

Original Article

Employment Precarity and Increased Risk of Hazardous Occupational Exposures Among Residents of High Socioeconomic Hardship Neighborhoods

Tessa Bonney^{1,*}, Kathleen M. Rospenda¹, Linda Forst¹, Lorraine M. Conroy¹, Dolores Castañeda¹, Sandra Avelar¹, Yvette Castañeda¹, Adlaide Holloway² and Jeni Hebert-Beirne¹

¹University of Illinois at Chicago, Chicago, IL, USA; ²Sinai Health System, Chicago, IL, USA

*Author to whom correspondence should be addressed. Tel: 312-355-7311; e-mail: tbonne5@uic.edu

Submitted 15 February 2022; revised 27 May 2022; editorial decision 28 June 2022; revised version accepted 11 August 2022.

Abstract

Background: While there is evidence that workers in nonstandard employment arrangements are disproportionately exposed to recognized occupational hazards, existing studies have not comprehensively examined associations between employment precarity and exposure to occupational hazards for these workers in the USA. The aim of this study was to examine relationships between employment precarity and occupational hazards in two contiguous high socio-economic hardship neighborhoods in Chicago.

Methods: Using a community-based participatory research approach, community researchers administered a community-developed survey to 489 residents of Greater Lawndale who reported current or recent employment in a job that met at least one characteristic of precarious employment (e.g. unpredictable schedule, insecure work, no living wage/benefits). Employment precarity was calculated using a modified version of the Employment Precarity Index (EPI) developed by the Poverty and Employment Precarity in Southern Ontario group. We modeled the association between employment precarity and occupational exposures using logistic regression models.

Results: We identified a high prevalence of precarious employment in this sample, as well as a high prevalence of self-reported exposure to recognized occupational hazards. Increases in relative employment precarity were significantly associated with self-reported exposure to chemical and biological hazards, physical hazards, and slip, trip, strike, fall, trap or crush hazards at work.

Conclusions: Results highlight the importance of using community research approaches and robust measures of employment characteristics, such as the EPI, to evaluate associations between employment precarity and hazardous exposures. These results suggest that variability in employment situations and resultant relative employment precarity are important predictors of exposure

What's Important About This Paper?

Employment precarity is a complex and multifaceted construct involving systemic disadvantage of workers. In this study, the conditions that make work precarious were measured comprehensively and associations between incremental increases in employment precarity and self-reported exposure to several recognized occupational safety and health hazards were examined. The results suggest that even small reductions in employment precarity may have significant implications for improving worker health.

to recognized occupational hazards. Findings also suggest that health inequities observed among precariously employed workers may be partly explained by increased risk for exposure to occupational hazards, which has implications for community health and should be investigated in future longitudinal research.

Keywords: precarious work; community-based participatory research; determinants of exposure; insecure work; health inequities

Introduction

Disparities persist in the quality and stability of employment and in the risk of exposure to occupational hazards in the US workforce. The relationship between lower socioeconomic position or social stratum and the lack of job security is well-documented (Keim *et al.*, 2014), as is the relationship between these phenomena and exposure to hazards related to the organization of work (i.e. work processes and organizational practices, including how jobs and human resource policies are structured, that influence job design) (Landsbergis *et al.*, 2014). Likely due to systemic racism, disparities by racial identity of workers in job quality and accessibility are particularly conspicuous: access to employment opportunities tends to be lower for residents of segregated neighborhoods populated predominately by people of color and job openings that do exist and that are accessible to residents tend to be of poor quality, contributing to a persistence of poverty-level wages among workers of color relative to white workers (Cooper, 2018; Jin and Paulsen, 2018). More low-wage and racial/ethnic minority workers work in hazardous industries than white workers, contributing to social disparities in the burden of occupational exposures (Quinn *et al.*, 2007; Ingram *et al.*, 2021). Data show that minority workers bear the highest injury risk on the job even after adjusting for intersecting social identity characteristics such as sex and education (Seabury *et al.*, 2017), and recent studies illustrate that, in addition to exposure to traditional occupational hazards, these workers are expected to experience a significantly higher incidence of occupational exposure to COVID-19 (McClure *et al.*, 2020; Asfaw, 2021).

Despite compelling associations between individual characteristics of work, sociodemographic factors, and occupational hazards, challenges in measuring these intersections remain. Of primary concern are the inadequacies of single-item measures for describing employment quality and its social impacts (e.g. features of work that impact family and wellbeing). Job security and job quality are complex constructs and understanding these constructs comprehensively may help to better contextualize the experiences, impacts, and risks related to incremental changes in employment quality and security. To address this challenge, researchers have proposed, operationalized, and applied multi-dimensional measures of the precariousness of employment, which embody facets of employment security and quality (examples include the European Employment Precariousness Scale, EPRES (Vives *et al.*, 2010); the Canadian Employment Precarity Index, EPI (Lewchuk, 2016); and measures constructed via latent class analysis of relevant indicators in existing population-based datasets, such as the National Longitudinal Survey of Youth (Oddo *et al.*, 2021) and the General Social Survey (Peckham *et al.*, 2022). These multidimensional measures rely on theoretically driven definitions of employment precarity, which encompass wage and hour metrics, measures of security and stability of a job situation, individual control over work tasks and scheduling, and protections conferred by a particular job arrangement. The latter two measures, constructed by Oddo *et al.* and Peckham *et al.*, aimed to characterize precarious employment in the US labor force, considering aspects of work such as non-wage benefits (e.g. health insurance) that differ from the more

limited material benefits included in the European and Canadian measures.

The overarching objective of the analyses presented in this paper is to examine associations between employment precarity, measured from the most stable to most precarious employment situations, and self-reported exposure to a range of occupational hazards. These analyses aim to expand upon the existing body of literature surrounding elements of employment quality and its associations with worker health, especially occupational injury (Koranyi *et al.*, 2018), by elucidating relationships between relative employment precarity and occupational exposure to hazards, a plausible mediating factor in a causal relationship between poor employment quality and poor health (Peckham *et al.*, 2019).

The work presented in this article is part of a larger project, the Greater Lawndale Healthy Work (GLHW) Project, which is a community-based participatory research (CBPR) project at the University of Illinois at Chicago, Center for Healthy Work, a Center of Excellence for *Total Worker Health* funded by the National Institute for Occupational Safety and Health. The Greater Lawndale community comprises two contiguous neighborhoods in Chicago, IL, South Lawndale (known by residents as Little Village) and North Lawndale, both of which are characterized as communities experiencing high economic hardship (defined as having high unemployment, low per capital educational attainment and income, high poverty, crowded housing, and large proportion of dependents under 18 or over 64 years of age) (*Chicago Health Atlas*, 2021). A majority of Little Village residents identify as Latino/a, Hispanic, or of Spanish decent with nearly 40% identifying as being born outside the USA, whereas a majority of North Lawndale residents identify as Black or African American (*Chicago Metropolitan Agency for Planning*, 2021).

The GLHW Project is further described elsewhere (Hebert-Beirne *et al.*, 2018; Velonis *et al.*, 2020). Briefly, the project built upon a multiyear academic-community collaboration between the university and residents in Little Village to establish a sustained, student-engaged, reciprocal community-academic partnership with organic community-based organizational leadership for community health inquiry. Our goal was to describe, in an ongoing capacity, the community health needs and assets from an emic, grounded perspective, with attention to structural and social determinants of health, using iterative research methods, and producing new knowledge that is shared and disseminated toward action (Hebert-Beirne *et al.*, 2018). In 2016, it expanded its focus to neighboring North Lawndale and focused on work as

a social determinant of health in Greater Lawndale, as well as to build community capacity to develop interventions that expand community members' access to healthy jobs.

Methods

The GLHW uses a mixed-method, community health assessment approach with the overall aim to contextualize health as related to work and to identify facilitators of and barriers to healthy work in Greater Lawndale. This paper presents findings from one of the multiple methods to achieve this aim. The GLHW academic-community project team created and employed a cross-sectional neighborhood survey design to comprehensively assess characteristics of Greater Lawndale residents' work situations, experiences seeking and maintaining employment, frequency of exposures to occupational and social hazards, select health behaviors and outcomes, and sociodemographic characteristics. This paper focuses on the associations between residents' occupational exposures, their sociodemographic characteristics, and the precarity of their employment. The Institutional Review Board at the University of Illinois at Chicago approved this GLHW study component (protocol #2013-0128) and community and university researchers from GLHW team obtained informed consent from all participants.

Population Characteristics and Recruitment

The priority population for this survey was residents of Greater Lawndale who were at least 18 years of age, who were currently employed or who had been employed within the two years prior to survey participation, and who self-identified as being employed in a precarious working situation. Precarious work was defined as work with at least one of the following characteristics: irregular or unpredictable schedule, temporary or seasonal work, no living wage, no paid benefits, dangerous working conditions, and little or no opportunities for advancement. GLHW community and academic researchers examined census tract-level American Community Survey data on work characteristics (e.g. occupation and industry metrics, selected economic characteristics; *American Community Survey Data - Employment Estimates* 60623, 2019) and community member expert knowledge (Lewis and Hasking, 2019; Salazar *et al.*, 2021) on their neighborhood to inform the development of a neighborhood map that depicts recruitment areas. A grid of 12 sections in Greater Lawndale was created and a purposive sample of survey participants from each geographic area was recruited to ensure that residents from all sections of the community

would be represented in the final sample. Worker job type and demographic characteristics (e.g. gender identity, race/ethnicity) were tracked throughout the data collection period in an attempt to ensure adequate representation of the known working population in the final sample. Survey respondents were compensated with a \$25 gift card for their time.

Questionnaire and measures

The GLHW team created a 192-item survey instrument, which included measures drawn from existing questionnaires as well as items developed specifically for the GLHW project. Community Researchers were trained in trauma-informed survey administration. The questionnaire was administered in English or in Spanish, depending on respondent preference. In most cases, Community Researchers (CRs) read survey items and response options aloud to respondents, though in some cases respondents read and completed the questionnaire on their own. The average survey completion time was 60 min. The following measures were used for the analyses reported in this paper:

Employment precarity was calculated using a modified version of the Employment Precarity Index (EPI) originally developed by the Poverty and Employment Precarity in Southern Ontario (PEPSO) group (Lewchuk, 2016). The original EPI generates scores from 0 (least precarious) to 100 (most precarious); however, we employed a scaled version of the EPI with scores from 0 to 10 (an increase in one point value represents a 10% increase in precarity). The EPI is calculated using 10 direct and indirect measures of employment insecurity: (1) employment type (full time, permanent part-time or variable hours, fixed-term contract, self-employed, temporary or short-term), (2) employment relationship (standard vs. nonstandard), (3) benefits (full, partial, none), (4) paid for missed work (yes, no), (5) income variability (secure to varies a great deal), (6) likelihood of reduction in paid hours (not likely to very likely), (7) on-call work (never to always), (8) scheduling (schedule known weeks in advance, one week in advance, or not known in advance), (9) cash payment (never to most of the time), and (10) negative consequences related to exercise of health and safety rights (no experience or no worry about negative consequences to experienced consequences or considerable worry about consequences). The GLHW team modified language for some individual items to better reflect employment characteristics of a United States-based study sample (for example, items regarding employer-provided benefits and retirement plans were modified to include terminology typically applied in the USA).

In their methods handbook, the PEPSO group specifies cut points for categories of relative employment precarity, which were determined by stratification of a sample of workers thought to be representative of the continuum of employment situations. Using these cut points, workers with EPI scores below 0.25 would be considered “secure” in their employment, scores between 0.3 and 1.75 would be considered “stable”, scores between 1.8 and 3.75 would be considered “vulnerable”, and scores above 3.8 would be considered “precarious”. Because we anticipated that this sample would be largely precariously employed, and given the primary aim of this study to explore the impacts of stepwise increases in precarity on self-reported exposures to hazards, we used EPI scores in our analyses and did not transform them into a categorical EPI variable. Furthermore, the PEPSO cut points are based on a large sample of Canadian workers, and relative precarity may not be comparable between our study population and that used to establish cut points included in the EPI handbook.

Occupational hazards (self-reported exposures) were measured via 19 individual Likert scale survey items where a respondent was asked to report how often they were exposed to a given hazard on the job in the previous 12 months. Individual items were drawn from several existing survey instruments, including the European Working Conditions Survey (Puig-Barrachina et al., 2014) and a survey tool previously used to identify hazards encountered by temporary workers in the Chicagoland area (Bonney et al., 2017). Three items were used to assess the frequency of exposure to chemical hazards (dust, fumes, or chemicals; secondhand tobacco smoke; and confined spaces), one item for biological hazards (infectious materials); seven items for physical hazards (high noise; vibration from tools or machinery; extreme temperatures; materials that could burn skin; materials that could injure eyes; materials that could cut/scrape; and work outside in bad weather), four items for ergonomic hazards (repeated lifting, pushing, pulling or bending; heavy lifting; on feet for long periods; and sitting for long periods); and four items measured other hazards, collectively termed “slip, trip, strike, fall, trap, crush” hazards (uneven or slippery surfaces; work at heights 4+ feet; materials that could hit, strike, catch, trap, or crush; and work near traffic or moving vehicles).

Sociodemographic characteristics, including gender identity, race and ethnicity, country of birth, educational attainment, and marital status were included in the questionnaire as self-report and were selected as relevant covariates for these analyses based on previous literature on employment precarity and occupational exposures, respectively. For gender identity, respondents could

select from the following: male, female, trans male, trans female, genderqueer/gender non-conforming, or prefer to self-describe. Recognizing race as a social construct (Collaboratory for Health Justice, 2021), we collected information on race and ethnicity of the research participants due to an increasing body of literature on the role of systemic racism and lived experience (Phelan and Link, 2015). Respondents were asked to select up to six options for their race and were asked separately whether they identified as Hispanic, Latino/a, or of Spanish descent. For education, respondents could select an option from the following categories: no degree, high school graduate/GED, college graduate, or other. Country of birth options included USA, Mexico, or other. Options for marital status included married, divorced, widowed, separated, a member of an unmarried couple, or never married and not currently with a partner. Due to small cell sizes and to reduce degrees of freedom for analyses, some response options were collapsed into fewer categories: for gender identity, all responses other than “male” and “female” were collapsed into a single “prefer to self-describe” category; marital status was collapsed into three categories, with “divorced”, “widowed”, and “separated” collapsed into one category and “member of an unmarried couple” and “never married and not currently with a partner” collapsed into the existing “single” category. Based on responses to the race, ethnicity, and nativity items, respondents were recoded into a single “race/ethnicity” category with the following response options: “Hispanic – Born in the US”, “Hispanic – Born Outside US”, “Black (Non-Hispanic)”, “White (Non-Hispanic)”, and “Other race/ethnicity”.

Members of the GLHW team, including CRs and student research assistants, piloted the questionnaire by administering it to a small sample of workers ($n = 5$) with personal connections to the team members (e.g. friends and family). Questionnaire wording and content were revised to clarify wording or to revise response options where needed.

Statistical analysis

Employment Precarity Index

Descriptive statistics were calculated for the 10 components that make up the EPI and for all demographic characteristics. One-way ANOVAs were conducted to determine if the scaled EPI values were different within each sociodemographic group (e.g. differences by reported gender identity). A P value of less than 0.05 was considered statistically significant.

Occupational exposures

For each occupational exposure item, two new dichotomous exposure variables were created as proxies

for self-reported exposure frequency in the previous 12 months: an “ever vs. never exposed” variable and a “less than or equal to half of the time versus more than half of the time” variable. Due to the large number of occupational exposure variables, individual items were grouped by hazard group for some analyses (four hazard groups: (1) chemical and biological hazards; (2) physical hazards; (3) ergonomic hazards; and (4) slip, trip, strike, fall, trap, or crush hazards. Individual hazard items were grouped on the basis of similar characteristics (e.g. hazard behavior, typical routes of exposure, adverse health impact with exposure)). If an individual was exposed to at least one individual hazard in a given group, they were considered exposed to at least one hazard in that group (denoted as e.g. “exposed to at least one physical hazard”). Because virtually all respondents either selected that they spent at least some time “on feet for long periods” and “sitting for long periods” at work, a separate grouped ergonomic variable was created that excluded these two items to better reflect nuances in exposure to ergonomic hazards.

Correlation analyses

Cross-tabulations were calculated for each of the dichotomized exposure frequency variables for the four exposure groups with each sociodemographic characteristic. Chi-square tests were performed to assess correlations between each set of variables. A P value of less than 0.05 was considered statistically significant.

Regression analyses

Logistic regression models with respondent gender identity, race/ethnicity, and educational attainment were constructed to evaluate the association between a 10% increase in employment precarity (measured via a one-point change in the scaled EPI) and exposure to each hazard group and individual hazard item, respectively, ever versus never and more than half of the time versus less than or equal to half of the time. For regression, predictor variables with fewer than 10 observations were either collapsed into an existing response option or excluded from analyses; this resulted in the combining of “white” race/ethnicity with “other race/ethnicity” and the exclusion of respondents who selected “prefer to self-describe” for gender identity.

Missing Data

We conducted multiple imputation using an iterative Markov Chain Monte Carlo method to replace missing values for cases with missing data for measures of interest. Ten iterations were conducted with five imputations. Rubin’s rules were used to combine

the imputed estimates (Rubin, 1987). All analyses were performed using SPSS Statistical Software version 26.

Results

Employment precarity

GLHW CRs collected 489 total survey responses from residents of the Greater Lawndale community, 10 of which had to be disqualified for not meeting study criteria (e.g. did not live in Greater Lawndale, age less than 18, or problematic survey responses such as marking all answers as “1”). To maximize power and precision of estimates in our analyses, we included both complete cases ($n = 407$) and imputed missing data for measures of interest (see Statistical Analysis section). This resulted in a final sample size of 479 with an overall mean scaled EPI score of 5.3. The distribution of frequencies of the 10 EPI components is included in Table 1, and the distribution of EPI scaled scores for the overall sample is shown in Fig. 1. Sample characteristics and stratified imputed EPI scores are included in Table 2.

Most respondents identified as male or female (48.2% and 45.9%, respectively), with a small percentage identifying as trans male or female, genderqueer/gender nonconforming, or prefer to self-describe. This latter group registered the highest mean EPI score by gender identity at 5.1, though all three groups had mean EPI scores within 8% of one another and differences between mean scores were not found to be statistically significant. Respondents who identified as non-Hispanic white (less than 2% of the sample) had the lowest mean EPI score at 2.9, while respondents who identified as Hispanic born outside the USA (32% of the sample) had the highest mean EPI score at 5.9. Aside from individuals who did not disclose the racial/ethnic group with which they identify, Hispanic-identifying respondents who were born in the USA (17% of the sample) registered the next highest mean EPI score at 5.2, followed by those identifying as non-Hispanic Black at 4.8 (38% of the sample). Significant differences in mean EPI scores were observed between Hispanic-identifying respondents born outside the USA and respondents identifying as non-Hispanic Black ($P < 0.001$) or non-Hispanic white ($P = 0.001$) but were not observed between other groups.

Among respondents who disclosed level of educational attainment, mean EPI scores were highest among those without a high school degree at 6.0 (27% of the sample) and lowest among those with a college degree at 3.8 (15% of the sample), and significant differences were observed between all groups ($P < 0.005$ between all groups). Among respondents who disclosed their marital

Table 1. Distribution of EPI component responses ($N = 479$)

EPI Component (EPI contributing value)	Sample N (%)
EPI Component 1: Employment Type	
Full time (0)	99 (20.7)
Permanent part-time/variable hours (0.25)	60 (12.5)
Fixed term contract (0.5)	28 (5.8)
Self Employed (0.75)	10 (2.1)
Temporary or short-term (1)	241 (50.3)
EPI Component 2: Nonstandard Employment Relationship	
Standard employment (0)	50 (10.4)
Nonstandard employment (1)	425 (88.7)
EPI Component 3: Benefits	
Full benefits (0)	74 (15.4)
Partial benefits (0.5)	71 (14.8)
No benefits (1)	325 (67.8)
EPI Component 4: Paid for Missed Work	
Paid if miss work (0)	91 (19.0)
Not paid if miss work (1)	374 (78.1)
EPI Component 5: Income Variability	
Secure income (0)	131 (27.3)
Varies a little (0.25)	112 (23.4)
Varies some (0.5)	128 (26.7)
Varies a lot (0.75)	63 (13.2)
Varies great deal (1)	36 (7.5)
EPI Component 6: Likelihood of Reduction in Paid Hours	
Not likely to reduce hours (0)	245 (51.1)
Somewhat likely to reduce hours (0.5)	69 (14.4)
Likely to reduce hours (0.75)	79 (16.5)
Very likely to reduce hours (1)	78 (16.3)
EPI Component 7: On Call Work	
Not on call (0)	169 (35.3)
On call sometimes (0.25)	117 (24.4)
On call half times (0.5)	35 (7.3)
On call most times (0.75)	69 (14.4)
Always on call (1)	84 (17.5)
EPI Component 8: Scheduling	
Schedule known weeks in advance (0)	266 (55.5)
Schedule known week in advance (0.5)	48 (10.0)
Schedule not known week in advance (1)	142 (29.6)
EPI Component 9: Cash Payment	
Not paid in cash (0)	288 (60.1)
Paid in cash less than half of time (0.5)	38 (7.9)
Paid in cash about half times (0.75)	45 (9.4)
Paid in cash most of time (1)	102 (21.3)
EPI Component 10: Negative Consequences Exercising Health & Safety Rights	
No experience/worry (0)	256 (53.4)
Experienced/worry some (0.25)	24 (5.0)
Experienced/worry (0.75)	28 (5.8)
Experienced/worry considerable (1)	138 (28.8)

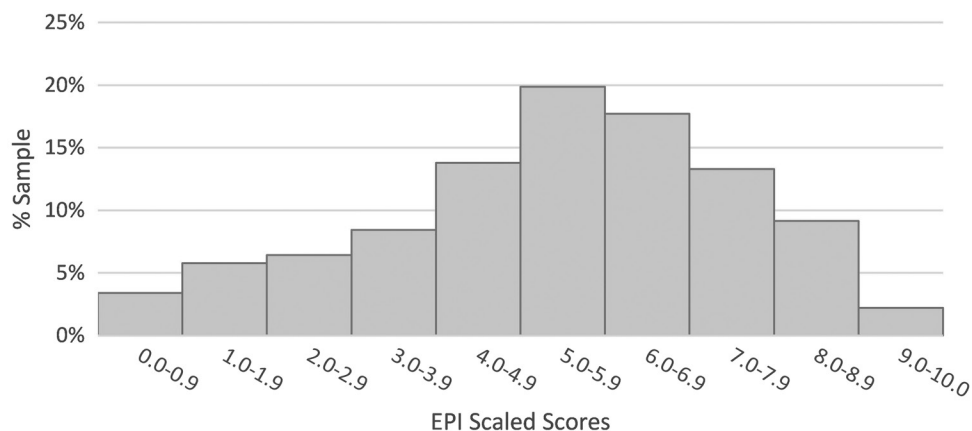


Figure 1. Distribution of EPI scaled scores.

Table 2. Sample sociodemographic characteristics and mean Employment Precarity Index (EPI) scores

	Sample N (%)	Mean EPI Score (SD)
Gender identity		
Male	231 (48.2)	5.4 (2.2)
Female	220 (45.9)	5.1 (2.3)
Self-describe	12 (2.5)	5.9 (1.3)
Did not disclose	16 (3.3)	5.7 (1.6)
F_3^1		0.9 ($p=0.451$)
Race/Ethnicity		
Hispanic - Born in US	82 (17.1)	5.2 (2.2)
Hispanic - Born Outside US	152 (31.7)	5.9 (2.0)
Black (Non-Hispanic)	182 (38.0)	4.8 (2.2)
White (Non-Hispanic)	7 (1.5)	2.9 (1.8)
Other race/ethnicity	25 (5.2)	5.2 (2.1)
Did not disclose	31 (6.5)	5.8 (1.8)
F_5^1		7.1 ($p<0.005$)
Education		
No degree	130 (27.1)	6.0 (1.7)
High school/GED	228 (47.6)	5.2 (2.1)
College degree (Associates or Bachelors)	73 (15.2)	3.8 (2.6)
Did not disclose	48 (10.0)	6.1 (1.7)
F_3^{1*}		17.3 ($p<0.005$)
Marital status		
Single	207 (43.2)	5.0 (2.2)
Married	129 (26.9)	5.3 (2.3)
Divorced, widowed, or separated	91 (19.0)	5.6 (2.1)
Did not disclose	52 (10.9)	6.0 (1.8)
F_3^1		4.0 ($p=0.008$)
Total	479 (100.0)	5.3 (2.3)

Notes: Gender identify “self-describe” includes trans male ($n = 4$) or trans female ($n = 3$), genderqueer/non-conforming ($n = 1$), or selected more than one response ($n = 2$); “other race/ethnicity” includes non-Hispanic American Indian/Alaskan ($n = 1$), non-Hispanic Asian ($n = 2$), and non-Hispanic other unspecified race ($n = 4$); “College degree” includes associate’s degree, bachelor’s degree, and/or master’s degree.

¹Numerator degrees of freedom.

* One-way Welch ANOVA. All other F values generated from standard one-way ANOVA.

status, the highest mean EPI score was among respondents who identified as divorced, widowed, or separated. No significant differences in mean EPI scores were observed between marital status groups.

Occupational exposures

The prevalence of self-reported exposures to grouped hazard types at work in the 12 months prior to survey participation are included in [Table 3](#). Overall, a majority of respondents reported exposure to each hazard group at least some of the time and more than 40% of respondents reported exposure to each hazard group more than half of the time. Ergonomic hazards were the most frequently reported hazards overall, with 92.3% of the sample reporting having been exposed at work in the past 12 months. The frequency of reported exposures to the four hazard groups differed by sociodemographic characteristic, with the largest differences in exposures reported by gender identity. For “ever” exposure, defined as exposure at any frequency at work in the prior 12 months, statistically significant differences were observed for chemical hazards by race/ethnicity ($P = 0.006$) and by education ($P < 0.05$); physical hazards by gender identity ($P < 0.005$); and for slip, trip, strike, trap, fall, or crush hazards by gender identity ($P < 0.005$), race/ethnicity ($P < 0.05$), and education ($P < 0.05$). For exposures more than half of the time at work in the prior 12 months, statistically significant differences were observed for chemical hazards, physical hazards, ergonomic hazards (excluding sitting or standing for long periods), and for slip, trip, strike, trap, fall, or crush hazards by gender identity ($P < 0.005$ for all) and education (except for chemical hazards; $P < 0.005$ for all other hazards). Significant differences were also observed for exposures more than half the time in the prior 12 months to slip, trip, strike, trap, fall, or crush hazards by race/ethnicity ($P < 0.05$). In general, those who identified as women or self-described their gender identity (versus those identifying as men) and those with a college degree (versus no degree or high school degree) had a lower frequency of exposures across all hazard groups compared to men. Findings were not as consistent across race/ethnicity or marital status.

Employment precarity*occupational exposures

One-point increases in scaled EPI scores (equivalent to a 10% increase in precarity of employment) were significantly associated with multiple self-reported exposures at work in the previous 12 months, including both “ever” exposures and exposures “more than half of the time” after adjusting for effects of relevant covariates (see [Table 4](#)). Crosstabulations of grouped

exposures by individual EPI components are included as a [Supplementary Table \(Supplementary Table A\)](#).

For “ever” exposures, work in confined spaces, with materials/equipment that could burn skin, on uneven or slippery surfaces, or at heights of at least four feet had the greatest increased odds: for every single point increase in scaled EPI score, the likelihood of reporting “ever” exposure to these hazards increased by 30%. Likelihood of reporting “ever” exposures to the following hazards increased by 20% per point increase in the scaled EPI: work in the presence of dust, fumes, or chemicals; work in the presence of secondhand tobacco smoke; work in presence of high noise; work with tools or machinery that vibrate(s); work in extreme temperatures; work with materials that could injure eyes; work with materials that could cut/scrape; work in bad weather; heavy lifting; work with materials that could hit, strike, catch, trap or crush; and work near traffic or moving vehicles. For exposures “more than half of the time,” exposure to secondhand tobacco smoke had the highest increased odds (OR = 1.4, 95% CI = 1.2–1.6), followed by work outside in bad weather (OR = 1.3, 95% CI = 1.1–1.5) and work with tools or machinery that vibrate(s) (OR = 1.3, 95% CI = 1.1–1.4). Exposures “more than half of the time” to high noise; extreme temperatures; repeated lifting, pushing, pulling, or bending; heavy lifting; and work on uneven or slippery surfaces also had significant increased odds.

Discussion

Findings highlight the high prevalence of highly precarious employment situations in this sample from a high socioeconomic hardship neighborhood, with a large proportion of respondents in work situations that registered scaled EPI scores above 4.0. The findings also highlight the range of employment precarity, measured comprehensively, within a sample of individuals who self-identified as being currently or recently employed in job situation that they perceived to be precarious. Using classification criteria as defined by the PEPSO group, nearly two-thirds of this sample can be classified as working in the most precarious jobs (Poverty and Employment Precarity in Southern Ontario (PEPSO), 2014). This finding was anticipated, given the inclusion criteria requiring that respondents perceive some facet of their employment situation to be precarious; however, the range of scaled EPI scores in the sample indicate considerable variability in the relative precarity of different working situations, not all of which may be captured by a single item about individual perception of employment precarity. Additionally, despite self-identified

Table 3. Self-reported prevalence of exposure to grouped hazard types at work in 12 months prior to survey, by demographic characteristics (N = 479)

	Exposure to chemical hazards		Exposure to physical hazards		Exposure to ergonomic hazards		Exposure to slip, trip, strike, trap, fall, crush hazards	
	Ever (%)	> 50% time (%)	Ever (%)	> 50% time (%)	Ever (%)	> 50% time (%)	Ever (%)	> 50% time (%)
Gender identity								
Male	76.2	47.2	93.1	68.8	94.8	80.5	84.0	58.9
Female	66.8	33.2	78.6	46.8	90.5	65.0	64.5	31.4
Self-describe	66.7	58.3	83.3	66.7	100.0	83.3	66.7	41.7
Did not disclose	56.3	25.0	62.5	31.3	62.5	43.8	50.0	25.0
P	0.047	<0.005	<0.005	<0.005	0.164	<0.005	<0.005	<0.005
Race/Ethnicity								
Hispanic - Born in US	65.9	37.8	81.7	57.3	90.2	67.1	76.8	56.1
Hispanic - Born Outside US	67.1	40.8	84.2	55.3	91.4	73.0	65.8	40.1
Black (Non-Hispanic)	78.6	42.9	88.5	61.5	94.5	75.3	80.2	45.1
White (Non-Hispanic)	42.9	14.3	100.0	42.9	100.0	71.4	85.7	14.3
Other race/ethnicity	68.0	36.0	72.0	36.0	96.0	68.0	56.0	36.0
Did not disclose	71.0	41.9	93.5	71.0	83.9	74.2	80.6	54.8
P	0.006	0.280	0.054	<0.005	0.663	0.439	0.007	0.045
Education								
No degree	74.6	42.3	88.5	59.2	95.4	76.9	76.2	43.8
High school/GED	74.6	44.3	84.6	61.4	93.0	77.6	77.2	50.4
College degree	58.9	28.8	80.8	37.0	87.7	49.3	58.9	24.7
Did not disclose	60.4	33.3	85.4	66.7	85.4	70.8	72.9	52.1
P	0.025	0.069	0.136	<0.005	0.183	<0.005	0.008	<0.005
Marital status								
Single	71.0	41.5	87.0	59.4	94.2	75.8	74.4	44.4
Married	69.8	41.1	82.9	55.8	91.5	71.3	72.9	47.3
Divorced, widow, separated	75.8	46.2	86.8	59.3	91.2	69.2	74.7	45.1
Did not disclose	67.3	25.0	84.6	53.8	88.5	69.2	73.1	42.3
P	0.500	0.576	0.680	0.415	0.687	0.408	0.857	0.906
Total	71.2	40.5	85.6	57.8	92.3	72.7	73.9	45.1

Notes: Ergonomic hazard group excluded the items "on feet for long periods," and "sitting for long periods." Chi-square tests were used to test group rate differences.

Table 4. Odds Ratios and 95% Confidence Intervals for effect of a point increase in employment precarity (EPI) on self-reported occupational exposures (N=479).

	Ever versus never Exposed	Exposed > 50% of the time
	OR (95% CI)	OR (95% CI)
Chemical & Biological		
Grouped	1.2 (1.1-1.3)	1.2 (1.0-1.3)
Dust, fumes, or chemicals	1.2 (1.1-1.3)	1.1 (1.0-1.2)
Infectious materials	1.1 (1.0-1.2)	1.0 (0.9-1.1)
Confined spaces	1.3 (1.1-1.5)	1.2 (1.0-1.5)
Secondhand tobacco smoke	1.2 (1.1-1.4)	1.4 (1.2-1.6)
Physical		
Grouped	1.3 (1.1-1.4)	1.3 (1.1-1.4)
High noise	1.2 (1.1-1.3)	1.2 (1.1-1.3)
Vibration from tools or machinery	1.2 (1.1-1.3)	1.3 (1.1-1.4)
Extreme temperatures	1.2 (1.1-1.4)	1.2 (1.1-1.4)
Materials that could burn skin	1.3 (1.1-1.4)	1.1 (1.0-1.2)
Materials that could injure eyes	1.2 (1.1-1.3)	1.1 (1.0-1.3)
Materials that could cut/scrape	1.2 (1.1-1.3)	1.1 (1.0-1.2)
Work outside in bad weather	1.2 (1.1-1.4)	1.3 (1.1-1.5)
Ergonomic		
Grouped	1.0 (0.8-1.3)	1.0 (0.9-1.2)
Grouped (without sit/stand)	1.2 (1.0-1.5)	1.2 (1.0-1.3)
Repeated lifting, pushing, pulling, bending	1.1 (1.0-1.3)	1.2 (1.1-1.3)
Heavy lifting	1.3 (1.1-1.4)	1.2 (1.1-1.4)
On feet for long periods	1.1 (1.0-1.3)	1.1 (1.0-1.2)
Sitting for long periods	1.0 (0.9-1.0)	0.9 (0.8-1.0)
Slip, trip, strike, fall, trap, crush		
Grouped	1.3 (1.2-1.4)	1.1 (1.0-1.3)
Uneven or slippery surfaces	1.3 (1.2-1.5)	1.2 (1.1-1.4)
Work at heights (4+ ft)	1.3 (1.1-1.4)	1.2 (1.0-1.4)
Materials that hit, strike, catch, trap, crush	1.2 (1.1-1.3)	1.1 (1.0-1.3)
Work near traffic or moving vehicles	1.2 (1.1-1.3)	1.0 (0.9-1.2)

Notes: All logistic regression models were adjusted for gender, race/ethnicity, and education. Due to small cell sizes, models were restricted to include cases identifying as male or female ("self-describe" excluded) and "white" and "other race/ethnicity" categories were combined. Cases that did not disclose one or more demographic characteristic were also excluded. Total n=395 for regression analyses. ORs with a 95% confidence interval that does not include 1 are significant at the $p < .05$ level or less.

employment precarity being a central inclusion criterion, 17% of the sample could be classified as having a stable or secure job situation according to PEPISO classification criteria, suggesting that the EPI measure is likely not capturing important aspects of precarity for this sample. Additional research is needed to obtain a more complete understanding of the components of employment precarity that are most central to workers from high hardship communities, as understanding all employment conditions that feed into employment precarity may help to identify clear opportunities for interventions to ultimately reduce health inequities between workers in high- and low-hardship communities. Addressing

multi-factorial drivers of employment precarity is likely to require multi-level interventions, including those at the community and policy levels, to broadly shift employment opportunities away from those that are precarious and instead towards stable, secure, and healthy work options with wages that allow workers, their families, and their larger communities to access and utilize resources that promote health.

The sample also reported a high prevalence of exposure to recognized occupational hazards, with nearly 75% of respondents reporting ever being exposed to at least one hazard at work and more than 40% of respondents reporting exposure more than half of the

time that they are at work. These findings suggest that respondents are working in high hazard industries, putting them at increased risk of occupational injury and illness. Though the GLHW project team did include several survey items aimed at understanding the types of work in which respondents were engaged, these items did not allow for consistent and infallible coding of occupation and industry for respondents and these measures were thus not included in the analyses performed for this paper. However, prior studies indicate that Black and Hispanic workers are over-represented in occupations and industries associated with high risks of acute and chronic injuries (Stanbury and Rosenman, 2014) and that occupational injuries tend to be clustered spatially by home location of affected workers, that is, at the community level (Forst *et al.*, 2015); findings from our analyses appear to support these associations.

Significant differences in relative employment precarity and self-reported exposures to occupational hazards were observed between demographic groups. These findings are consistent with well-documented associations between some of the most prevalent demographic characteristics in this sample and features of precarious work and exposure to occupational hazards, respectively (Quinn *et al.*, 2007; Cooper, 2018). However, unlike prior studies, we examined employment precarity comprehensively and were able to attribute the increased risk of reporting specific and grouped occupational hazard exposures to incremental increases in precarity of employment. Notably, we found that a 10% stepwise increase in employment precarity is an important predictor of self-reported exposure to a wide range of occupational hazards even after adjusting for the effects of confounders. We opted to use a less conservative threshold for statistical significance in our models, aiming to treat individual self-reported occupational exposures as unique observations and not as multiple, related comparisons, an approach championed by Rothman (1990). These findings suggest that an individual in the most precarious job situation, defined by a high EPI score, could have a 10-fold or higher increased likelihood of exposure to occupational hazards than an individual in the most stable job situation.

Because employment precarity and work in high hazard environments are both independently associated with adverse health outcomes, workers who are precariously employed and who are frequently exposed to occupational hazards are expected to experience the highest risk of work-related injury or illness. Workers in precarious employment situations may be less likely to report hazards at work and, if they do become injured or ill due to hazardous exposures at work, they

may experience difficulties accessing supports, including workers' compensation, due to the convoluted nature of their employment arrangements (Probst *et al.*, 2018; Anderson, Smith and Foley, 2022). Moreover, the existence of these arrangements is driven and sustained by the multiple systems of oppression through which marginalized communities experience work, which reinforces the importance of and need for research designed to expose the mechanisms at play which collectively contribute to experiences of poor health and well-being.

Strengths and limitations

This study has several important strengths. First, CRs who lived and/or worked in the Greater Lawndale community took on the leading roles of recruitment and data collection, which likely contributed to increased trust in the research process and may have contributed to higher quality data. This was a particular strength during a time when social conditions during a hostile presidential administration made it risky for workers who were undocumented to participate in research. Additionally, a larger group of community researchers and university researchers was involved in the compilation of the survey instrument and decisions of which measures were most important to include in order to ensure a comprehensive view of employment and working conditions, as well as barriers to and facilitators of employment, experienced by Greater Lawndale residents. Another important and related strength of this study was the effort made to recruit individuals who met the eligibility criteria, which included being both a resident of one of two high socioeconomic hardship communities in Chicago that make up the Greater Lawndale neighborhood and perceiving one's current or recent employment to be precarious. This helped to ensure a robust sample of individuals likely to be precariously employed, a group that is historically harder to engage in traditional research. Importantly, this study was not designed to generate results representative of the population of Greater Lawndale as a whole but was instead designed to reach this particular population to elaborate the phenomenon of work as a social determinant of health at the neighborhood level and use community development approaches to build community capacity to foster healthy work.

The study involved some noteworthy limitations. Among them was the small sample size, which resulted in small numbers of respondents for some important characteristics when the sample was stratified (e.g. respondents who identified as gender queer, nonconforming, or who preferred to self-describe). This limitation resulted in the exclusion of some subgroups within the sample

that may be disproportionately employed in precarious jobs or whose demographic characteristics may make their work situations more hazardous. Notably, some respondents were reluctant to provide demographic data and were thus excluded from hypothesis testing; however, in the aggregate, these individuals reported highly precarious employment situations, evidence by high mean EPI scores. Future studies should explore particular risks for these groups.

Another challenge stemmed from the restriction of survey items to focus only on one job when a respondent may have held more than one job at the time of survey participation. When a respondent indicated that they held more than one job, they were told to reflect only on whichever of their jobs was their primary or “main job” (e.g. where they worked the most hours or received the greatest pay). For the analyses performed for this paper, the restriction to one job may result in an incomplete picture of a respondent’s exposures to occupational hazards; this limitation has been documented in other settings where surveys are employed to collect data about occupational exposures (Quinlan *et al.*, 2001; Quinn *et al.*, 2007). Other methods, such as qualitative interviews and job histories, may be preferable to attain more complete data. In fact, our qualitative research components of this project note that working multiple jobs is a community norm (Velonis *et al.*, 2020; Hebert-Beirne *et al.*, 2021).

Finally, these data were collected pre-COVID-19 pandemic and do not capture possible changes in employment precarity or hazardous exposures since the pandemic. However, it is likely that the pandemic exacerbated findings we observed here, as other studies have documented the disproportionately adverse impacts of the pandemic on precariously employed workers in particular (Matilla-Santander *et al.*, 2021). Many precarious jobs can be classified as “essential workers,” e.g. restaurant work, retail, and we know that working during the pandemic only increased worker exposures to hazards for various reasons such as working in close proximity to other workers (e.g. on meat packing lines), to those at greater risk for contracting the virus (e.g. in care facilities), and to the public. Furthermore, staffing shortages in various industries might have contributed to more hazardous workplace conditions in general.

Conclusions

This paper provides an important contribution to occupational health and health disparities literature and is the first to employ a multiitem measure of employment precarity to assess the relationship between incremental

increases in precarity and risk for hazardous occupational exposures in a high hardship community. Study findings highlight that even among a group of self-identified precarious workers, there are degrees of precariousness, and these degrees matter for likelihood of exposure to hazardous workplace conditions and ultimately for worker health. Even small decreases in precarity may have significant implications for worker health, and future studies should further explore the mechanisms that may contribute to health disparities between workers employed in precarious and those employed in more stable job situations. Due to structural drivers that segregate neighborhoods by race and class, workers employed in precarious jobs are also likely to be concentrated in community areas. This also has implications for community health. It is important that future studies continue to explore the complexities of the relationships between employment arrangements, working conditions, and worker and community health to design effective interventions that will improve the health of all community residents.

Supplementary Data

Supplementary data are available at *Annals of Work Exposures and Health* online.

Acknowledgements

This research is made possible by the collaborative efforts of UIC faculty, staff, students and Greater Lawndale Community Researchers: Rosi Carrasco, Virgilio Hernandez (Chicago Community and Workers’ Rights); Arturo Carrillo, Melissa Chrusfield, Adriana Magana, David Mosley, Maria Post, Angelica Rosales, Rev. Bob Smith (Community Residents); Richard Wallace (Equity and Transformation); Teresa Berumen, Robert Calhoun, Suzanne Zoheri Chopra (Saint Anthony Hospital); Gabriela Bustos, Madeline Woodberry (Sinai Urban Health Institute); Jackeline Ortiz, Laura Romero, Leonarda Rosendo, Patricia Pereda, Maria Velazquez (Telpochcalli Community Education Project); Jennifer Felner (UC San Diego Department of Health Promotion and Behavioral Science); Aeysha Chaudhry, Rodney Johnson, Morgan Lawson, Natalie Merrick, Amanda Montgomery, Jennifer Plascencia Lopez (UIC Graduate Students); Rolando Favela, Sylvia Gonzalez, Marsha Love (UIC SPH Staff); Renee Hatcher (UIC Law School); Preethi Pratap (UIC Department of Environmental and Occupational Health Sciences); Alisa Velonis (UIC Department of Community Health Sciences).

Conflicts of interest

The authors declare that there are no conflicts of interest.

Funding

Funding for this study was provided by the Centers for Disease Control and Prevention National Institute for Occupational Safety and Health under grant number U19 OH011232. The views expressed in publications do not necessarily reflect the official policies of the Department of Health and Human Services, nor does the mention of trade names, commercial practices, or organizations imply endorsement by the U.S. Government. *Total Worker Health*® is a registered trademark of the U.S. Department of Health and Human Services (HHS).

Ethics

This protocol was approved by the Institutional Review Board of the University of Illinois at Chicago. IRB#2013-0128 (Full Review). There was verbal informed consent and presentation of a consent form to participants.

Data availability statements

Requests for data underlying this article may be made to the Greater Lawndale Healthy Work Council by contacting principal investigator, Jeni Hebert-Beirne at jheber1@uic.edu.

References

- American Community Survey Data - Employment Estimates 60623 (2019). Available at: [https://data.census.gov/cedsci/table?t=Class of Worker%3AEmployment and Labor Force Status%3AOccupation&g=860XX00US60623&tid=ACSS15Y2019.S2406](https://data.census.gov/cedsci/table?t=Class+of+Worker%3AEmployment+and+Labor+Force+Status%3AOccupation&g=860XX00US60623&tid=ACSS15Y2019.S2406).
- Anderson NJ, Smith CK, Foley MP. (2022) Work-related injury burden, workers' compensation claim filing, and barriers: Results from a statewide survey of janitors. *Am J Ind Med*; 65(3): 173–95.
- Asfaw A. (2021) Racial disparity in potential occupational exposure to COVID-19. *J Racial Ethn Health Disparities*; Springer, 1–14. Available at: <https://link.springer.com/article/10.1007/s40615-021-01110-8>.
- Bonney T *et al.* (2017) Occupational safety and health in the temporary services industry: a model for a community–university partnership. *New Solut J Environ Occup Health Policy*; SAGE Publications Sage CA: Los Angeles, CA, 27(2): 246–59.
- Chicago Health Atlas (2021) *University of Illinois Chicago School of Public Health the Population Health Analytics, Metric and Evaluation (PHAME)*. Available at: www.chicagohealthatlas.com/neighborhood.
- Chicago Metropolitan Agency for Planning (2021) *Community Snapshots*. Available at: <https://www.cmap.illinois.gov/data/community-snapshots>. Accessed 5 November 2021.
- Collaboratory for Health Justice (2021) *Best Practices for Using Race in Public Health Research*. doi:10.25417/uic.15159393.v1.
- Cooper D. (2018) Workers of color are far more likely to be paid poverty-level wages than white workers. *Econ Policy Inst*; 21. Available at: <https://www.epi.org/blog/workers-of-color-are-far-more-likely-to-be-paid-poverty-level-wages-than-white-workers/>.
- Forst L *et al.* (2015) Spatial clustering of occupational injuries in communities. *Am J Public Health*; American Public Health Association, 105(S3): S526–33.
- Hebert-Beirne J *et al.* (2018) Partner development praxis: the use of transformative communication spaces in a community-academic participatory action research effort in a Mexican ethnic enclave in Chicago. *Action Res*; SAGE Publications Sage UK: London, England, 16(4): 414–36.
- Hebert-Beirne J *et al.* (2021) Community resident perceptions of and experiences with precarious work at the neighborhood level: the greater Lawndale healthy work project. *Int J Environ Res Public Health*; Multidisciplinary Digital Publishing Institute, 18(21): 11101.
- Ingram M *et al.* (2021) Proposing a social ecological approach to address disparities in occupational exposures and health for low-wage and minority workers employed in small businesses. *J Expo Sci Environ Epidemiol*; Nature Publishing Group, 31(3): 404–11.
- Jin J, Paulsen K. (2018) Does accessibility matter? Understanding the effect of job accessibility on labour market outcomes. *Urban Stud*; SAGE Publications Sage UK: London, England, 55(1): 91–115.
- Keim AC *et al.* (2014) Why do employees worry about their jobs? A meta-analytic review of predictors of job insecurity. *J Occup Health Psychol*; Educational Publishing Foundation, 19(3): 269.
- Koranyi I *et al.* (2018) Precarious employment and occupational accidents and injuries—a systematic review. *Scand J Work Environ Health*; JSTOR, 44(4): 341–50.
- Landsbergis PA, Grzywacz JG, LaMontagne AD. (2014) Work organization, job insecurity, and occupational health disparities. *Am J Ind Med*; Wiley Online Library, 57(5): 495–515.
- Lewchuk W. (2016) The precarity penalty: How insecure employment disadvantages workers and their families. *Altern Routes J Crit Soc Res*; 27: 87–108.
- Lewis SP, Hasking P. (2019) Putting the “self” in self-injury research: Inclusion of people with lived experience in the research process. *Psychiatr Serv*; Am Psychiatric Assoc, 70(11): 1058–60.
- Matilla-Santander N *et al.* (2021) COVID-19 and precarious employment: consequences of the evolving crisis. *Int J Health Serv*; Sage Publications Sage CA: Los Angeles, CA, 51(2): 226–8.
- McClure ES *et al.* (2020) Racial capitalism within public health—how occupational settings drive COVID-19 disparities. *Am J Epidemiol*; Oxford University Press, 189(11): 1244–53.
- Oddo VM *et al.* (2021) Changes in precarious employment in the United States: a longitudinal analysis. *Scand J Work, Environ Health*; Nordic Association of Occupational Safety and Health, 47(3): 171.

- Peckham T *et al.* (2019) Evaluating employment quality as a determinant of health in a changing labor market. *RSF Russell Sage Foundation J Soc Sci*; RSF: The Russell Sage Foundation Journal of the Social Sciences, 5(4): 258–81.
- Peckham T *et al.* (2022) What does non-standard employment look like in the United States? An empirical typology of employment quality. *Soc Indic Res*; Springer, 1–29. Available at: <https://link.springer.com/article/10.1007/s11205-022-02907-8#citeas>.
- Phelan JC, Link BG. (2015) Is racism a fundamental cause of inequalities in health?. *Annu Rev Sociol*; Annual Reviews, 41: 311–30.
- Poverty and Employment Precarity in Southern Ontario (PEPSO) (2014) *Employment Precarity Index Methods Manual*. Available at: <https://pepso.ca/tools>. Accessed 27 April 2020.
- Probst TM *et al.* (2018) Moderating effects of contingent work on the relationship between job insecurity and employee safety. *Saf Sci*; 106: 285–93. doi:10.1016/j.ssci.2016.08.008.
- Puig-Barrachina V *et al.* (2014) Measuring employment precariousness in the European Working Conditions Survey: the social distribution in Europe. *Work*; IOS Press, 49(1): 143–61.
- Quinlan M, Mayhew C, Bohle P. (2001) The global expansion of precarious employment, work disorganization, and consequences for occupational health: a review of recent research. *Int J Health Serv*; SAGE Publications Sage CA: Los Angeles, CA, 31(2): 335–414.
- Quinn MM *et al.* (2007) Social disparities in the burden of occupational exposures: results of a cross-sectional study. *Am J Ind Med*; Wiley Online Library, 50(12): 861–75.
- Rothman KJ. (1990) No adjustments are needed for multiple comparisons. *Epidemiol (Cambridge, Mass.)*; United States, 1(1): 43–6.
- Rubin DB. (1987) *Multiple imputation for survey nonresponse*. New York: Wiley.
- Salazar ZR *et al.* (2021) Research led by people who use drugs: centering the expertise of lived experience. *Subst Abuse Treat Prev Policy*; Springer, 16(1): 1–4.
- Seabury SA, Terp S, Boden LI. (2017) Racial and ethnic differences in the frequency of workplace injuries and prevalence of work-related disability. *Health Aff*; 36: 266–73.
- Stanbury M, Rosenman KD. (2014) Occupational health disparities: a state public health-based approach. *Am J Ind Med*; Wiley Online Library, 57(5): 596–604.
- Velonis AJ *et al.* (2020) Impact of precarious work on neighborhood health: concept mapping by a community/academic partnership. *Am J Ind Med*; Wiley Online Library, 63(1): 23–35.
- Vives A *et al.* (2010) The Employment Precariousness Scale (EPRES): psychometric properties of a new tool for epidemiological studies among waged and salaried workers. *Occup Environ Med*; BMJ Publishing Group Ltd, 67(8): 548–55.