Annals of Work Exposures and Health, 2022, Vol. 66, No. 9, 1095–1098
https://doi.org/10.1093/annweh/wxac071
Advance Access publication 11 October 2022
Editorial

Editorial

A Healthy Workforce Needs Comprehensive Reproductive Healthcare

Margaret M. Quinn*

Lowell Center for Sustainable Production and Department of Public Health, University of Massachusetts Lowell, MA 01854, USA

*Author to whom correspondence should be addressed. Tel: +1-978-934-3196; e-mail: Margaret_Quinn@uml.edu

The May 2018 *Annals of Work Exposures and Health* special issue on gender, work, and health, was initiated with a call for research on work exposures that evaluated the different experiences of workers by sex (biological differences) and/or gender (socially constructed differences) and subsequent impacts on health (Quinn and Smith, 2018). Working age populations worldwide are increasingly diverse and men, women, all gender identities, should be included with safety, dignity, and income equality. Healthy, secure workers are needed to develop and sustain a robust workforce.

In the May 2018 issue, Cherry *et al.* (2018) reported on early stages of their prospective longitudinal cohort study of Canadian men and women in the welding and electrical trades, called Workers Health in Apprenticeship Trades—Metal and Electrical, 'WHAT-ME'. In addition to the work of Cherry *et al.*, 10 papers from 6 countries were included in the special issue. Overall, it was seen that few work exposure and health studies adequately account for sex and/or gender and a call was made to the occupational health community to advance this research in order to remain relevant to increasingly diverse worker populations.

Since then, Cherry *et al.* have forged ahead and this editorial reflects on two new papers from their team. The first provides a detailed quantitative exposure assessment of urinary and airborne metals, including aluminum, chromium, manganese, and nickel exposures among male and female welders (Galarneau *et al.*, 2022a). The second evaluates the impacts of metal fume exposures and ergonomic exposures (heavy lifting, whole-body vibration, heat, noise, and extended work shifts) on pregnancy outcomes (birth weight, gestation, miscarriage, still birth) experienced by the women welders (Galarneau *et al.*, 2022b).

The methods in each paper are innovative and meticulously executed. Male and female study participants were recruited from construction trades apprenticeship programs and completed a baseline questionnaire and follow-up questionnaires every 6 months for up to 5 years. The first study identified sex differences in urinary metals (higher excretion of aluminum and chromium among women), differences in estimated airborne exposures, and differences in work practice behaviors such as use of respiratory protection equipment and use of local exhaust ventilation. The second study found that adverse pregnancy outcomes were increased by several ergonomic exposures and to a lesser degree by metals and particles in welding fume. The authors concluded that the welding environment cannot be assumed safe should a welder become pregnant and that ergonomic factors present a high priority for intervention. These findings are discussed thoroughly and thoughtfully by the authors and provide a basis for policy and practice interventions to improve the health of both female and male welders.

There is another key finding, not highlighted by the authors, that warrants further discussion at this

time when comprehensive reproductive health services including access to abortion are being taken from women in the USA (Totenberg and McCammon, 2022) and are curtailed or threatened in other countries (United Nations, 2022). In order to ascertain the pregnancy outcomes of the women welders, it was essential to obtain complete and accurate information on their pregnancy experiences. Successful studies of work exposures and pregnancy outcomes are very challenging because they require a design that can identify all pregnancies experienced by a relatively large, diverse population and that can determine when the exposures of interest occurred relative to conception.

Galarneau *et al.* met these challenges by recruiting and retaining a population of welding apprentices at ages when they were first likely to conceive, documenting their exposures before and during their welding jobs, and following their health and pregnancy status for years. This assured that very few pregnancies were missed and that the health and work-related information on the women was high quality.

The cohort in the pregnancy outcomes paper included 447 women recruited from all Canadian provinces, the Yukon and Northwest Territories. The average number of pregnancies among the gravid women was 2.3 (range 1–9) resulting in a total of 680 pregnancies. It is noteworthy that, of these, 121 ended in elective abortion and 8 were terminated as ectopic. Thus, 129/680 (nearly 1 in 5) ended in abortions. Clearly, abortion is a common pregnancy outcome for these young welders and restricting access could have huge consequences for the workers, their employers, and for the ability of researchers to conduct this study.

Who are the young women who volunteered for this study and why have they entered the welding trade? When we step back to consider the social context of the Galarneau *et al.* studies we get a case example of the far-reaching implications of limiting reproductive services on workforce development, advances in income equality, and improvements in occupational health research.

Approximately one in five employed Canadians work in the skilled trades in many sectors of the Canadian economy (Red Seal, 2022). The occupation of welder is among these trades and the Canadian government projects a national labor shortage in welders over the period of 2019–2028 (Government of Canada Job Bank, 2021). To become certified to work in the skilled trades, including welding, a Canadian worker completes an apprenticeship in their province/territory and then passes an examination for 'Red-Seal' endorsement, indicating achievement of a standard set of skills recognized across Canada. Apprentices usually enter these programs directly from high school. Because women are under-represented in welding, the Canadian government provides the Apprenticeship Incentive Grant for Women to recruit certified women welders (Employment and Social Development Canada, 2022). The apprenticeship program provides substantial income benefits for women because welding work pays considerably higher wages than many jobs where high school educated women typically work, healthcare support jobs, for example (Statistics Canada, 2021).

Men and women working in the welding trades undergo the same apprenticeship training. However, prior to the What-ME studies, it was unknown whether, once in the trade, their exposures and health differ. There are limited quantitative exposure data on welders and the populations studied are mainly men (Olsson and Kromhout, 2021). Very little is known about the impacts of welding work on women's health and on pregnancy. In this context, the possible risk of welding in pregnancy was identified as a priority by the Canadian Standards Association (Cherry *et al.*, 2018).

In Canada, as in most high- and middle-income countries, the population is aging rapidly (United Nations, 2019) and the economy needs young welders with competencies in a standard set of skills, strong physical and cognitive capacities, and timely availability for work. Thus, incentivizing women to become welders is an economic imperative as well as one of gender equity.

In Canada, abortion is a component of regular, legal, publicly funded medical care (NAF Canada, 2022). For the Galarneau *et al.* studies, information on abortion was provided by the study participants along with numerous other types of health information. Without complete and accurate information from study participants, it would have been impossible to obtain these valuable study results: no pregnancy denominator data, very limited pregnancy outcome data, no possibility to align the timing of exposure with conception, no possibility to evaluate the impact of exposures on pregnancy, no possibility to know how to make the workplace safer for women and their pregnancies.

In the USA, the recent Supreme Court abortion decision declaring that the constitutional right to abortion no longer exists, has triggered many states to move to criminalize abortions and potentially other reproductive and gender-related rights (Cyr and Holder, 2022). It will be very difficult to recruit and retain women in the workforce if they are interrupted unwillingly by pregnancy when they can no longer access comprehensive reproductive health services. Additionally, occupational reproductive health research will be devastated as potential

study participants will not feel free to report criminalized activity for public health research. Even the discussion of criminalization is likely to have a dampening effect on study participants.

Galarneau *et al.* (2022b) have provided strong evidence that welding can have adverse reproductive health effects. But, as impressive as their work is, it should be considered a starting point for widening the inquiry on the impacts of work exposures on the full range of reproductive health outcomes, including the reproductive health of male workers. Numerous workplace exposures are associated with men's adverse reproductive function, including effects on birth and development of their offspring (Frazier and Barkin Fromer, 2011). Additionally, welding exposures are associated with other serious health outcomes in both men and women, including cancer (IARC, 2018; Olsson and Kromhout, 2021), respiratory illness (Riccelli *et al.*, 2020), and neurotoxic effects (Baker and Fiedler, 2011). Some of the early landmark occupational reproductive health studies in the 1970s identified exposures to metals (and other exposures) that harmed the health of men (Frazier and Barkin Fromer, 2011). Yet, in those dark times, instead of improving working conditions and exposures for all workers, women were often excluded from jobs, purportedly due to concern about adverse pregnancy outcomes (McCann and Tomaskovic-Devey, 2021), while men still had to face the exposures. Let us keep our sights on creating a truly inclusive workforce and making work healthy and safe for everyone. Just as the research on gender, work, and health is advancing, we do not want the threat of losing reproductive rights and services to set back the field of occupational health and safety. Most importantly, the work of our profession should aim to protect and improve the lives of women, men, all people.

Funding

No funding was provided for this project.

Conflict of Interest

The author declares no conflict of interest related to the material presented in this article. Its contents, including any opinions and/or conclusions expressed, are solely those of the author.

Data Availability

No new data were generated or analyzed in support of this research.

References

Baker EL, Fiedler NL. (2011) Neurologic and psychiatric disorders. In Levy BS, Wegman DH, Baron SL et al., editors. *Occupational and environmental health: recognizing and preventing disease and injury*. New York: Oxford University Press. pp. 428–45. ISBN 978-0-19-539788-8.

Cherry N, Arrandale V, Beach J *et al.* (2018) Health and work in women and men in the welding and electrical trades: how do they differ? *Ann Work Expo Health*; **62**: 393–403.

Cyr J, Holder RH. (2022) Simultaneous attacks on abortion and LGBTQ rights are not coincidental. Cognoscenti. Available at https://www.wbur.org/cognoscenti/2022/04/26/abortion-rights-lgbtq-rights-roe-vs-wade-julian-cyr-rebecca-hart-holder. Accessed 19 September 2022.

Employment and Social Development Canada. (2022) Funding: Apprenticeship Incentive Grant for Women—what this grant offers. Available at https://www.canada.ca/en/employment-social-development/services/funding/apprenticeship-incentive-women-overview.html. Accessed 19 September 2022.

Frazier LM, Barkin Fromer D. (2011) Reproductive and developmental disorders. In Levy BS, Wegman DH, Baron SL et al., editors. *Occupational and environmental health: recognizing and preventing disease and injury*. New York: Oxford University Press. pp. 446–60. ISBN 978-0-19-539788-8.

Galarneau J-M, Beach J, Cherry N. (2022a) Urinary metals as a marker of exposure in men and women in the welding and electrical trades: a Canadian cohort study. *Ann Work Expo Health*; **66**: 1111–21.

Galarneau J-M, Beach J, Cherry N. (2022b) Pregnancy outcome in women exposed to metal fume in welding: a Canadian cohort study. *Ann Work Expo Health*; **66**: 1099–110.

Government of Canada Job Bank. (2021) Job prospects: welder in Canada. Available at https://www.jobbank.gc.ca/marketreport/outlook-occupation/23242/ca. Accessed 19 September 2022.

International Agency for Research on Cancer. (2018) *Welding, molybdenum trioxide, and indium tin oxide*. Vol. **118**. Lyon, France: IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. pp. 36–265. ISBN 978-92-832-0185-4.

McCann C, Tomaskovic-Devey D. (2021) Pregnancy discrimination at work: an analysis of pregnancy discrimination charges filed with the U.S. Equal Employment Opportunity Commission. University of Massachusetts Amherst, Center for Employment Equity. Available at https://www.umass.edu/employmentequity/pregnancy-discrimination-workplace-1. Accessed 19 September 2022.

National Abortion Federation Canada. (2022) History of abortion in Canada. Available at https://nafcanada.org/history-abortion-canada/. Accessed 19 September 2022.

Olsson A, Kromhout H. (2021) Occupational cancer burden: the contribution of exposure to process-generated substances at the workplace. *Mol Oncol*; **15**: 753–63.

Quinn MM, Smith PM. (2018) Gender, work, and health. *Ann Work Expo Health*; **62**: 389–92.

Red Seal. (2022) Trades. Available at https://www.red-seal.ca/eng/trades/tr.1d.2s_c.1n.1d.1.shtml. Accessed 19 September 2022.

Riccelli MG, Goldoni M, Poli D *et al*. (2020) Welding fumes: a risk factor for lung diseases. *Int J Environ Res Public Health*; **17**: 2552–84.

Statistics Canada. (2021) Employee wages by occupation, annual. Available at https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410034001. Accessed 19 September 2022.

Totenberg N, McCammon S. (2022) Supreme Court overturns Roe v. Wade, ending right to abortion upheld for decades. Available at https://www.npr.org/2022/06/24/1102305878/supreme-court-abortion-roe-v-wade-decision-overturn. Accessed 19 September 2022.

United Nations, Department of Economic and Social Affairs, Population Division. (2019) *World population ageing 2019: highlights (ST/ESA/SER.A/430)*. New York: United Nations. pp. 1–38. ISBN: 978-92-1-148325-3.

United Nations, News. (2022) US abortion debate: rights experts urge lawmakers to adhere to women's convention. Available at https://news.un.org/en/story/2022/07/1121862. Accessed 19 September 2022.