unhealthy conditions at work, poor air/ventilation, crowded workstations and uncomfortable working postures, having a safe work environment, adequate protective clothing and equipment, adequate work-related welfare facilities; psychological job demands/workload, work is interesting, company informs about its achievements, on-site training courses, resources/help and equipment availability, supervisor-related, discrimination - intimidation or threats; household income inadequacy, social and family working hours fit, adequate sanitary living conditions/potable water, children under 18. | Musculoskeletal Pain | Exposure-outcome among blue-collar women | Multiple associations reported between various measures of working hours and salary; safety and health; tasks and organizational aspects; extra-organizational factors, and musculoskeletal pain among blue-collar women. | The risk of carpal tunnel syndrome (CTS) among blue-collar women was increased as compared with female farmers (RR = 2.9, 95% CI 2.5-3.4). The risk of CTS among women in construction was increased as compared with women in manufacturing (RR = 2.0, 95% CI 1.7-2.4). | High-Income | (Brunette et al., 2011) |
| **Cross-Sectional** | Age, marital status, type of carpet-weaving loom, weaving style, stature, work hours, work experience | Elbow pain; Forearm pain; Wrist pain | Exposure-outcome among blue-collar women | Among female carpet-weavers, type of carpet weaving loom (fixed vs. moving vertical) was significantly associated with shoulder pain (OR = 3.422, 95% CI 2.026-6.124); elbow pain (OR = 2.621, 95% CI 1.715-4.006); and wrist pain (OR = 2.299, 95% CI 1.539-3.433). | Stratified random sample of carpet weavers in urban and rural regions within the Kerman, Esfahan, and East Azerbaijan provinces. | Upper-Middle-Income | (Motamedzade and Moghimbeigi, 2012) |
| **Cross-Sectional** | Age, smoking, company's gender equality index, employment hours, occupational class, high engagement in domestic work, number of children < 18 years, work demands, work control, work support, constrained physical heavy work load, work-home imbalance | Neck and shoulder disorders; low back disorders | Blue-collar women vs. other women | There was no evidence of a difference between blue- and white-collar women's risk for neck and shoulder disorders (OR = 1.0, 95% CI = 0.5-1.7). | Employees at 9 companies in computer science and 12 companies in the food industry in Sweden. | High-Income | (Ahlgren et al., 2012) |
| **Longitudinal** | Occupation | Surgically treated osteoarthritis in the hip or knee | Blue-collar women vs. other women | Among female construction workers, the rate for surgically-treated osteoarthritis of the hip as compared with female office workers (HR = 1.21, 95% CI 0.91-1.61). | Danish residents employed in one of five occupational | High-Income | (Andersen et al., 2012) |

(continued on next page)
| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|-------------|-------------------------|------------------|---------------|--------------------------|----------------------------------------|-----------------------|----------|
|                  | Cross-Sectional | Age, BMI, job type, education, time in industry, monthly income | Musculoskeletal complaints of the back, knee, and upper limb | Blue-collar women vs. other women | As compared with female sewing machine operators, the odds were decreased for back complaints (OR = 0.62, 95% CI 0.28–1.39) and knee complaints (OR = 0.70, 95% CI 0.21–2.34), and increased for upper limb complaints (OR = 1.28, 95% CI 0.36–4.50) as compared with female quality control assistants. The rates for first acute injury were increased among blue-collar women as compared with blue-collar men (HR = 1.21, 95% CI 1.06, 1.39). | Female garment workers employed in factories in the Koggala FTZ in Sri Lanka. | Lower-Middle-Income | Lombardo et al., 2012 |
|                  | Longitudinal | Gender, manager type, location, year, race/ethnicity, age when started in department, tenure when started in department, department is high demand | First-aid injury, reportable injury | Male vs. female blue-collar workers | Among those with or paid lost time, the rates of hand and finger injuries among blue-collar women is increased as compared with blue-collar men (RR = 1.2, 95% CI 1.0–1.5). Among those with paid lost time, the rates of hand and finger injuries is also increased among blue-collar women as compared with blue-collar men (RR = 1.8, 95% CI 1.1–3.0). | The American Manufacturing Cohort Study (AMC) | High-Income | Kubo et al., 2013 |
|                  | Longitudinal | Age, sex, time in the union, predominant work | Hand and Finger Injuries | Male vs. female blue-collar workers | Among blue-collar women, the odds of injury among blue-collar women were increased as compared with blue-collar men (OR = 1.58, 95% CI 1.48–1.67). | Union carpenters working in Washington State. | High-Income | Ipscomb et al., 2013 |
|                  | Cross-Sectional | Work experience, prolonged working hours, awkward posture, perceived high job demand | Musculoskeletal Disorders | Exposure-outcome among blue-collar women | Among blue-collar women, the odds of musculoskeletal disorders were increased among those with five or more years of work experience (OR = 1.79, 95% CI 0.72–4.44), with prolonged working hours (OR = 7.63, 95% CI 2.06, 28.31), with awkward work postures (OR = 43.79, 95% CI 17.09–112.20), and perceived high job demand (OR = 1.16, 95% CI 0.34–3.98). | The American Manufacturing Cohort Study (AMC) | Upper-Middle-Income | Hanklang et al., 2014 |
|                  | Longitudinal | Gender | Injury | Male vs. female blue-collar workers | The odds of injury among blue-collar women were increased as compared with blue-collar men (OR = 1.58, 95% CI 1.48–1.67). | The American Manufacturing Cohort Study (AMC) | High-Income | Tessier-Sherman et al., 2014 |
|                  | Longitudinal | Physical demand, exposure to heat, psychological demand, job control, race/ethnicity, job tenure, age, sex | First aid injury and first aid MSD, Serious Injury and serious MSD, First aid MSD only; Serious MSD only | Male vs. female blue-collar workers | Among blue-collar women, the risk was increased for first aid injury (RR = 1.51, 95% CI 1.31–1.73), serious injury and serious musculoskeletal disorders (RR = 1.55, 95% CI 1.23–1.93), first aid musculoskeletal disorder only (RR = 1.26, 95% CI 1.00–1.59) and serious musculoskeletal disorder only (RR = 1.75, 95% CI 1.25–2.46) as compared with blue-collar men. | The American Manufacturing Cohort Study (AMC) | High-Income | Cantley et al., 2016 |
|                  | Cross-Sectional | Total sitting time per day | Neck and shoulder pain intensity | Exposure-outcome among blue-collar women | Among blue-collar women, the odds of NSP were increased for high total sitting time vs. moderate total sitting time (OR = 1.19, 95% CI 0.33–4.15) and the decreased for low total sitting time vs. moderate total sitting time (OR = 0.80, 95% CI 0.21–2.99). The odds for NSP were increased for high work sitting vs. moderate work sitting (OR = 1.17, 95% CI 0.32–4.33) and the odds for NSP were the same low work sitting vs. moderate work sitting (OR = 1.01, 95% CI 0.28–3.59). | New method for Objective Measurements of Physical Activity in Daily living (NOMAD) Study | High-Income | Hallman et al., 2015 |

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Table 2 (continued)

| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|--------------|--------------------------|------------------|----------------|---------------------------|---------------------------------------|-----------------------|----------|
| Cross-Sectional  | Age, current smoker, moderate/heavy alcohol, severe obesity, chronic disease, clean room, current chemical exposure | Headache, lightheadedness, vertigo, weakness, memory loss, abdominal pain, rash, multiple symptoms | Exposure-outcome among blue-collar women | As compared with blue-collar women, the odds of cervical origin headache were increased among female managers and professionals (OR = 2.94, 95% CI 1.3–6.6), and female clerical workers (OR = 1.37, 95% CI 0.6–3.2). | Residents of two adjoining Tasmanian municipalities randomly sampled from electoral rolls. Workers in six paint manufacturing plants in northern Taiwan. | High-Income | (Grimmer, 1993) |
| Cross-Sectional  | Age, education, sex, alcohol, solvent exposure index | Continuous performance test; pattern comparison (latencies); pattern memory (latencies) | Male vs. female blue-collar workers | Continuous performance test scores were decreased among blue-collar men as compared with blue-collar women (ß = –0.019, SE = 0.014), and pattern comparison (ß = 0.031, SE = 0.033) and pattern memory (ß = 0.020, SE = 0.029) were increased among blue-collar men as compared with blue-collar women. | Workers in six paint manufacturing plants in northern Taiwan. | High-Income | (Tsai et al., 1997) |
| Cross-Sectional  | Overcompensating at work, job certainty, sexual harassment and discrimination | Insomnia, nausea, headaches | Exposure-outcome among blue-collar women | Among female construction workers, the odds of insomnia were increased among those who overcompensated at work (OR = 1.41, 95% CI 1.14–1.74) and decreased among those with job certainty (OR = 0.85, 95% CI 0.77–0.94). The odds of nausea were increased among those experiencing sexual harassment and discrimination (OR = 1.35, 95% CI 1.11–1.60). The odds of headache were increased among those experiencing sexual harassment and discrimination (OR = 1.21, 95% CI 1.02–1.43). | Female members of the Laborers' International Union of North America (LIUNA) in Seattle, Washington and Portland, Oregon. | High-Income | (Goldenhar et al., 1998) |
| Cross-Sectional  | Age, area of factory | Hearing impairment | Exposure-outcome among blue-collar women | Audiometric tests performed on 69 female workers from the weaving section revealed that workers with more than 10 years of noise exposure had the | Female workers from the weaving section of a textile mill. | Lower-Middle-Income | (Nguyen et al., 1998) |

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| Outcome Category | Study Design | Specific Outcome Referent Group | Summary of Study Findings | Brief Description of Study Population | Citation |
|------------------|--------------|---------------------------------|---------------------------|--------------------------------------|----------|
| Fatigue | Cross-Sectional | Blue-collar women vs. other women | Fatigue spillover was less frequent among female bus-drivers as compared to male bus-drivers (ß = -0.05, p > 0.05) and there was a negative interaction between gender and workload score (ß = -0.24, p > 0.05). | Male vs. female blue-collar workers | **Rydstedt et al., 1998** |
| Noise level | Cross-Sectional | Blue-collar women vs. other women | Among blue-collar women, the odds of noise levels among women in technical field (OR = 15.01, 95% CI 1.90–118.50). | Female workers at four textile factories in Denizli, Turkey. | **Cobankara et al., 2011** |
| | Cross-Sectional | Blue-collar women vs. other women | As compared with professional women, the odds of long-term conditions were decreased among blue-collar women (OR = 0.80, 95% CI 0.62–1.04) and the odds of short-term conditions were decreased among blue-collar women (OR = 0.89, 95% CI 0.64–1.24). | Workers at a large company in Montenegro. | **Shirom et al., 2000** |
| | Cross-Sectional | Blue-collar women vs. other women | As compared with professional women, the odds of long-term conditions were decreased among blue-collar women (OR = 0.80, 95% CI 0.62–1.04) and the odds of short-term conditions were decreased among blue-collar women (OR = 0.89, 95% CI 0.64–1.24). | Workers at a large company in Montenegro. | **Shirom et al., 2000** |
| | Cross-Sectional | Blue-collar women vs. other women | Among blue-collar women, serum urine acid levels were negatively associated with ergonomic stress levels (ß = -0.18, SE = 0.10), environmental annoyance (ß = -0.05, SE = 0.03), and perceived control (ß = -0.03, SE = 0.02). | Female workers from a garment factory in Kuopio, Finland and a reference group of employees of a governmental and organizational risk management institute and governmental and social welfare organization and affiliated members. | **Juutilainen et al., 2000** |
| | Cross-Sectional | Blue-collar women vs. other women | Blood lead levels among women in technical jobs (for example, miners) were higher than blood lead levels among women in administrative support or administration (ß = 0.242, 95% CI = -0.115 - 0.599). | Female workers at four textile factories in Denizli, Turkey. | **Potula and Kaye, 2006** |
| | Cross-Sectional | Blue-collar women vs. other women | The odds of fibromyalgia were increased among blue-collar women as compared with blue-collar men (OR = 15.01, 95% CI 1.90–118.50). | Female workers at four textile factories in Denizli, Turkey. | **Potula and Kaye, 2006** |
| | Cross-Sectional | Blue-collar women vs. other women | Sleep score quality was decreased among blue-collar women as compared with blue-collar men (ß = -0.100, p = 0.041). | A convenience sample of operating engineers coming to either an apprentice certification or hazardous materials (Hazmat) refresher course in Michigan. | **Choi et al., 2017** |
| | Cross-Sectional | Blue-collar women vs. other women | Among blue-collar women, work-related fatigue was decreased among those currently married or cohabiting (ß = -0.07, p < 0.05). | Workers at a single semiconductor company in Montenegro. | **Lin et al., 2015** |

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| Study Design | Outcome Category | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Country Classification | Citation |
|--------------|------------------|-------------------------|------------------|----------------|--------------------------|-----------------------|---------|
| Cross-Sectional | Reproductive & Sexual Health | Occupation, age, smoking, parity, years of education | Birthweight of most recent birth | Blue-collar women vs. other women | As compared with lower white-collar workers, the odds of natural menopause were increased among blue-collar factory workers (OR = 1.17, 95% CI 0.96–1.42). | High-Income | (Eskenazi et al., 1993) |
| Cross-Sectional | Reproductive & Sexual Health | Occupation, education, place of residence | Natural Menopause | Blue-collar women vs. other women | As compared with lower white-collar workers, the odds of natural menopause were increased among blue-collar factory workers (OR = 1.17, 95% CI 0.96–1.42). | High-Income | (Outo et al., 1994) |
| Cross-Sectional | Reproductive & Sexual Health | Race, age, occupational class, smoking, contraception, coitarche, partners last year, total partners, and intercourse, sexual intercourse with partner from abroad, no non-regular partners, diagnosis with other STI, diagnosis with other STI, high vaginal swab | HSV-2 Infection | Blue-collar women vs. other women | Odds of HSV-2 infection among blue-collar women were increased as compared with white-collar women (OR = 4.14, 95% CI 1.33–12.92). | High-Income | (Evans et al., 2003) |
| Longitudinal | Reproductive & Sexual Health | Occupational class | Prematurity, low birth weight, SGA, LGA, perinatal mortality, birth weight | Blue-collar women vs. other women | As compared with upper white-collar workers, the odds of prematurity were increased (OR = 1.14, 95% CI 1.07–1.22), the odds of low birth weight were increased (OR = 1.25, 95% CI 1.16–1.34), the odds of SGA were increased (OR = 1.44, 95% CI 1.31–1.58), the odds of LGA were increased (OR = 1.24, 95% CI 1.14–1.36), and the odds of perinatal mortality were increased (OR = 1.44, 95% CI 1.13–1.83) among blue-collar women between 2003 and 2006. | High-Income | (Gissler et al., 2009) |
| Longitudinal | Reproductive & Sexual Health | Rubber cohort membership | Birth weight | Blue-collar women vs. other women | Among women who were rubber workers during pregnancy, the odds of having a girl were increased (OR = 1.15, 95% CI 1.02–1.13) and having a small-for-gestational-age child (OR = 2.15, 95% CI 1.45–3.18) as compared with food workers. | High-Income | (Osloborny and Mikóczy, 2009) |
| Quasi-Experimental | Reproductive & Sexual Health | Parental leave | Fertility | Exposure-outcome among blue-collar women | Among blue-collar women, the effect of the 1990 reform was an increase in the probability of having an additional birth in 0–36 months (ß = 0.048, SE = 0.016), in 0–120 months (ß = 0.036, SE = 0.016), and 17–28 months (ß = 0.078, SE = 0.013). The probability of having an additional birth was decreased in 0–16 months (ß = -0.031, SE = 0.009) and 29–120 months (ß = -0.008, SE = 0.016). | High-Income | (Gissler et al., 2009) |
| Cross-Sectional | Reproductive & Sexual Health | Age, education, year of conception, employment area, medical conditions during pregnancy, smoked during pregnancy, drank alcohol during pregnancy | Adverse Pregnancy Outcomes | Blue-collar women vs. other women | The odds of congenital anomalies among female laboratory workers in an aluminum smelter were increased during employment as compared with women who gave birth prior to employment (OR = 7.89, 95% CI 1.16–53.77). | High-Income | (Sakr et al., 2010) |

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| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|-------------|--------------------------|------------------|----------------|--------------------------|----------------------------------------|------------------------|----------|
| Cross-Sectional  | Age, marital status, education, age at first sexual exposure, sources of knowledge on HIV/AIDS | Use of condoms; sex with multiple partners; drug abuse | Exposure-outcome among blue-collar women | Among female garment workers, increased knowledge score was associated with increased odds of using a condom at last intercourse (OR = 1.482, p < 0.010), decreased odds of sex with multiple partners (OR = 0.832, p = 0.036), and decreased odds of drug abuse (OR = 0.766, p = 0.034). | Female workers randomly selected from five garment factories in Dhaka, Bangladesh | Lower-Middle-Income | Sayem, 2010 |
| Cross-Sectional  | Age, education, monthly income, occupation, marital status, health status, sexual norms and other behaviors, rural residency, communist party membership | Lifetime multiple sexual partnerships | Exposed-outcome among blue-collar women vs. other women | As compared with women in other occupations, the odds of having multiple sexual partners were increased among women in manual labor (OR = 3.347, 95% CI 1.069–10.476). | China Health and Family Life Survey (CHFLS) of 2000 and 2006 Survey of Chinese People’s Sexuality | Upper-Middle-Income | Yingying et al., 2011 |
| Quasi-Experimental | Displacement and firm closure | Fertility | Exposure-outcome among blue-collar women | There were minimal effects of firm closure on fertility among blue-collar women for births in the three years following firm closure (b = 0.002, SE = 0.016) and in the six years following firm closure (b = -0.013, SE = 0.023). | Women in Austria affected by a firm closure compared to a control group of non-displaced women. | High-Income | Del Bono et al., 2012 |
| Cross-Sectional  | Age, gender, nationality, marital status, level of education, level of knowledge, level of attitude | Use of condon in last sexual intercourse | Male vs. female blue-collar workers | As compared with blue-collar men, the odds of using a condom during last sexual intercourse were increased among blue-collar women (OR = 8.790, 95% CI 2.099–38.467). | Workers at eight different construction Sites in the Kathmandu Valley of Nepal. | Low-Income | Pant et al., 2013 |
| Cross-Sectional  | Maternal age, birth weight, male fetal sex, smoking status, occupational class, induction, pre-eclampsia, gestational diabetes, maternal diabetes mellitus, fear of childbirth, placental abruption, placenta previa, in vitro fertilization, prior terminations, prior miscarriages, prior caesarean section, time period | Planned Caesarian Section; Non-Planned Caesarian Section | Blue-collar women vs. other women | As compared to white-collar women, the odds of women for births in the three years following firm closure (b = 0.002, SE = 0.016) and in the six years following firm closure (b = -0.013, SE = 0.023). | Among European blue-collar women, increased dust concentration on the logarithmic scale was associated with decreased FEV1 (b = -0.011, p > 0.05). | High-Income | Kaissinen et al., 2014 |
| Case-Control     | Occupation | Preterm birth | Blue-collar women vs. other women | As compared with women in office and administrative support occupations, the odds of preterm birth were increased among women in building and grounds keeping (OR = 1.86, 95% CI 0.95–3.63) and among women in production occupations (OR = 1.43, 95% CI 0.83–2.45). | University of California, Los Angeles, Environment and Pregnancy Outcomes Study | High-Income | Ron Ehrenstein et al., 2014 |
| Cross-Sectional  | Years Exposed to Sulfur Dioxide | Age at natural menopause; Early Menopause | Exposure-outcome among blue-collar women | Among blue-collar women, the rate of natural menopause was greatest among those with 21–25 years of sulfur dioxide exposure as compared to those with no sulfur dioxide exposure (HR = 1.19, 95% CI 1.13–1.25) and unplanned C-section (OR = 1.14, 95% CI 1.08–1.22) and unplanned C-section (OR = 1.22, 95% CI 1.14–1.30). | Population of Finland | Upper-Middle-Income | Wang et al., 2015 |
| Respiratory      | Sex, age, smoking habits, atopy, familial asthma, SFEV1, airway protection | Methacholine Responsiveness | Male vs. female blue-collar workers | The odds of methacholine response among female potroom workers was increased as compared with male potroom workers (OR = 5.7, 95% CI 2.2–14.8). | Potroom Workers at Ardal aluminum plant in Western Norway | High-Income | Konrad and Sowys, 1991 |
| Cross-Sectional  | Smoking, age, height, weight, mill number, dust concentration | Lung Function | Exposure-outcome among blue-collar women | Among European blue-collar women, increased dust concentration on the logarithmic scale was associated with decreased FEV1 (b = -0.011, p > 0.05). | Wool textile workers at five mills in West | High-Income | Gove et al., 1991 |

(continued on next page)
| Country | Citation | Specific Outcome Referent Group | Summary of Study Findings | Brief Description of Study Findings |
|---------|----------|---------------------------------|---------------------------|-------------------------------------|
| Yorkshire, United Kingdom | High-Income (Raza et al., 1999) | Cross-Sectional | Lung function | Male vs. female blue-collar workers in the Lancashire area of the United Kingdom. The study found that male blue-collar workers had a higher FEV1 (ß = 4.9, SE = 1.09) and FVC (ß = 5.96, SE = 1.05) than female blue-collar workers. |
| Blue-collar workers | Cross-Sectional | Vital capacity, FEV1 | As compared with female blue-collar workers, FEV1 was increased among male blue-collar workers (ß = 4.9, SE = 1.09) and FVC was increased among male blue-collar workers (ß = 5.96, SE = 1.05). |
| Workers at two dolomite mines | High-Income (Takezaki et al., 2001) | Cross-Sectional | Lung function | Among women, the observed mean vital capacity was 3.86 (SD 0.80) and among men the observed mean FEV1 was 3.20 (SE 0.79). |
| Workers at one of three cotton mills | High-Income (Heikkilä et al., 2008) | Longitudinal | Occupational class | As compared with blue-collar men, the rate of acute airway response was increased among blue-collar women (HR = 1.51, 95% CI 1.01–2.24). |
| All residents of Finland employed in wood-processing industries | Cross-Sectional | Gender, Acute airway response | | As compared with female administrators, managers, and clerical workers, the odds of asthma were increased among blue-collar women (OR = 1.4, 95% CI 1.2–1.6) and other blue-collar women (OR = 1.4, 95% CI 1.2–1.6). |
| Blue-collar workers | Cross-Sectional | Occupational class; job exposure to gases, fumes, dust or smoke; left or changed job because of respiratory symptoms | As compared with professional women, the odds of chronic rhinosinusitis were increased among blue-collar women (OR = 1.91, 95% CI 1.27–2.86). |
| Blue-collar workers | Cross-Sectional | Self-Rated Health Status | | As compared with professional women, the odds of self-reported poor health were increased among blue-collar women (OR = 2.02, 95% CI 1.57–2.61). |

(Continued on next page)
| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome Referent Group | Summary of Study Findings Brief Description of Study Population | Country Classification | Citation |
|------------------|-------------|--------------------------|---------------------------------|---------------------------------------------------------------|------------------------|----------|
| Longitudinal     | Working class parents, household appliances, and poor somatic health at age 16; time in paid work, poor cash margin, and having children at age 21; months unemployment, financial strain, physically heavy work, high demands, low control, violence, and daily smoking at day 30 | Somatic health | Blue-collar women vs. other women | As compared with white-collar women with good somatic health at age 30, the odds were decreased for poor somatic health at age 16 (OR = 0.53, 95% CI 0.23–1.24) blue-collar women with poor somatic health at age 30. As compared with white-collar women with good somatic health at age 30, the odds of daily smoking (OR = 2.72, 95% CI 1.22–6.06) were increased in blue-collar women with poor somatic health at age 30. | Northern Swedish Cohort | High-Income (Hammarström et al., 2011) |
| Quasi-Experimental | Living wage | Global self-rated health; comparative self-rated health | Exposure-outcome among blue-collar women | Odds of “excellent” or “much better” global self-rated health were increased among women in the intervention factory as compared with women the control factory (OR = 1.4, 95% CI 0.61–3.0). Odds of “excellent” or “much better” comparative self-rated health were increased among women in the intervention factory as compared with women the control factory (OR = 1.4, 95% CI 1.4–6.7). | Workers at intervention and control factories in the Dominican Republic | Upper-Middle-Income (Landeck et al., 2014) |
| Smoking & Other Substance Use | Gender, race, age, alcohol, burnout, job problems, unwind time, years driving | Smoking increase, initiation, and maintenance | Male vs. female blue-collar workers | The odds of smoking were decreased among male bus drivers as compared with female bus drivers (OR = 0.60, 95% CI 0.33–1.09). | San Francisco MUNI Health and Safety Study | High-Income (Cunradi et al., 2007) |
| Cross-Sectional | Job demand and control, effort and reward; over commitment; physical demand; shift work; working hours; job pressure | Current Smoking | Former Smoking | Both job strain and passive jobs were associated with smoking among blue-collar women (OR = 2.6 and 3.7, respectively), and physical demand was associated with smoking among blue-collar women (OR = 16.8). No confidence intervals reported. | A random sample of White Pages listings in the state of Victoria in Australia. | High-Income (Radd et al., 2007) |
| Longitudinal | Young adult socioeconomic position (education and occupational class); family socioeconomic position; family structure; family connectedness; smoker in home; easy access to cigarettes; high school, CSS-D; number of friends who smoke; smoked during adolescence | Heavy and Light-Moderate Smoking | Blue-collar women vs. other women | As compared to women with further education, the odds were increased among blue-collar women for light-to-moderate smoking (OR = 1.88, 95% CI 1.28–2.78), heavy smoking (OR = 3.12, 95% CI 2.10–4.63). As compared to women with further education, there was no difference in odds of overweight among blue-collar women (OR = 1.04, 95% CI 0.49–2.21) and the odds of overweight were decreased (OR = 0.74, 95% CI 0.29–1.85). | National Longitudinal Study of Adolescent Health | High-Income (Yang et al., 2008) |
| Longitudinal | Partner cessation request, partner smoking, intervention group, age, gender, race/ethnicity, education, income, smoking quantity (per day) | Smoking Abstinence at 1- and 6-Months Post Intervention Follow-Up | Male vs. female blue-collar workers | As compared with men, the odds of smoking at baseline among women were 0.36 times the odds of smoking at baseline among men (0.14, 0.91). The OR for smoking one-month post-intervention in women versus men was 0.71 (0.23–2.18) and the | The MassBUILT Study | High-Income (Okechukwu et al., 2010) |

(continued on next page)
| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|--------------|--------------------------|------------------|----------------|--------------------------|---------------------------------------|------------------------|----------|
| Cross-Sectional  | Age, marital status, education, age at first sexual exposure, sources of knowledge on HIV/AIDS | Use of condom; sex with multiple partners; drug abuse | Exposure-outcome among blue-collar women | OR for prolonged cessation (6-months after baseline) in women vs. men was 1.19 (0.25, 5.80). Among female garment workers, increased knowledge score was associated with increased odds of using a condom at last intercourse (OR = 1.482, p = 0.10), decreased odds of sex with multiple partners (OR = 0.832, p = 0.036), and decreased odds of drug abuse (OR = 0.766, p = 0.034). | Female workers randomly selected from five garment factories in Dhaka, Bangladesh | High-Income | (Sayem, 2010) |
| Cross-Sectional  | Gender, age, education, ethnicity, negative affectivity, social desirability, drinking norms, policy enforcement, role overload, job insecurity, job hazards, decision involvement, self-estrangement, social interactions | Quantity of alcohol consumption; Frequency of alcohol consumption; Frequency of Drug Use | Male vs. female blue-collar workers | As compared with blue-collar men, blue-collar women consumed greater quantities of alcohol ($B = 0.161, p \geq 0.05$), consumed alcohol with greater frequency ($B = 0.260, p > 0.050$), and used drugs less frequently ($B = -0.845, p < 0.01$). | Random sample of workers from a single manufacturing firm in Israel employed at plants with 80 or more workers. | High-Income | (Biron et al., 2011) |
| Longitudinal     | Working class parents, household appliances, and poor somatic health at age 16; time in paid work, poor cash margin, and having children at age 21; months unemployment, financial strain, physically heavy work, high demands, low control, violence, and daily smoking at day 30 | Somatic health | Blue-collar women vs. other women | As compared with white-collar women with good somatic health at age 30, the odds of daily smoking (OR = 1.37, 95% CI 0.87–2.17) were increased in blue-collar women with poor somatic health at age 30. | | | | |
| Cross-Sectional  | Age, gender, race, income, education, self-rated health, occupational factors, union commitment, job satisfaction, exposure to occupational factors, Intervention status, age, gender, race, income, education, smoking intensity, union commitment, exposure to occupational hazards, concern about exposure to occupational hazards | Current smoking | Male vs. female blue-collar workers | The odds of current smoking among blue-collar women were increased as compared with blue-collar men (OR = 1.37, 95% CI 0.67–2.17). | | | | |
| Longitudinal     | Smoking Cessation at 1- and 6-months post-intervention monitoring | Odds of smoking cessation one-month post-intervention were increased among blue-collar women as compared with blue-collar men (OR = 1.99, 95% CI 0.61–7.89). Odds of prolonged cessation six months post-intervention among blue-collar women were increased as compared with blue-collar men (OR = 1.20, 95% CI 0.24–6.06). | | | | | | |
| Cross-Sectional  | Age, gender, race, income, education, time to first cigarette, age of smoking initiation, intention to quit at 30 days, self-efficacy for quitting 30 days, temptation to smoke, decisional balance, household smoking, dust exposure at work, chemical exposure at work, concern about exposure to occupational hazards | Heavy smoking | Male vs. female blue-collar workers | The odds of heavy smoking among blue-collar men were increased as compared with blue-collar women (OR = 4.55, 95% CI 1.62–12.79). | | | | |
| Cross-Sectional  | Occupational class, education, poverty-income ratio | Smoking | Blue-collar women vs. other women | The odds of smoking among blue-collar women were increased as compared with white-collar women (6.65, 95% CI 4.90–9.03). | | | | |
| Cross-Sectional  | Occupational class, exposure to workplace environmental tobacco smoke (ETS) | Never smoking; Exposure to workplace ETS; Smoking cessation; Smoking intensity | Blue-collar women vs. other women | The odds of being a never-smoking were similar among blue-collar women and female managers and professionals (OR = 1.08, 95% CI 0.75–1.55). The odds of workplace environmental tobacco smoker were increased among blue-collar women as compared with female managers and professionals (OR = 1.53, 95% CI 1.01–2.30). | | | | |
| Cross-Sectional  | Age, sex, past month cigarette use, AUDIT (alcohol problem), race, education | Smokeless Tobacco Use | The odds of smokeless tobacco use were increased among male operating engineers as compared with | | | | |

(continued on next page)
Table 2 (continued)

| Outcome Category | Study Design | Independent Variable(s) | Specific Outcome | Referent Group | Summary of Study Findings | Brief Description of Study Population | Country Classification | Citation |
|------------------|-------------|--------------------------|------------------|----------------|--------------------------|----------------------------------------|------------------------|----------|
|                  | Longitudinal| Labor market shock, cigarette prices, state anti-smoking sentiment, age, sex, education, race/ethnicity, employment status, family income, data collection year | Smoking status | Male vs. female blue-collar workers | The odds of smoking among female construction workers were increased as compared with male construction workers (OR = 1.08, 95% CI 0.90–1.29). | to either an apprentice certification or Hazardous Materials (Hazmat) refresher course in Michigan. | High-Income | Okechukwu et al., 2012 |
|                  | Cross-Sectional| Occupational class, race/ethnicity, age, education, adverse childhood events | Monthly binge drinking, past 30 day smoking, past year marijuana use, polysubstance use (≥ 2 more) | Male vs. female blue-collar workers | As compared with women employed in non-physically demanding occupations, the odds were increased for binge drinking (OR = 4.01, 95% CI 1.66–9.49), past 30-day smoking (OR = 1.94, 95% CI 1.18–3.21), marijuana use (OR = 1.37, 95% CI 0.59–3.20), and polysubstance use (OR = 3.21, 95% CI 1.40–7.30) among blue-collar women. | A purposive sample of workers and their spouses or cohabitating partners sampled from a large union representing construction industry workers in Northern California. | High-Income | Cunradi et al., 2014 |
|                  | Cross-Sectional| Occupational class; occupational status (high, upper, intermediate, simple, low); employment status | Cigarette smoking, heavy smoking; alcohol consumption; excessive heavy drinking; cannabis use; analgesic use; weekly analgesics use | Blue-collar women vs. other women | As compared with white-collar women, the 30-day prevalence of smoking (OR = 1.10, 95% CI = 0.88–1.38); the odds of smoking ≥ 20 cigarettes per day in the past 30 days (OR = 1.15, 95% CI 0.70–1.90); the 12-month prevalence of cannabis use (OR = 1.08, 95% CI 0.56–2.10); and the 30-day prevalence of analgesic use (OR = 2.83, 95% CI 0.93 – 1.63) were increased among blue-collar women. The 30-day prevalence of alcohol consumption (OR = 0.74, 95% CI 0.60 – 0.92); the 30-day prevalence of excessive heavy drinking (OR = 0.74, 95% CI 0.59 – 1.03); and the 30-day prevalence of analgesic use (OR = 0.88, 95% CI 0.73 – 1.07) were decreased among blue-collar women as compared with white-collar women. | German Epidemiological Survey of Substance Use | High-Income | Maron et al., 2016 |

* NR = Not Reported.
** We included only those independent variables for which authors reported results.
A Denotes studies in which occupational class was not the primary independent variable.
B Denotes studies in which sex/gender was not the primary independent variable.
C Denotes exploratory studies that considered multiple independent variables simultaneously.
3.2. Health outcomes

We report characteristics for each study in Table 2 within each health outcome category. The two most commonly studied outcomes were musculoskeletal disorders (N = 30, 16.9%), followed by all-cause and cause-specific mortality (N = 20, 11.3%) and cardiovascular diseases (N = 19, 10.7%) (Fig. 3). Cross-sectional design predominated among studies of mental health outcomes, reproductive and sexual health, and smoking and other substance use. By contrast, the majority of mortality studies were longitudinal, and studies on cancer were either longitudinal or case-control design. (Fig. 4)

Overall, study findings across health outcome categories suggested inferior health among female blue-collar workers as compared with blue-collar men or women in other industries or job types. Of studies that compared the health of blue-collar men and women, the majority considered musculoskeletal, respiratory, or smoking-related outcomes. Studies on musculoskeletal disorders consistently showed increased risk for pain and work-related injuries in blue-collar women as compared with men (Cantley, Tessier-Sherman, Slade, Galusha, & Cullen, 2016; Iverson and Erwin, 1997; Kubo, Cullen, Desai, & Modrek, 2013; Lipscomb, Schoenfisch, & Cameron, 2013; Pollack et al., 2007; Taiwo et al., 2008; Tessier-Sherman et al., 2014; Wang, Rempel, Harrison, Chan, & Ritz, 2007). Similarly, blue-collar women exhibited inferior respiratory health compared with blue-collar men based on results from pulmonary function tests and airway responsiveness (Bakirci et al., 2007; Kongerud and Soyseth, 1991; Raza, Fletcher, Pickering, Niven, &

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Fig. 3. Number of Studies Published by Country.

*Fig. 4. Number of Studies by health outcome category*. *Studies that reported findings across health outcome categories appear multiple times.*
Faragher, 1999; Seldén et al., 2001). Comparisons of smoking frequency in male and female blue-collar workers, however, yielded inconsistent findings (Chin, Hong, Gillen, Bates, & Okechukwu, 2012; Chin, Hong, Gillen, Bates, & Okechukwu, 2012; Chin, Hong, Gillen, Bates, & Okechukwu, 2013; Cunradi, Lipton, & Banerjee, 2007; Noonan and Duffy, 2012; Okechukwu, Bacic, Cheng, & Catalano, 2012; Okechukwu, Nguyen, & Hickman, 2010).

Inferior health was also observed among blue-collar women for a wide range of health outcomes as compared with women in other industries or job types. Increased risk for cardiovascular disease—including myocardial infarction, chest discomfort, coronary heart disease, hypertension, and stroke—was consistently observed in blue-collar women as compared with white-collar women (Baigi, Marklund, & Fridlund, 2001; Clougherty, Eisner, Slade, Kawachi, & Cullen, 2011; Cho and Lee, 2012; Honjo, Tsutsui, Kayaba, & Group JMSCS, 2010; Ostlin, Alfredsson, Hammar, & Reuterwall, 1998; Stokholm, Bonde, Christensen, Hansen, & Kolstad, 2013; Wamala, Lynch, & Caspersson, 2001; Wamala, Wolk, Schenck-Gustafsson, & Orth-Gomér, 1997). The majority of studies on all-cause and cause-specific mortality found increased risk in blue-collar women as compared with other working women (Baigi, Fridlund, Marklund, & Oden, 2002; Bentley, Kavanagh, Subramanian, & Turrell, 2008; Bogren, 2014; von Bonsdorff et al., 2011; Brockmann, Müller, & Helmer, 2009; Chenon, Leon, Mckee, & Vassin, 1998; Dasgupta, Baade, Atikten, & Turrell, 2012; Käreholt, 2001; Mamo, Marinacci, Demaria, Mirabelli, & Costa, 2005; Mattisson, Horstmann, & Hein, Stayner, Lehman, & Dement, 2007; Pekkanen, Tuomilehto, Uutela, Vartiainen, & Nissinen, 1995; Prescott, Godtfredsen, Vestbo, & Osler, 2003). Two studies found decreased risk of all-cause and cause-specific mortality in blue-collar women as compared with women in the general population (Arena, Costantino, Sussman, & Redmond, 1999; Zhang et al., 2015), a finding which may reflect the fact that employed persons tend to be healthier on average as compared with members of the general population. Studies also find increased risk for various musculoskeletal disorders (Andersen, Thygesen, Davidsen, & Helweg-Larsen, 2012; Kaila-Kangas et al., 2006; Khatun, Ablgren, & Hammarsström, 2004; Lombardo, Vijitha de Silva, Lipscomb, & Östhype, 2012; Mattioli et al., 2009; Nakata & Kita, 2006; Niedhammer, Chastang, David, & Kelleher, 2008; Roqueuera et al., 2008; Roqueuera et al., 2009), adverse pregnancy-related outcomes (Eskenazi, Gueudelmann, & Elkin, 1993; von Ehrenstein, Wilhelm, Wang, & Ritze, 2014; Gissler et al., 2009; Jakobsson and Mikkonen, 2009; Räisänen, Gissler, Kramer, & Heinonen, 2014; Sakr et al., 2010), and smoking (Cho and Lee, 2012; Fufishio, Stukovsky, Diez-Roux, Landsbergis, & Burchfiel, 2012; Hammarsström, Stenlund, & Janlert, 2011; Maron, Kraus, Pogarell, Gomes de Matos, & Piontek, 2016; Yang, Lynch, Schulenborg, Rou, & Raghunathan, 2008) in blue-collar women as compared with women in other occupations and job types.

Of note, comparisons of risk of overweight and obesity in blue-collar women as compared with women in other industries or job types yielded mixed findings. Studies on health behaviors also did not consistently show whether levels of physical activity were increased or decreased in blue-collar women as compared with other women. This discrepancy persisted even in studies that only considered leisure time physical activity.

Studies that focused on identifying risk factors for morbidity and mortality among blue-collar women typically focused either on the physical risks associated with blue-collar, job demand, or organizational climate. Several studies identified chemical exposures a risk factor not only for cancers among blue-collar women (Betenia, Costello, & Eisen, 2012; Oddone et al., 2014; Richiardi et al., 2004; Thompson, Kriebel, Quinn, Wegman, & Eisen, 2005), but also for psychiatric distress and depression (Bromet, Dew, Parkinson, Cohen, & Schwartz, 1992; Parkinson et al., 1990). Increased job demand, job conflict, subjective monotony, skill underutilization and sexual harassment were all identified as risk factors for psychiatric distress (Goldenhar, Swanson, Hurrell, Ruder, & Deddens, 1998; Kivimäki et al., 2007; Melamed, Ben-Avi, Luz, & Green, 1995), although reduced psychological distress was observed among blue-collar women with adequate social support (Bromet et al., 1992; Brunette, Smith, & Punnett, 2011). Factors such as work control, job strain, and occupational stress do not appear to be associated with cardiovascular disease among blue-collar women (Hall, Johnson, & Tsou, 1993; Tsutsui, Kayaba, & Ishikawa, 2011; Tsutsui, Kayaba, Tsutsui, & Igarashi, 2001). We include a complete discussion of study findings on the health of female blue-collar workers in Appendix B.

4. Discussion

The primary objectives of this systematic review were to catalogue the extent and strength of the existing empirical evidence on the health of blue-collar women; identify patterns in publication over time, across countries, and among various health outcomes; and to evaluate the degree to which study findings converge. We examined literature published between 1990 and 2015, a 25-year period selected to capture major trends in the global economy that may be salient to contemporary working women’s health.

Our search identified 177 peer-reviewed studies published over the past 25 years across 40 different countries on a wide range of health outcomes. Findings from these studies suggests that blue-collar women experience worse health than either blue-collar men or other women. This finding emerged as a general pattern across a diverse array of studies with different target populations, designs, analyses, times, contexts, and referent groups. The following factors, however, may preclude direct comparison between many of the studies included in this review.

First, substantial heterogeneity across geographicalies implies heterogeneity in sociopolitical and cultural contexts, which in turn may influence labor regimes, gendered norms around labor force participation, and ultimately any findings on the association between gender, occupational class or the work environment, and health. Second, while several studies reported findings on a specific exposure-outcome relationship among blue-collar women, the majority compared disease risk among blue-collar women to disease risk among another group of women (such as female white-collar workers). Fewer studies compared disease risk among blue-collar men and blue-collar women. These three different types of measures of association cannot be directly compared with one another. Interpretation of study findings that contrast risk of morbidity and mortality among blue-collar men and blue-collar women is further complicated by the fact that any differences may be attributable to differences in biological sex, socially-constructed gender, or some combination thereof. Interpretation of study findings that contrast the risk of morbidity and mortality among two groups of women distinguished by their occupational class is complicated by the fact that measures of associations likely reflect some combination of the effects of occupational class and indirect selection processes (i.e. selection of more or less educated women into a particular occupational class) (Klumb and Lampert, 2004).

Third, study findings were influenced by age- and cohort-effects that were not always addressed or adjusted for in analyses. Age effects result from the physiological state of aging and the social influences associated with a certain age, while cohort effects stem from influences associated with membership to a particular birth cohort (Carlsson and Karlsson, 1970). Although most studies controlled for age as a potential confounder, we note substantial heterogeneity in the age range to which the study population was restricted. Some studies, for example, limited participation to older adults (Wamala et al., 1997; Wu and Porell, 2000), while others included any adult over the age of 18 in their study samples (McCormack, Giles-Corti, & Milligan, 2006).

Because risk for nearly all diseases increases with age, studies that limited their samples to older adults are not comparable to those that included a broader range of ages. Cohort effects also hinder cross-study comparisons because different birth cohorts may have been exposed to
certain risk or protective factors that differentially influenced their likelihood of morbidity or mortality. Changes over time in societal norms or other social, political, and environmental factors related to gender and work potentially influenced patterns of health outcomes. As men and women's exposure to job-related chemicals and substances, ergonomic demands, and psychosocial stressors have varied over time, the statistical significance of study findings may depend on the specific birth cohorts included in the study population.

Fourth, because we did not limit our review to studies whose primary research question pertained to the causal effects of gender and occupational class on health, estimates for sex/gender or occupational class were often considered as secondary variables. Direct interpretation of the effect estimates for secondary risk factors, therefore, do not necessarily represent total effect estimates, and may be confounded even when the effect estimate for the main exposure is not (Westreich and Greenland, 2013). This phenomenon can occur when the set of variables used for adjustment are selected with the goal of isolating the causal effect of the main exposure, not the secondary variables. The appropriate set of control variables for a causal study of the effect of any of the secondary variables may be different, however, from the set presented in the current study. We therefore encourage readers to be cautious in drawing conclusions from studies that controlled for gender or occupational class but did not consider either as a main effect in their analysis. We indicate which studies did not consider gender or occupational class as a main effect with superscripts in the “reference group” column in Table 2.

Fifth, the generalizability of results in this review is limited by the over-representation of high-income nations. Although 40 different countries were represented in our synthesis, the majority were based on the experiences of women in industrialized, high-income countries – particularly the Scandinavian countries and the United States. The percentage of women employed in blue collar jobs in these countries has held steady over the past 30 years (Mammen and Paxson, 2000; O’Farrell, 1999), with growth of women in blue collar work occurring predominantly in middle and low-income countries (Centre for Social Development et al., 2018). A concerted effort to study the health of blue-collar women in lower and middle-income countries will be essential in order to gain a comprehensive understanding of how work influences women’s health in varied geographic contexts amidst changing sociopolitical contexts, gender norms, and labor laws. Generalizability is further complicated by the fact that single study populations were represented multiple times among several of the papers, and by variability in the composition of blue-collar industries represented by the study population. While studies focused on workers from the same industry subsector (e.g. primary metals manufacturing, textile mills) may be more readily compared to one another, population-based studies where multiple blue-collar industries are represented have the potential to offer more general information about blue-collar workers’ health.

Sixth, studies of working populations can yield biased findings due to the healthy hire and the healthy worker survivor effects. The healthy hire effect is the processes whereby healthier workers are more likely to seek and gain employment (Lea et al., 1999), a phenomenon that is particularly problematic for studies that directly compared blue-collar men or women in other occupational classes. Methodological limitations and notable heterogeneity across study populations, however, introduce uncertainty into the interpretation of such findings. These factors, alongside the rapidly changing nature of women in the workplace, motivate further study on the health of blue-collar women. Efforts to identify specific mechanisms by which blue-collar work may predispose women to adverse health may be particularly valuable in informing future workplace-based and policy-level interventions. For example, future reviews may focus on the synthesis of evidence on sex differences in response to physical hazards in the workplace so as to inform regulatory guidelines to improve occupational safety and health (Howard, Piacentino, MacMahon, & Schulte, 2017; Sheehan and Lam, 2015). Alternatively, future efforts may focus on synthesizing the evidence on the effects of various aspects of organizational climate on women’s health and well-being in historically male-dominated industries and occupations.

Expanding research into other countries, particularly less developed nations, will be useful in order to gain understanding of how differences in labor laws, working conditions, workplace safety, and in cultural norms and attitudes toward women and work contribute to the health of blue collar women. With much blue-collar work in middle and low-income countries remaining in the informal sector, studies on the experiences of these “invisible women,” at least from the economic sense, are needed.

Acknowledgements

The authors would like to thank Dr. Ellicott Matthey for her thoughtful comments on an earlier version of this manuscript. This research was supported by the National Institute of Health National Institute on Aging grant R01-AG026291; the National Institute on Occupational Health and Safety grant 5T42OH008429-13; and by the National Institute on Mental Health grant F31 MH 112246. The conclusions expressed are solely those of the authors.

Ethics approval

Ethics approval is not required for this paper, as this is a systematic review that does not directly involve data collected from human subjects.
Appendix A. List of search algorithms

| Database          | Search terms                                                                 |
|-------------------|-----------------------------------------------------------------------------|
| Google Scholar    | health, “blue collar women”                                                |
|                   | health “female blue collar”                                                 |
| PubMed A          | Preliminary Search:                                                         |
|                   | health, “blue collar women”                                                |
|                   | health “female blue collar”                                                 |
|                   | Updated Search:                                                             |
|                   | (((((sex[tiab] OR female[tiab])) OR (“Sex Factors”[Mesh]) OR (“Women’s Health”[Mesh]) OR “Women, Working”[Mesh])) AND (((“Industrial Development”[Mesh:NoExp]) OR “Manufacturing Industry”[Mesh:NoExp]) OR “Construction Industry”[Mesh:NoExp]) OR “Extraction and Processing Industry”[Mesh]) OR “Textile Industry”[Mesh]) OR “Tobacco Industry”[Mesh]) OR (“blue collar”[tw] OR “blue-collar”[tw])) |
| Web of Science A  | Preliminary Search:                                                         |
|                   | health, “blue collar women”                                                |
|                   | health “female blue collar”                                                 |
|                   | Updated Search:                                                             |
|                   | (TS = (“blue collar”) OR TI = (“blue-collar”)) AND (TS = (women OR female OR “women work*”) OR TI = (Women OR female OR “women work*”)) |
| SCOPUS            | (TITLE-ABS-KEY (“blue collar” OR ‘blue-collar’) AND TITLE-ABS KEY (women OR female) AND TITLE-ABS-KEY (industr* OR ‘women work*’) AND TITLE-ABS-KEY (health)) |
| Contemporary Women's Issues | Words and phrases: blue collar                                               |
| Women's Studies Quarterly | Subject: health general                                                        |
| Social Sciences Citation Index | TOPIC(blue collar) OR TITLE: (blue collar) AND TOPIC:(women) OR TITLE:(women) AND TOPIC:(health) OR TITLE: (health) |
| LGBT Life with Full Text SafetyLit | Women AND Blue Collar                                                          |
| CINAHL            | MH blue collar workers OR TI blue collar OR AB blue collar OR SU blue collar OR MH industry AND (MH “Women + ”) OR (MH “Women, Working + ”) |
| Gender Watch      | ((SU.EXACT("Gender") OR SU.EXACT("Women") OR SU.EXACT("Female employees") OR SU.EXACT("Gender differences")) OR all(women OR "women work") AND ((SU.EXACT("Manufacturing") OR SU.EXACT("Blue collar workers") OR SU.EXACT("Manual workers") OR SU.EXACT("Construction industry")) OR all("blue-collar" OR "blue collar")) |
| Cochrane          | “Blue collar” AND women                                                     |

*For Web of Science and PubMed we report our preliminary search strategy as well as the updated strategy developed by the medical librarian.

Appendix B. Description of findings by health outcome category

Studies that met the inclusion criteria for this systematic review were classified into one of 11 health outcome categories: BMI and metabolism; cancer; cardiovascular diseases; disability and absenteeism; mental health; all-cause and cause-specific mortality; musculoskeletal disorders; reproductive and sexual health; respiratory diseases; self-rated health; and smoking and other substance use. Disease endpoints that did not fit into one of these categories were classified as “other.” Below, we summarize study findings within each health outcome category. For each health outcome category, we first summarize results from studies that compared male and female blue-collar workers, we then summarize results from studies that compared blue-collar women to women in other industries or job types. Finally, we discuss specific risk factors for disease identified among blue-collar women. Where possible, we synthesize results and note consistency of findings.

BMI & metabolism (N = 13 Studies)

In one cross-sectional study of Michigan operating engineers, the odds of obesity were decreased in women versus men (Duffy, Cohen, Choi, McCullagh, & Noonan, 2012). Findings on risk of obesity or increased BMI in female blue-collar workers, however, yield mixed findings. While several studies note increased odds of obesity and increased BMI among blue-collar women as compared with either white-collar workers or professionals (Bennett, Wolin, & James, 2007; Cho and Lee, 2012; Miura and Turrell, 2014; Santos and Barros, 2003), others reported equivalent odds of overweight and obesity in blue-collar women and women with further education (Yang et al., 2008); lower waist circumference and waist-to-hip ratio in blue-collar women versus white-collar women (Nakamura, Nakamura, & Tanaka, 2000); and no increase in fat mass index (FMI) in blue-collar women versus those working in the transport and communications industry (Lewin et al., 2014). These discrepancies may reflect differences in the reference group selected by the investigators or differences in the specific outcomes considered. The one study that compared diabetes risk in blue- and white-collar women found increased risk for type 2 diabetes in blue-collar women (Maty, Everson-Rose, Haan, Raghunathan, & Kaplan, 2005).

Among blue-collar women, retirement was associated with weight gain; type 2 diabetes was associated with soda drinking; work-related factors such as low job stress, low social support, and repetitive work were associated with metabolic syndrome and elevated serum glucose levels (Eshak et al., 2013; Forman-Hoffman et al., 2008; Hwang and Lee, 2014; Melamed et al., 1995).
Cancer (N = 12 Studies)

No studies in this review compared cancer risk in blue-collar men and women. Women working in a wide-range of blue-collar industries - including textile mills, paper mills, printing and publishing industries, petroleum refining, and motor vehicles manufacturing – were at increased risk for cancers of the central nervous system (Cocco, Heineman, & Dozemeci, 1999). Comparisons of breast cancer risk in blue-collar women versus women in other industries and job types yielded mixed findings. While one study from the Netherlands found no difference in breast cancer risk in blue- and white-collar women, results from a Swedish case-control study suggest excess breast cancer risk among metal platers and coaters and results from a longitudinal U.S. study suggest increased breast cancer risk in female crafts/operatives as compared with housewives (Van Loon, Goldbohm, & Van Den Brandt, 1994; Pollán and Gustavsson, 1999; Pudrovská, Carr, McFarland, & Collins, 2013). However, studies suggest decreased risk for lung cancer and colon cancer in blue- versus white-collar women (Hrubá et al., 2009; Van Loon, Van den Brandt, & Golbohm, 1995).

Among blue-collar women, studies consistently identified increased risk for cancers of the lung, breast, and cervix associated with exposure to occupational hazards such as chlorinated organic solvents or metalworking fluids (Betenia et al., 2012; Oddone et al., 2014; Richardi et al., 2004; Thompson et al., 2005). Greater duration of employment in blue-collar jobs was also associated with increased risk for cancers of the breast and bladder (Colt et al., 2011; Oddone et al., 2013).

Cardiovascular Diseases (N = 19 Studies)

One cross-sectional study from South Korea found that cardiovascular disease risk equivalent in blue-collar men and women (Won, Hong, & Hwang, 2013). However blue-collar women's cardiovascular health is consistently noted as inferior to women in other industries and job types. Studies find increased risk for a wide range of cardiovascular diseases including myocardial infarction, chest discomfort, coronary heart disease, hypertension, and stroke as well as elevated lipid levels in blue- versus white-collar women (Baigi et al., 2001; Cho and Lee, 2012; Clougherty et al., 2011; Honjo et al., 2010; Östlin et al., 1998; Stokholm et al., 2013; WMala et al., 1997; WMala et al., 2001). However, two studies find reduced intima-media thickness in blue-collar women as compared with clerical workers and professional women, respectively (Gallo et al., 2003; Fujishiro et al., 2015).

Studies of risk factors for cardiovascular diseases among blue-collar women consider not only a wide range of risk factors, but also a wide range of specific disease endpoints, making it difficult to compare or synthesize study findings. Cross-sectional studies conducted in China and Israel identified sound pressure levels and short-cycle repetitive work, respectively, as risk factors for hypertension (Melamed et al., 1995; Zhao, Zhang, Selvin, & Spear, 1991). Scandinavian studies identified limited possibilities to learn new things, monotony, and noise (Hammar, Alfredsson, & Theorell, 1994) as well as severity of symptoms with risk of first myocardial infarction (Jousilahti, Vartiainen, Tuomilehto, & Puska, 1996). Cardiovascular morbidities in general were more common in blue-collar women with low work social support and increased physical demand in one Swedish cohort (Hall et al., 1993), and noise exposure has also been linked with elevated serum cholesterol in Israeli blue-collar women (Melamed, Froom, Kristal-Boneh, Gofar, & Ribak, 1997). Risk for cardiovascular diseases were decreased among blue-collar women with increased psychological job demand, and no association was observed between work control and cardiovascular morbidity, job strain and hypertension, or occupational stress and stroke among blue-collar women (Hall et al., 1993; Tsutsumi et al., 2001; Tsutsumi et al., 2011).

Disability & Absenteeism (N = 13 Studies)

No studies included in this review compared risk of disability or absenteeism in male and female blue-collar workers. Studies did consistently find that blue-collar workers were more likely to have a limiting, long-standing illness or disability (Arber, 1991; von Bonsdorff et al., 2011); report sickness absence (Christensen, Labriola, Lund, & Kivimäki, 2008; Niedhammer et al., 2008; Vahtera, Virtanen, Kivimäki, & Pentti, 1999); have lowered work ability (Aittomäki, Lahelma, & Roos, 2003); or report lost worktime injury or illness (Strong and Zimmerman, 2005) as compared to women in other industries or occupations. By contrast, two studies found decreased likelihood of functional impairment in Mexican blue-collar women (Guendelman and Silberg, 1993) and decreased odds of having a long-term condition, reduced activity days, or time off work among Australian blue-collar women (Korda, Strazdins, Broom, & Lim, 2002) as compared with their respective counterparts in white-collar jobs. Only three studies considered determinants of disability and absenteeism among blue-collar women, and identify risk factors ranging from organizational climate (Heo, Leem, Park, Jung, & Kim, 2015; Väänänen et al., 2004) and work-family conflict (Väänänen et al., 2008) to reduced heart rate reserve (Gupta et al., 2014).

Health behaviors (N = 16 Studies)

Both studies that compared health behaviors in blue-collar men and women found inferior health among blue-collar women as measured by levels of physical activity (Wu and Porell, 2000) and health risk scores (Hwang, Hong, & Rankin, 2015). The majority of studies that compared health behaviors in blue-collar women and women in other industries or job types found that blue-collar women were less likely to engage in physical activity and exhibited less healthy dietary patterns (Burton and Turrell, 2000; Ericson, Wirfält, Mattisson, Gullberg, & Skog, 2007; Gan et al., 2002; Mäkinen et al., 2010; McCormack et al., 2006; Miura and Turrell, 2014; Oliveira, Maia, & Lopes, 2014). However, several studies reported that blue-collar women were more physically active as compared with women in other industries and job types (Cho and Lee, 2012; Cleland, Schmidt, Salmon, Dwyer, & Yenn, 2011; Kuiaic, Irving, & Faulkner, 2007; Takao, Kawakami, & Ohtsu, 2003; Uijtdewilligen et al., 2014; Uijtdewilligen et al., 2015). Discrepant findings on physical activity in blue-collar women versus other women persist even among studies that only considered physical activity during leisure time. One study found that blue-collar women who participated in a cancer prevention intervention decreased their fruit and vegetable consumption over the course of follow-up (Harley et al., 2010).

Mental health (N = 17 Studies)

Overall, findings on the mental health of blue-collar women yielded mixed findings. Both studies that compared mental health outcomes in blue-collar men and women found that blue-collar women were more likely to be depressed (Minh, 2014) and to use stress-related drugs (Rydstedt, Johansson, & Evans, 1998). Findings from studies that compared the mental health of women in blue-collar jobs to women in other industries and job
types were mixed. Two studies from South Korea found increased risk of suicidal ideation among blue-collar women (Moon and Park, 2012; Yoon, Won, Lee, Jung, & Roh, 2014); increased odds of depression were noted in female garment workers as compared with service workers (Gundel et al., 1993); and female workers at the Toulouse AZF disaster were more likely to experience psychological distress (Cohidon et al., 2009). By contrast, three studies from Scandinavia find no evidence of a difference in burnout, suicide, or emotional exhaustion in blue-collar women as compared with women in other occupations (Ahlgren, Malmgren Olsson, & Brunil, 2012; Andrs, Collings, & Qin, 2010; Soares et al., 2007).

Among blue-collar women, studies linked psychological distress to work-related physical and psychological stressors including sexual harassment (Bromet et al., 1992; Brunette et al., 2011; Goldenhar et al., 1998; Loscocco and Spitz, 1990; Kivimäki and Kalimo, 1996; Melamed et al., 1995; Parkinson et al., 1990); domestic arrangements (Asztalos et al., 2009; Goldenhar et al., 1998; Loscocco and Spitz, 1990); and individual-level factors such as self-esteem, smoking, and BMI (Bromet et al., 1992; Kivimäki and Kalimo, 1996; Loscocco and Spitz, 1990). Reduced psychological distress was observed among blue-collar women with adequate social support (Bromet et al., 1992; Brunette et al., 2011).

Mortality (\( N = 20 \) Studies)

One study on smoking and all-cause mortality in urban transit operators reported increased risk for all-cause mortality in male drivers as compared with female drivers (Lipton, Cunradi, & Chen, 2008). Several studies reported comparisons blue-collar women versus women in other industries or job types, and the majority find increased risk for both all-cause and cause-specific mortality among blue-collar women (Baigi et al., 2002; Bentley et al., 2008; von Bonis, et al., 2011; Brockmann et al., 2009; Chen et al., 1998; Dasgupta et al., 2012; Hein et al., 2007; Kähreholm, 2001; Mamo et al., 2005; Mattisson et al., 2014; Pekkanen et al., 1995; Prescott et al., 2003). Only one study found decreased mortality risk among blue-collar women as compared with white-collar women (Hirokawa, Tsutsumi, & Kayaba, 2013). Two studies found decreased risk of all-cause and cause-specific mortality in blue-collar women as compared with women in the general population (Arena et al., 1999; Zhang et al., 2015), a finding which may reflect the fact that working populations tend to be healthier on average as compared with members of the general population. Risk factors for mortality identified among blue-collar women included physical demand and exposure to metalworking fluid (Costello, Picciotto, Rehkopf, & Eisen, 2014; Hall et al., 1993), although shift work, active work, and increased psychological demand appeared protective against mortality (Åkerstedt, Kecklund, & Johansson, 2004; von Bonis, et al., 2012; Hall, et al., 1993).

Musculoskeletal Disorders (\( N = 30 \) Studies)

Nearly all studies of musculoskeletal disorders find increased risk among blue-collar women as compared with blue-collar men or as compared with women in other industries or job types. Studies that compared blue-collar women and men find women at increased risk for pain in the neck, shoulder, and distal upper extremity (Wang et al., 2007). Women were also at increased risk for various work-related injuries (Cantley et al., 2016; Iverson and Erwin, 1997; Kubo et al., 2013; Lipscomb et al., 2013; Pollack et al., 2007; Taiwo et al., 2008; Tessler-Sherman et al., 2014), as compared with men, although five of these seven studies were based on the same study population of primary metal and fabricated metal product manufacturers in the US (Cantley et al., 2016; Kubo et al., 2013; Taiwo et al., 2008; Tessler-Sherman et al., 2014; Pollack et al., 2007). As compared with women in other industries or job types, blue-collar women were at increased risk for musculoskeletal disorders in general (Khatun et al., 2004); hospitalization for back disorders (Kaila-Kangas et al., 2006); injuries (Nakata et al., 2006; Niedhammer et al., 2008); carpel tunnel syndrome (Mattioi et al., 2009; Roque laure et al., 2009; Roque laure et al., 2008); and disorders of the hip, back, and knee (Andersen et al., 2012; Lombardo et al., 2012). Higher risk for musculoskeletal disorders among blue-collar women is most likely attributable to the physical nature of jobs in blue-collar industries, and only one study found no evidence of a difference between blue and white-collar women’s risk for neck and shoulder disorders (Ahlgren et al., 2012).

Several studies assessed risk factors for musculoskeletal disorders among blue-collar women. Specific risk factors identified included psychological or physical strain (Björkstén, Boquist, Talbäck, & Edling, 2001; Fredriksson et al., 1999; Hankleng, Kaewboonchoo, Silpasuwan, & Mungaramee, 2014; Kim, Park, Min, & Yoon, 2009; Nag, Vyas, & Nag, 2010; Vingård, Alfredsson, Goldie, & Hogstedt, 1991; Westgaard and Jansen, 1992) uncomfortable or inadequate work arrangements (Björkstén et al., 2001; Hankleng et al., 2012; Kaergaard and Andersen, 2000; Motamedzade and Moghimbeigi, 2012); age (Murata, Kawakami, & Amari, 2000; Nag et al., 2010; Vingård et al., 1991); tenure (Hankleng et al., 2014; Murata et al., 2000; Nag et al., 2010); household arrangement (Björkstén et al., 2001; Kaergaard and Andersen, 2000); and sitting time (Hallman, Gupta, Mathiasson, & Holtermann, 2015). The majority of these studies were conducted either in Scandinavian countries (e.g. Sweden, Norway, Denmark) or in low- and middle-income countries (e.g. India, Perú, Thailand, Iran). Although similar risk factors are noted across these various geographic contexts, most are based on very limited sample sizes.

Reproductive & sexual health (\( N = 14 \) Studies)

Only one study conducted in the Kathmandu Valley compared the sexual health of blue-collar men and women, and found substantially increased odds of condom use among female factory workers as compared with men (Pant, Kanato, Thapa, & Ratanasiri, 2013). The majority of studies compared blue-collar women to an all-female referent group and consistently noted increased risk for a wide range of adverse pregnancy-related outcomes – including low birth weight and small for gestational age (Eskenazi et al., 1993; Gissler et al., 2009; Jakobsson and Mikoczy, 2009), prematurity (Gissler et al., 2009; von Ehrenstein et al., 2014), perinatal mortality (Gissler et al., 2009), congenital anomalies (Sakr et al., 2010), and Caesarian section (Räisänen et al., 2014) – in blue-collar women as compared with women employed in other industries. Studies also found that blue-collar women were more likely to have multiple sexual partners, HSV-2 infection, and earlier natural menopause (Evans et al., 2003; Luoto, Kaprio, & Uutela, 1994; Yingying, Smith, & Suiming, 2011).

Two quasi-experimental studies evaluated the effects of parental leave policies and plant closures and fertility outcomes, respectively, among blue-collar women in Austria. These studies found that parental leave reform increased fertility but found minimal effects on fertility up to six years following plant closure (Del Bono et al., 2012; Lalive and Zweimüller, 2009). Increased knowledge on HIV/AIDS was associated with increased condom use and decreased odds of sex with multiple partners among garment workers in Bangladesh (Sayem, 2010), and sulfur dioxide was identified as an independent risk factor for early natural menopause among blue-collar women in China (Wang et al., 2015).
Respiratory diseases (N = 14 Studies)

Studies that compared the blue-collar women to that of blue-collar men or women in other industries consistently found inferior respiratory health among blue-collar women. As compared with blue-collar men, women were noted increased methacholine responsiveness; decreased FEV1 and FVC; and increased acute airway response (Bakirci et al., 2007; Kongerud and Sosyseth, 1991; Raza et al., 1999; Seldén et al., 2001). Increased risk for asthma, chronic rhinosinusitis and lung cancers was observed blue-collar women as compared with women in other industries (Helkkilä, Martikainen, Kurppa, Hugsfavel-Pursiainen, & Karjalainen, 2008; Takezaki et al., 2001; Thilsging et al., 2012; Storaas et al., 2015). Among European blue-collar women, increased dust concentration was associated with decreased lung capacity (as measured by FVC and FEV1) (Love, Muirhead, Collins, & Sourat, 1991), although no significant effects of manganese exposure on pulmonary function was observed among female metalworkers in China (Wang et al., 2015).

Self-Rated health (N = 5 Studies)

Studies on self-rated health that compared blue-collar women and white-collar women yielded inconsistent findings (Brunette et al., 2011; Hammarström et al., 2011; Korda et al., 2002; Niedhammer et al., 2008). In one quasi-experimental study of the effect of a living wage policy, affected factory workers “excellent” or “much better” global and comparative self-rated health as compared with workers in control factories (Landeled et al., 2014).

Smoking & Other Substance Use (N = 16 Studies)

Comparisons of smoking frequency in male and female blue-collar workers yield inconsistent findings (Cunradi et al., 2007; Noonan and Duffy, 2012; Okechukwu et al., 2012). Notably, results from three studies that compared frequency of smoking in male and female construction workers are inconsistent even though based on the MassBUILT study population (Chin et al., 2012; Chin et al., 2013; Chint et al., 2010). However, studies consistently find that blue-collar women smoked more frequently as compared with white-collar women, managers and professionals, and women with further education (Cho and Lee, 2012; Fujishiro et al., 2012; Hammarström et al., 2011; Maron et al., 2016; Yang et al., 2008), with job strain, passive work, and physical demand identified as risk factors for smoking in a cross-sectional study from Australia (Radi, Ostry, & LaMontagne, 2007). Findings on alcohol and other substance use are limited and inconsistent (Biron, Bamberger, & Noyman, 2011; Cunradi, Ames, & Xiao, 2014; Maron et al., 2016; Sayem, 2010).

Other health outcomes (N = 15 Studies)

Other health outcomes studied included work-related fatigue, insomnia, melatonin production, and sleep quality (Choi, Terrell, Pohl, Redman, & Duffy, 2013; Goldenhar et al., 1998; Juutilainen et al., 2000; Lin, Chen, Hsieh, & Chen, 2015; Rydsäter et al., 1998); fibromyalgia (Cobankara, Unal, & Xiao, 2014; Maron et al., 2016; Sayem, 2010); hearing loss (Nguyen et al., 1998); and the prevalence long and short-term health conditions (Korda et al., 2002).

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