Occupational, social, and relationship hazards and psychological distress among low-income workers: implications of the 'inverse hazard law'

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ABSTRACT

Background Few studies have simultaneously included exposure information on occupational hazards, relationship hazards (eg, intimate partner violence) and social hazards (eg, poverty and racial discrimination), especially among low-income multiracial/ethnic populations.

Methods A cross-sectional study (2003–2004) of 1202 workers employed at 14 worksites in the greater Boston area of Massachusetts investigated the independent and joint association of occupational, social and relationship hazards with psychological distress (K6 scale).

Results Among this low-income cohort (45% were below the US poverty line), exposure to occupational, social and relationship hazards, per the 'inverse hazard law,' was high: 82% exposed to at least one occupational hazard, 79% to at least one social hazard, and 32% of men and 34% of women, respectively, stated they had been the perpetrator or target of intimate partner violence (IPV). Fully 15.4% had clinically significant psychological distress scores (K6 score ≥13). All three types of hazards, and also poverty, were independently associated with increased risk of psychological distress. In models including all three hazards, however, significant associations with psychological distress occurred among men and women for workplace abuse and high exposure to racial discrimination only; among men, for IPV; and among women, for high exposure to occupational hazards, poverty and smoking.

Conclusions Reckoning with the joint and embodied reality of diverse types of hazards involving how people live and work is necessary for understanding determinants of health status.

Despite growing interest in how people's everyday context affects their health - at work, at home, in the neighbourhood, and society at large[1] - few studies have simultaneously obtained data on occupational hazards, relationship hazards (eg, intimate partner violence) and social hazards (eg, poverty and racial discrimination).[1–4] Yet, as posited by the 'inverse hazard law' - which states: 'The accumulation of health hazards tends to vary inversely with the power and resources of the populations affected'[5] - these disparate hazards are likely to be clustered, jointly affecting health.

Three considerations suggest it may be useful to analyse these three types of hazards together. First, aetiologically, knowledge about their co-occurrence and possible interactions may be relevant.[1][6][7] Second, methodologically, are concerns about bias, confounding and omitted variables, as might occur if a health outcome (eg, high blood pressure) were studied in relation to only one type of hazard when in fact all three mattered (eg, exposure to lead, to discrimination and to violence).[8] Third, from a clinical and public health perspective, a focus on only one domain of hazards could lead to an incomplete assessment of the risks that patients experience and inadequate prevention strategies.

In the present study, the focus is on the co-occurrence and health consequences of occupational, social and relationship hazards in relation to psychological distress, an outcome plausibly linked to all three types of exposures.[3][4][9–11] Guided by the ecosocial theory of disease distribution and its focus on how people literally embody, biologically, their societal context, thereby shaping population patterns of health and disease (see figure 1),[8][12] the a priori hypothesis was that joint inclusion of all three hazards would alter effect estimates of any single hazard, and also potentially reveal important interactions. The study population consisted of the *United for Health* cohort,[13] a group of US black, Latino and white women and men employed in a mixture of relatively low-income working class jobs.

METHODS
Study population and protocol: the United for Health cohort
As described previously,[13] participants were recruited between March 2003 and August 2004 from the rosters of union members employed at 14 worksites engaged in meat processing, electrical light manufacturing, retail grocery stores and school bus driving, and located in the greater Boston area in Massachusetts. Neither unions nor management had access to the study data and neither had any role in the preparation, review, or approval of the study's scientific papers. The study incentive was either a 1 h paid work-release plus a $25 pre-paid grocery card (handed out after the survey was completed) or, if paid work-release was not an option, a $50 pre-paid grocery card. All participants received an informed consent reference sheet and provided verbal informed consent. Conduct of the study was approved by the Dana-Farber Cancer Institute's Office for the Protection of Research Subjects, the Human Subjects Committee of the Harvard School of Public Health, and the Institutional Review Board of the University of Massachusetts.

Figure 1 Conceptual model (United for Health Study, Boston, MA, 2003-2004).
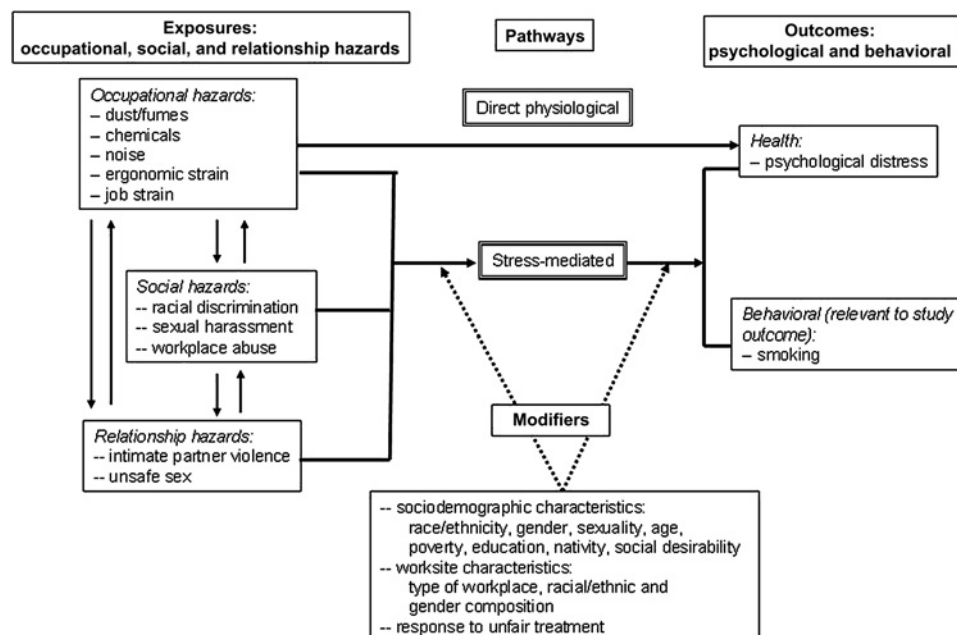
After the unions sent their members at each worksite an introductory letter, study staff then screened, recruited and administered the survey to the workers on-site. The 40–45 min survey was administered (either in English or Spanish) in a private room, followed by a 15 min health check. For the survey, an audio-computer assisted self-interviewing (ACASI), to improve likelihood of obtaining sensitive information and to enable persons with low literacy to respond.[14] The Spanish version of the survey was translated from English and then back-translated to ensure accuracy. Interview staff bilingual in English and Spanish were available to answer participants' questions.

Among the 2323 union members on the list provided by the unions, 1776 stated that they met study eligibility criteria for age (25–64 years old) and length of employment (at least 2 months). Of these, 1282 (72%) completed the survey, of whom 80 had an age that was either unknown or outside the eligible age range, yielding an analytic sample of 1202 age-eligible workers.

Sociodemographic measures: individual-level and worksite

Self-reported data were obtained on race/ethnicity, gender, sexual identity ('straight/heterosexual', 'lesbian or gay', 'bisexual', 'other'), sexual partners ('all men', 'mostly men', 'equally men and women', 'mostly women', 'all women'), relationship status (eg, married or living as married), nativity, and socioeconomic position- both current (eg, educational level, household poverty level) and during childhood. Data on race/ethnicity, conceptualised as a social category,[4] were obtained because of the salience for assessing exposure to racial discrimination and its health impact; the categories we used were: white non-Hispanic, black non-Hispanic, Hispanic and additional race/ethnicities. At the worksite level, data were obtained on the gender and racial/ethnic composition of the participants' coworkers and also worksite type (manufacturing, retail, transportation).

Occupational hazard measures

Self-reported data on workplace occupational hazards, using well-established instruments described in detail in prior publications,[5 15] were based on 12 month recall period and pertained to: 1. airborne dust, fumes and chemicals[16] 2. noise[17] 3. ergonomic strain,[18] including the heaviest objects lifted at work and 4. job strain.[19] For all exposures, a three-point scale was employed corresponding to low, moderate or high exposure, except for chemical and dust exposure, which used a four-point scale to maintain comparability to prior studies.[15] High exposure equalled the top level for all occupational hazards except for: A. dust and chemicals, for which the top two levels were used, and B. job strain, where 'high strain' equalled 'high demand/low control' and all else was 'low strain,' with scores dichotomised at the national median value.

Social hazard measures

Validated self-report measures were used for the three social hazards, also described in prior publications[5 20]: workplace abuse in the past year (eg, being yelled or sworn at while at work),[21] sexual harassment in the past year (eg, unwanted sexual attention and sexual coercion)[21 22] and the 'Experiences of Discrimination' (EOD) instrument on having ever experienced racial/ethnic discrimination in nine different domains (including getting hired or getting a job or at work).[4 23] Questions were also included about participant's response to unfair treatment,[4 23] and single-item queries about having ever been exposed to discrimination based on gender and on sexuality. To control for how self-presentation might affect these responses, a five-item validated social desirability scale was used.[24]

Relationship hazard measures

Self-reported data were obtained on two relationship hazards: intimate partner violence (IPV) and unsafe sex. For IPV, 10 items from the validated Conflict Tactic Scale were employed,[25] pertaining to situations in which one partner had physically beaten the other, used force or threats to have sex, or threatened to kill the partner, and another six items pertaining to employment-situated violence (eg, the partner coming to work to harass the respondent). Given time constraints, only participants who identified as being men were asked about perpetration and only those who identified as being women were asked about being a target. Two items from the parent-child Conflict Tactics Scales were also used[26] to ascertain if the participants, during the first 18 years of their life, had ever been the target of physical harm by an adult in their household (eg, hit so hard as

to be injured). To measure exposure to 'unsafe sex' during the past 6 months, previously developed instruments[27] [28] were drawn on to ascertain if participants: A. had used condoms only sometimes, rarely, or never (and were not trying to get pregnant), B. had two or more partners and/or C. replied 'yes' or 'don't know' when asked if any of their sex partners during the past 6 months 'ever injected drugs; had sex with other people during the period when you were having sexual relations; had a sexually transmitted disease when you were having sexual relations; definitely or maybe has HIV infection'.

Health outcome data

The validated K6 six-item scale for psychological distress (score range: 0—24) was employed, for which scores of 13 or higher have been shown to be predictive of clinically diagnosed mental illness (eg, depression).[9] [29] To address possible confounding, data were obtained on two additional health-related covariates potentially associated with psychological distress: A. cigarette smoking, using questions from the US National Health Interview Survey[30] and B. body mass index (BMI=weight (kg)/height (m^2)), calculated based on measurements taken during the physical exam (with shoes removed; height to the nearest half-inch and weight to the nearest pound, with these measurements converted to the metric scale, following standard scientific convention).

Statistical analysis

Statistical analysis of the data was premised on a conceptual model (figure 1) and a priori hypothesis that effect estimates for the three types of hazards would change if included singly versus jointly in the models. All analyses were conducted in R[31] and SAS.[32] To enhance statistical power and avoid bias due to missing data, 20 imputed data sets were created, using Amelia II[33]; the imputation model contained all variables included in the analytic models and results combined across imputations were reported (valid under the assumption of Missing at Random). The reported R^2 for each model is the average of the R^2 computed for each of the 20 imputation models.

Bivariate associations were first ascertained, separately for women and men, between the specified covariates and psychological distress, modelled as a continuous outcome (Model 1). Multivariable linear regression was then used to analyse four sets of models, for: A. the relationship hazards (Model 2), B. the occupational hazards (Model 3), C. the social hazards (Model 4) and D. all three hazards together (Model 5). Each model included the same core set of covariates pertaining to individual and worksite characteristics; Models 4 and 5 also included interaction terms between race/ethnicity and racial discrimination, and between sexuality and sexuality-based discrimination. Model 6 (not shown) additionally included interaction terms between exposure to high versus low levels of occupational hazards (with 'high' defined as three or more occupational hazards and/or high job strain) and each of the two hazards that, for women and men, remained significantly associated with psychological distress in Model 5: workplace abuse and racial discrimination. Because initial analyses using a mixed model approach did not provide evidence of clustering of workers within worksites, conditional on the covariates, solely results based on fixed effects models are presented, controlling for worksite type.

RESULTS

Table 1 shows the observed (non-imputed) distribution of psychological distress, the occupational, social and relationship hazards, and the other key covariates among the 1202 members of the United for Health cohort, overall and by race/ethnicity.

Among this cohort of predominantly low-income multiracial/ethnic working class women and men, the average score for psychological distress equalled 7.7; fully 15% had clinically significant scores, ranging from 12.8% among white men to 29.9% among Latina women. As discussed in more detail in previous papers,[13] [15] [20] fully 45% of the cohort was below the US poverty line (24% of whites vs 50—60% among black, Latino, and other workers of colour), 79% were exposed to at least one social hazard, and 82% to at least one occupational hazard (see supplementary table 1 for more detailed exposure data).

As table 1 further reveals, exposure to relationship hazards was also high: overall, 32% of the men reported having ever been a perpetrator of IPV; 34% of the women reported having ever experienced IPV (19% in the last year); and 43% of participants reported having had unsafe sex in the past 6 months.

Among the men (table 2), the only three variables yielding consistent significant estimates across Models 2 through 5 for their positive association with psychological distress were: 1. being a perpetrator of IPV (β range 0.5-0.7, per unit change in score), 2. being subjected to high versus no racial discrimination (β range 2.3-2.5) and 3. being subjected to workplace abuse (β range ≈0.2, per unit change in score). Other variables significantly associated with psychological distress in one or more of Models 2 through 4, but not in Model 5 (containing all three types of hazards) were: A. poverty (Model 2, relationship hazards; Model 3, occupational hazards), B. occupational hazards (Model 3), C. sexual harassment (Model 4, social hazards), D. smoking (Model 3; Model 4) and E. lesbian, gay, bisexual (LGB)-identified with any same-sex partners (Model 4). No interactions were detected between exposure to occupational hazards and either racial discrimination or workplace abuse (Model 6, not shown). Inclusion of the social hazard variables, in addition to the core covariates included in all the models, made the largest contribution to explaining the variance for the outcome: the R^2 was only 0.15 and 0.11 in the relationship and occupational hazard models, respectively, but increased to 0.27 in the social hazard model and rose only slightly more, to 0.29, in the combined hazard model.

Among the women (table 3), five variables yielded consistently significant parameter estimates in the different models, indicating higher risk of psychological distress associated with: 1. poverty (β range 1.1—1.4), 2. being subjected to high levels of racial discrimination (β range 4.8-5.4), 3. workplace abuse (β range ≈0.2), 4. high exposure to occupational hazards (β range 1.9—3.1) and 5. smoking (β range 1.7—2.2); significantly lower levels of psychological distress were consistently associated with higher scores for social desirability (β range −0.03 to −0.02). Other variables significantly associated with psychological distress in one or more of Models 2 through 4, but not in Model 5 (containing all three types of hazards) were: for increased distress, being Latina (Model 3), and for decreased distress, living with a partner or being in a serious relationship but not married (Model 4). As with the men, no interactions were detected between exposure to occupational hazards and either racial discrimination or workplace abuse (Model 6, not shown) The R^2 was lowest in the relationship and occupational hazard models (0.17-0.18), increased to 0.31 in the social hazard model and was only marginally larger (0.34) in the combined hazard model.

DISCUSSION

The present study of a multiracial/ethnic group of employed lower-income working class US adults affirms the importance of jointly analysing occupational, social and relationship hazards, all of which - per the 'inverse hazard law'[5] - were highly

Table 1 United for Health study population: sociodemographic and worksite characteristics and distribution of relationship hazards, social and occupational hazards, health outcomes, and additional covariates, overall and by race/ethnicity and gender*. Boston, MA (USA), 2003–2004

Characteristic	Total*	Black*		Latino*		White*		Other race/ethnicity*	
	All	Men	Women	Men	Women	Men	Women	Men	Women
	N=1202	N=308	N=158	N=152	N=115	N=182	N=102	N=73	N=45
Health outcome									
Psychological distress (in past 30 days): mean (SD)	7.7 (5.0)	7.7 (4.6)	7.2 (5.3)	7.9 (4.9)	9.7 (5.8)	6.6 (4.7)	7.8 (4.7)	6.8 (5.6)	8.1 (5.1)
Clinically significant distress (% with score ≥13)	15.4	13.8	17.4	17.1	29.9	12.8	12.9	13.6	18.2
Sociodemographic and worksite characteristics									
Age (%): 24–44 years	49.3	38.3	55.1	64.5	68.7	39.6	45.1	48.0	62.2
45–64 years	50.7	61.7	44.9	35.5	31.3	60.4	54.9	52.1	37.8
Nativity (%): born in US state or territory	50.0	27.3	67.7	29.9	26.7	86.8	92.2	29.0	44.4
Poverty level (household) (%): % below poverty	45.0	49.8	52.0	55.9	66.3	21.8	31.3	36.9	53.7
Education: highest level completed (respondent) (%)									
<12th grade	25.1	21.0	15.9	43.6	43.3	20.7	20.8	13.9	31.0
High school degree/General Educational Development (GED) diploma	40.5	39.2	52.3	29.0	33.0	45.3	40.6	38.5	38.1
Some college/vocational school	24.4	28.7	25.2	17.7	17.5	21.8	26.7	29.2	26.2
4 years of college	6.6	6.7	2.7	8.1	4.1	9.5	7.9	10.8	4.8
Graduate degree	3.5	4.4	4.0	1.6	2.1	2.8	4.0	7.7	0.0
Relationship status (%)									
Currently married	44.6	57.9	25.3	50.3	36.3	44.5	29.0	54.8	44.4
Divorced, separated, widowed	18.6	16.1	24.1	11.9	24.8	17.0	27.0	19.2	13.3
Live with partner or serious relationship, not married	19.0	14.5	21.5	23.2	26.6	17.6	25.0	11.0	20.0
Single and never legally married	14.4	9.2	24.1	13.3	9.7	16.5	17.0	12.3	15.6
Other	3.4	2.3	5.1	1.3	2.7	4.4	2.0	2.7	6.7
Sexuality (%)									
Straight-identified and only other-sex partners	74.8	71.1	81.0	71.2	77.0	80.1	77.1	69.2	71.8
LGB-identified with any same-sex partners	3.2	1.1	1.4	3.2	3.5	4.1	6.3	3.1	7.7
LGB-identified with unknown sex of partners	1.0	0.0	1.4	1.6	1.2	1.8	1.0	0.0	2.6
LGB-identified with only other-sex partners	2.0	1.1	0.7	5.6	6.9	1.2	2.1	0.0	0.0
Non-LGB identified and any same-sex partners	12.9	21.6	7.0	15.2	4.6	8.2	5.2	20.0	5.1
Straight-identified and unknown sex of partners	6.1	5.1	8.5	3.2	6.9	4.7	8.3	7.7	12.8
Type of worksite (%)									
Manufacturing	29.0	2.3	2.5	73.0	70.4	40.7	25.5	23.3	15.6
Retail	32.6	18.5	54.4	16.5	25.2	41.2	64.7	21.9	55.6
Transportation	38.4	79.2	43.0	10.5	4.4	18.1	9.8	54.8	28.9
Worksite gender composition of coworkers (%)									

Continued

Table 1 Continued

Characteristic	Total* All N=1202	Black* Men N=308	Black* Women N=158	Latino* Men N=152	Latino* Women N=115	White* Men N=182	White* Women N=102	Other race/ethnicity* Men N=73	Women N=45
Mostly men	36.4	55.7	36.5	21.7	5.2	44.5	19.6	45.8	20.0
Mostly women	13.4	6.5	12.8	19.7	25.2	10.4	11.8	18.1	13.3
About even	50.3	37.8	50.6	58.6	69.6	45.1	68.6	36.1	66.7
Worksite racial/ethnic composition of coworkers (%)									
Mostly same race/ethnicity	25.7	30.5	24.2	27.6	32.5	21.4	9.8	34.3	22.2
Mostly different race/ethnicity	46.8	43.5	51.0	39.5	33.3	50.0	58.8	49.3	53.3
About even	27.5	26.0	24.8	32.9	34.2	28.6	31.4	16.4	24.4
Relationship hazards									
Unsafe sex in last 6 months (%)									
Yes	43.1	43.4	40.5	37.4	32.2	65.2	45.8	40.0	27.0
No	10.6	16.7	12.7	9.6	6.7	3.6	4.8	14.6	8.1
No sexual activity in last 6 months	46.3	39.9	46.8	53.0	61.1	31.2	49.4	45.5	64.9
Intimate partner violence: perpetrator (men, %)	Men only								
Ever, in last year (%)	20.9	24.3		22.6		15.1		17.9	
Ever, but not in last year (%)	10.9	10.1		9.7		12.3		13.4	
Intimate partner violence in last year: perpetrator – score for physical and sexual violence (men)	Men only								
Mean (SD)	0.44 (1.40)	0.56 (1.48)		0.40 (1.36)		0.29 (1.11)		0.50 (1.89)	
Intimate partner violence, employment-related: target (women, %)	Women only								
Ever, in last year (%)	11.2		6.9		10.6		10.0		25.0
Ever, but not in last year (%)	9.6		9.0		8.5		15.0		5.6
Intimate partner violence in last year: target – score for employment-related violence (women)	Women only								
Mean (SD)	0.26 (1.04)		0.18 (0.87)		0.27 (1.04)		0.31 (1.23)		0.32 (0.91)
Intimate partner violence, physical and sexual violence: target (women, %)	Women only								
Ever, in last year (%)	13.2		14.1		11.8		7.2		26.2
Ever, but not in last year (%)	10.2		9.0		6.4		14.4		11.9
Intimate partner violence in last year: target – score for physical and sexual violence (women only)	Women only								
Mean (SD)	0.45 (1.58)		0.44 (1.50)		0.46 (1.68)		0.36 (1.63)		0.49 (0.95)
Intimate partner violence, combined (employment-based and physical and sexual violence): target (women, %)	Women only								
Ever, in last year (%)	19.4		16.4		18.7		13.4		40.5
Ever, but not in last year (%)	14.7		14.4		9.9		22.0		10.8
Intimate partner violence in last year: target – combined score (women)	Women only								
Mean (SD)	0.74 (2.54)		0.62 (2.26)		0.76 (2.48)		0.74 (3.01)		0.82 (1.53)

Continued

Table 1 Continued

Characteristic	Total* All N=1202	Black* Men N=308	Black* Women N=158	Latino* Men N=152	Latino* Women N=115	White* Men N=182	White* Women N=102	Other race/ethnicity* Men N=73	Other race/ethnicity* Women N=45
Social hazards									
Reported at least one type of workplace abuse in past year (%)	72.3	68.2	73.4	67.1	63.5	85.7	81.4	68.5	71.1
Workplace abuse summary score (range: 1–16) Mean (SD)	4.9 (4.0)	3.2 (3.9)	3.9 (3.8)	3.8 (4.1)	3.1 (3.8)	5.3 (4.3)	4.4 (3.5)	4.3 (4.6)	3.6 (3.8)
Reported at least one type of sexual harassment in past year (%)	23.8	25.5	27.9	22.5	17.5	19.2	20.6	26.4	33.3
Sexual harassment summary score (range: 0–5) Mean (SD)	0.4 (0.9)	0.4 (0.9)	0.5 (1.0)	0.4 (0.9)	0.3 (0.9)	0.3 (0.6)	0.3 (0.6)	0.6 (1.4)	0.5 (0.8)
Racial discrimination (ever): number of situations, %									
0	44.8	32.6	32.3	48.3	57.4	62.4	62.4	33.8	40.0
1–2	24.5	18.8	30.4	21.0	26.9	27.1	27.7	21.1	33.3
3+	30.7	48.7	37.3	30.8	15.7	10.5	9.9	45.1	26.7
Gender discrimination: ever (%)	19.5	20.3	26.0	12.8	14.7	12.7	25.0	15.9	40.9
Sexuality discrimination: ever (%)	7.6	7.8	9.3	7.1	5.6	6.2	7.1	8.6	14.3
Occupational hazards: high exposure in past year									
Dust: % yes	32.2	26.7	30.8	34.5	20.2	38.7	47.1	34.8	24.4
Chemicals: % yes	22.6	14.4	26.6	27.8	15.8	32.8	31.4	22.2	17.8
Noise: % yes	29.9	24.4	15.9	46.4	44.4	33.2	31.4	34.3	8.9
Ergonomic strain: shoulder, % yes	25.9	33.4	23.5	29.3	30.3	15.4	23.5	26.0	22.2
Ergonomic strain: neck, % yes	39.8	34.4	33.6	49.0	52.6	39.0	47.1	34.3	36.4
Ergonomic strain: back, % yes	34.1	30.9	22.9	48.0	41.4	36.3	40.2	28.8	33.3
Ergonomic strain: hand repetition, % yes	31.7	22.1	28.2	38.1	35.1	39.1	47.1	19.7	34.1
Ergonomic strain: heavy lifting, % yes	21.0	10.7	15.3	32.4	17.5	33.2	31.4	12.9	25.0
Combined high occupational exposures: %									
0	18.7	26.0	23.4	9.2	14.8	11.0	11.8	20.6	28.9
1–2	39.1	42.2	39.9	33.6	34.8	39.6	32.4	43.8	35.6
3–4	28.3	23.1	27.2	34.2	35.7	31.3	32.4	26.0	24.4
5+	13.9	8.8	9.5	23.0	14.8	18.1	23.5	9.6	11.1
Job strain (in past year): % high exposure	33.6	28.0	39.9	20.4	29.8	39.9	44.4	32.4	47.6
Additional covariates									
Body mass index (kg/m²): mean (SD)	29.4 (6.1)	28.3 (4.6)	32.9 (8.5)	28.3 (4.9)	28.9 (5.8)	29.7 (6.0)	29.1 (7.2)	28.4 (4.4)	28.8 (6.4)
Smoking: % current smoker	23.0	16.3	16.7	21.5	15.9	32.4	50.5	19.4	17.8
Response to unfair treatment (%)									
Act/talk	44.8	43.4	51.0	41.0	37.4	42.1	56.6	46.4	50.0
Act/quiet	11.3	10.2	8.0	14.4	15.0	12.4	10.1	5.8	11.4
Accept/talk	25.2	25.8	28.5	23.7	22.4	24.2	23.2	27.5	27.3
Accept/quiet	18.7	20.7	12.6	20.9	25.2	21.4	10.1	20.3	11.4
Social desirability: mean (SD)	37.2 (31.8)	38.5 (30.7)	51.1 (34.1)	35.7 (31.0)	34.0 (30.0)	28.0 (29.9)	41.0 (32.5)	28.1 (29.4)	36.8 (30.0)
Childhood physical abuse: ever (%)	64.9	77.8	77.1	62.5	57.4	52.9	59.2	63.5	64.0

LGB, lesbian, gay, bisexual.

*The per cent distribution is based on participants with no missing data for each variable (see supplementary table 1 for % missing data). Data on the 1202 workers includes 38 missing data on race/ethnicity and 29 missing data on gender. The data shown by race/ethnicity and gender do not include: among the 480 total black workers, 14 missing data on gender; among the 274 total Latino workers, seven missing data on gender; among the 289 white workers, five missing data on gender; and among the 121 workers belonging to other racial/ethnic groups (1.6% American Indian; 23% Asian; 1% South Asian; 1% Native Hawaiian; 64% 'two or more races'; 10% 'other'), three missing data on gender.

Table 2 Comparing multivariable analyses for psychological distress focussing on: A. relationship hazards, B. occupational hazards, C. social hazards, and D. relationship, occupational and social hazards, taking into account relevant sociodemographic and health covariates: men, United for Health study, Boston, MA (2003–2004)

Variable	Model 1 Bivariate	Model 2 Relationship hazards Multivariable*	Model 3 Occupational hazards Multivariable*	Model 4 Social hazards Multivariable*	Model 5 Relationship, occupational and social hazards Multivariable*
	Psychological distress in past 30 days (N=756): Parameter estimate (95% CI)				
Unsafe sex in the past 6 months: yes	−0.03 (−0.93 to 0.87)	0.13 (−0.79 to 1.04)			−0.04 (−0.91 to 0.82)
IPV perpetration (physical and sexual) in the past year (continuous: score)	**0.83 (0.58 to 1.09)**	**0.66 (0.39 to 0.93)**			**0.45 (0.18 to 0.71)**
Race/ethnicity					
White (referent [ref])					
Black	**1.01 (0.11 to 1.90)**	0.79 (−0.29 to 1.86)	0.64 (−0.54 to 1.82)	−0.24 (−1.72 to 1.23)	−0.08 (−1.56 to 1.39)
Latino	**1.30 (0.24 to 2.35)**	0.88 (−0.34 to 2.11)	1.02 (−0.22 to 2.26)	0.33 (−1.15 to 1.80)	0.43 (−1.03 to 1.90)
Other	0.31 (−1.03 to 1.64)	−0.27 (−1.66 to 1.11)	−0.10 (−1.52 to 1.33)	−1.14 (−3.10 to 0.81)	−1.06 (−3.02 to 0.89)
Age (Continuous: years)	−0.03 (−0.07 to 0.01)	−0.02 (−0.06 to 0.02)	−0.03 (−0.07 to 0.01)	−0.02 (−0.06 to 0.02)	−0.02 (−0.06 to 0.02)
Nativity					
US-born (ref)					
Foreign-born	**1.02 (0.29 to 1.74)**	0.79 (−0.11 to 1.68)	0.65 (−0.30 to 1.60)	**1.17 (0.27 to 2.07)**	**1.07 (0.16 to 1.97)**
Poverty					
No (≥100% poverty) (ref)					
Yes (<100% poverty)	**1.41 (0.69 to 2.14)**	**0.87 (0.13 to 1.61)**	**0.96 (0.21 to 1.71)**	0.53 (−0.20 to 1.26)	0.52 (−0.20 to 1.25)
Education					
4+ years college (ref)					
≥HS to < 4 years college	1.13 (−0.14 to 2.40)	0.48 (−0.76 to 1.71)	0.89 (−0.36 to 2.15)	0.51 (−0.68 to 1.70)	0.36 (−0.83 to 1.55)
<High school (HS)	0.59 (−0.54 to 1.71)	0.58 (−0.48 to 1.64)	0.67 (−0.41 to 1.74)	0.58 (−0.45 to 1.60)	0.60 (−0.42 to 1.62)
Relationship status					
Currently married (ref)					
Divorced, separated or widowed	0.84 (−0.20 to 1.89)	**1.13 (0.14 to 2.12)**		0.69 (−0.26 to 1.64)	0.67 (−0.28 to 1.62)
Live with partner or in serious relationship, not married	−0.09 (−1.07 to 0.88)	−0.29 (−1.26 to 0.67)		−0.48 (−1.39 to 0.43)	−0.46 (−1.38 to 0.45)
Single and never legally married	−0.37 (−1.50 to 0.76)	−0.04 (−1.20 to 1.12)		−0.56 (−1.66 to 0.54)	−0.42 (−1.54 to 0.70)
Sexuality					
Straight/heterosexual-identified and/or only opposite-sex partners (ref)					
LGB-identified with any same-sex partners	**2.54 (0.29 to 4.79)**	1.73 (−0.50 to 3.96)		**2.76 (0.38 to 5.14)**	2.21 (−0.21 to 4.63)
Non-LGB-identified with any same-sex partners	0.84 (−0.12 to 1.80)	0.27 (−0.67 to 1.22)		0.01 (−0.95 to 0.97)	−0.05 (−1.03 to 0.92)
Other	−0.15 (−1.65 to 1.35)	−0.46 (−1.98 to 1.06)		−0.11 (−1.55 to 1.34)	−0.06 (−1.57 to 1.45)
Racial discrimination (ever)					
Never (ref)					
One to two exposures	**1.71 (0.83 to 2.59)**			1.30 (−0.15 to 2.76)	1.22 (−0.24 to 2.68)
Three+ exposures	**3.56 (2.78 to 4.34)**			**2.46 (0.38 to 4.54)**	**2.30 (0.20 to 4.39)**
Racial discrimination* race/ethnicity					
One to two exposures*Black				−0.01 (−2.08 to 2.06)	−0.07 (−2.14 to 2.01)
One to two exposures*Latino				0.46 (−1.82 to 2.74)	0.46 (−1.82 to 2.75)
One to two exposures*Other				−0.50 (−3.79 to 2.79)	−0.57 (−3.84 to 2.69)
Three+ exposures*Black				−0.14 (−2.46 to 2.19)	−0.35 (−2.68 to 1.98)
Three+ exposures*Latino				0.94 (−1.68 to 3.56)	0.85 (−1.78 to 3.48)
Three+ exposures*Other				−0.41 (−3.49 to 2.67)	−0.30 (−3.37 to 2.76)
Gender discrimination					
Never (ref)					
Ever	**2.33 (1.35 to 3.30)**			0.23 (−0.82 to 1.28)	0.36 (−0.69 to 1.40)
Sexuality discrimination					
Never (ref)					
Ever	**3.63 (2.17 to 5.08)**			0.77 (−0.91 to 2.46)	0.69 (−0.97 to 2.36)

Continued

Table 2 Continued

Variable		Psychological distress in past 30 days (N=756): Parameter estimate (95% CI)				
		Model 1 Bivariate	Model 2 Relationship hazards Multivariable*	Model 3 Occupational hazards Multivariable*	Model 4 Social hazards Multivariable*	Model 5 Relationship, occupational and social hazards Multivariable*
Sexuality discrimination * sexuality	Ever*LGB-identified with any same-sex partners				−1.52 (−6.16 to 3.11)	−1.72 (−6.30 to 2.86)
	Ever*non-LGB-identified with any same-sex partners				3.12 (−0.11 to 6.35)	**2.92 (0.31 to 6.15)**
Sexual harassment in past year		**0.90 (0.51 to 1.28)**			**0.46 (0.07 to 0.84)**	0.32 (−0.07 to 0.70)
Workplace abuse in past year		**0.29 (0.21 to 0.38)**			**0.20 (0.11 to 0.28)**	**0.18 (0.08 to 0.27)**
Occupational hazards in past year	0 exposures (ref)					
	One to two exposures	0.87 (−0.16 to 1.90)		**1.16 (0.16 to 2.16)**		0.67 (−0.27 to 1.61)
	Three to four exposures	1.09 (−0.01 to 2.19)		**1.44 (0.35 to 2.54)**		0.62 (−0.45 to 1.68)
	Five+ exposures	**2.04 (0.75 to 3.34)**		**2.42 (1.11 to 3.73)**		1.15 (−0.12 to 2.43)
Social desirability		**−0.03 (−0.04 to −0.02)**	**−0.03 (−0.04 to −0.02)**	**−0.03 (−0.05 to −0.02)**	**−0.03 (−0.04 to −0.02)**	**−0.03 (−0.04 to −0.01)**
Childhood physical abuse	Never (ref)					
	Ever	**−0.91 (−1.74 to −0.09)**	−0.79 (−1.61 to 0.04)			−0.50 (−1.31 to 0.32)
Type of workplace	Retail (ref)					
	Manufacturing	0.29 (−0.69 to 1.28)		−0.49 (−1.57 to 0.59)		−0.41 (−1.44 to 0.62)
	Transportation	0.60 (−0.29 to 1.49)		0.71 (−0.39 to 1.81)		0.75 (−0.35 to 1.84)
Coworker gender	About even (ref)					
	Mostly men	0.57 (−0.19 to 1.33)			0.12 (−0.64 to 0.89)	0.16 (−0.60 to 0.92)
	Mostly women	**1.65 (0.48 to 2.82)**			0.28 (−0.82 to 1.40)	0.16 (−0.94 to 1.25)
Coworker race/ethnicity	Mostly same (ref)					
	Mostly different	−0.02 (−0.87 to 0.82)			0.40 (−0.39 to 1.19)	0.31 (−0.48 to 1.10)
	About even	−0.73 (−1.69 to 0.23)			0.06 (−0.85 to 0.97)	0.11 (−0.80 to 1.02)
Job strain	High (ref)					
	Low	−0.47 (−1.26 to 0.33)		−0.64 (−1.42 to 0.14)		−0.25 (−0.97 to 0.46)
Response to unfair treatment	Do something/talk (ref)					
	Do something/quiet	**1.37 (0.17 to 2.57)**			1.00 (−0.10 to 2.11)	1.06 (−0.04 to 2.16)
	Accept/talk	0.82 (−0.08 to 1.73)			0.76 (−0.07 to 1.59)	**0.84 (0.01 to 1.66)**
	Accept/quiet	0.71 (−0.26 to 1.67)			**0.98 (0.09 to 1.86)**	**1.05 (0.17 to 1.94)**
Smoking	Never (ref)					
	Current	0.66 (−0.18 to 1.50)	0.70 (−0.14 to 1.54)	**0.91 (0.07 to 1.76)**	**0.90 (0.10 to 1.70)**	0.74 (−0.06 to 1.54)
Body mass index		0.00 (−0.07 to 0.07)	0.03 (−0.04 to 0.10)	0.02 (−0.05 to 0.09)	0.02 (−0.05 to 0.09)	0.01 (−0.06 to 0.08)
R^2			0.1477	0.1111	0.2680	0.2884

IPV, intimate partner violence.; LGB, lesbian, gay, bisexual.
Parameter estimates where the 95% CI exclude 0 are in bold.
*In multivariable models, all parameter estimates are mutually adjusted for all the other included variables in that column.

Table 3 Comparing multivariable analyses for psychological distress focusing on: A. relationship hazards, B. occupational hazards, C. social hazards and D. relationship, occupational and social hazards, taking into account relevant sociodemographic and health covariates: women, United for Health study, Boston, MA (2003–2004)

Psychological distress in past 30 days (N=446) — Parameter estimate (95% CI)

Variable	Model 1 Bivariate	Model 2 Relationship hazards Multivariable*	Model 3 Occupational hazards Multivariable*	Model 4 Social hazards Multivariable*	Model 5 Relationship, occupational and social hazards Multivariable*
Unsafe sex in the past 6 months: yes	0.62 (−0.54 to 1.78)	0.53 (−0.67 to 1.72)			0.11 (−1.12 to 1.34)
IPV target (combined) in the past year (continuous: score)	**0.39 (0.18 to 0.60)**	**0.30 (0.09 to 0.51)**			0.20 (−0.01 to 0.41)
Race/ethnicity					
White (referent [ref])					
Black	−0.48 (−1.80 to 0.83)	0.18 (−1.19 to 1.55)	−0.29 (−1.74 to 1.17)	−1.13 (−3.05 to 0.78)	−1.03 (−2.94 to 0.88)
Latino	**1.72 (0.30 to 3.14)**	1.39 (−0.18 to 2.96)	**1.93 (0.28 to 3.57)**	1.12 (−0.83 to 3.07)	1.12 (−0.83 to 3.08)
Other	0.28 (−1.56 to 2.12)	0.12 (−1.73 to 1.97)	0.08 (−1.80 to 1.97)	−2.04 (−4.63 to 0.55)	−1.70 (−4.31 to 0.91)
Age (Continuous: years)	**−0.08 (−0.13 to −0.03)**	−0.04 (−0.10 to 0.01)	−0.05 (−0.11 to 0.00)	−0.02 (−0.08 to 0.03)	−0.03 (−0.09 to 0.03)
Nativity					
US-born (ref)					
Foreign-born	**1.34 (0.32 to 2.37)**	0.30 (−0.94 to 1.53)	0.96 (−0.25 to 2.16)	0.75 (−0.50 to 2.00)	0.66 (−0.58 to 1.91)
Poverty					
No (≥100% poverty) (ref)					
Yes (<100% poverty)	**1.34 (0.31 to 2.38)**	**1.09 (0.07 to 2.12)**	**1.08 (0.05 to 2.10)**	**1.31 (0.31 to 2.31)**	**1.36 (0.36 to 2.36)**
Education					
4+ years college (ref)					
≥HS to <4 years college	0.64 (−1.39 to 2.68)	0.36 (−1.58 to 2.31)	0.48 (−1.46 to 2.41)	0.29 (−1.58 to 2.15)	0.26 (−1.61 to 2.12)
<High school (HS)	−0.09 (−1.96 to 1.78)	−0.01 (−1.82 to 1.80)	0.01 (−1.75 to 1.77)	−0.19 (−1.89 to 1.51)	−0.27 (−1.97 to 1.43)
Relationship status					
Currently married (ref)					
Divorced, separated, or widowed	−1.32 (−2.70 to 0.05)	−1.02 (−2.41 to 0.36)		−0.98 (−2.28 to 0.32)	−1.03 (−2.34 to 0.29)
Live with partner or in serious relationship, not married	−1.08 (−2.46 to 0.31)	**−1.47 (−2.84 to −0.10)**		**−1.55 (−2.88 to −0.22)**	**−1.63 (−2.96 to −0.29)**
Single and never legally married	−0.53 (−2.06 to 1.01)	−0.69 (−2.32 to 0.93)		−1.04 (−2.55 to 0.47)	−0.96 (−2.49 to 0.57)
Sexuality					
Straight/heterosexual-identified and/or only opposite-sex partners (ref)					
LGB-identified with any same-sex partners	**3.62 (0.90 to 6.34)**	2.34 (−0.32 to 5.00)		0.55 (−2.53 to 3.62)	0.50 (−2.58 to 3.58)
Non-LGB-identified with any same-sex partners	−0.69 (−3.16 to 1.78)	−1.26 (−3.64 to 1.12)		−0.92 (−3.29 to 1.44)	−1.05 (−3.46 to 1.36)
Other	−0.22 (−1.87 to 1.43)	−0.10 (−1.78 to 1.57)		−0.22 (−1.82 to 1.38)	−0.12 (−1.74 to 1.50)
Racial discrimination (ever)					
Never (ref)					
One to two exposures	**1.79 (0.64 to 2.93)**			−0.25 (−2.44 to 1.95)	−0.33 (−2.52 to 1.86)
Three+ exposures	**3.67 (2.46 to 4.87)**			**5.36 (2.17 to 8.56)**	**4.80 (1.62 to 7.99)**
Racial discrimination* race/ethnicity					
One to two exposures*Black				0.66 (−2.20 to 3.53)	0.71 (−2.15 to 3.57)
One to two exposures*Latino				2.23 (−0.80 to 5.26)	2.28 (−0.72 to 5.27)
One to two exposures*Other				**4.08 (0.20 to 7.96)**	3.89 (0.00 to 7.79)
Three+ exposures*Black				−2.48 (−6.12 to 1.17)	−2.03 (−5.69 to 1.62)
Three+ exposures*Latino				−2.22 (−6.33 to 1.88)	−1.65 (−5.79 to 2.49)
Three+ exposures*Other				−1.87 (−6.70 to 2.96)	−1.82 (−6.63 to 2.98)
Gender discrimination					
Never (ref)					
Ever	**1.91 (0.76 to 3.07)**			0.13 (−1.12 to 1.38)	0.13 (−1.13 to 1.38)
Sexuality discrimination					
Never (ref)					
Ever	**3.24 (1.39 to 5.09)**			1.13 (−1.28 to 3.54)	1.03 (−1.34 to 3.40)

Continued

Table 3 Continued

Variable	Psychological distress in past 30 days (N=446)				
	Parameter estimate (95% CI)				
	Model 1	Model 2 Relationship hazards	Model 3 Occupational hazards	Model 4 Social hazards	Model 5 Relationship, occupational and social hazards
	Bivariate	Multivariable*	Multivariable*	Multivariable*	Multivariable*
Sexuality discrimination * sexuality					
Ever*LGB-identified with any same-sex partners				3.67 (−1.74 to 9.08)	3.23 (−2.24 to 8.70)
Ever*non-LGB-identified with any same-sex partners				−1.91 (−6.61 to 2.80)	−2.64 (−7.48 to 2.20)
Sexual harassment in past year	**1.04 (0.46 to 1.61)**			0.16 (−0.48 to 0.79)	0.07 (−0.58 to 0.72)
Workplace abuse in past year	**0.30 (0.17 to 0.44)**			0.20 (−0.06 to 0.34)	0.16 (0.02 to 0.30)
Occupational hazards in past year					
0 exposures (ref)					
One to two exposures	0.11 (−1.34 to 1.57)		0.57 (−0.83 to 1.96)		0.19 (−0.18 to 1.55)
Three to four exposures	0.87 (−0.62 to 2.36)		1.13 (−0.32 to 2.58)		0.78 (−0.69 to 2.25)
Five+ exposures	**2.39 (0.63 to 4.16)**		**3.12 (1.39 to 4.86)**		**1.92 (0.19 to 3.65)**
Social desirability	**−0.04 (−0.05 to −0.02)**	**−0.03 (−0.04 to −0.01)**	**−0.03 (−0.05 to −0.01)**	**−0.02 (−0.04 to −0.01)**	**−0.02 (−0.04 to −0.01)**
Childhood physical abuse					
Never (ref)					
Ever	**−1.33 (−2.55 to −0.12)**	−0.82 (−2.04 to 0.40)			−0.48 (−1.70 to 0.73)
Type of workplace					
Retail (ref)					
Manufacturing	0.27 (−0.93 to 1.48)		**−1.59 (−3.02 to −0.15)**	−1.15 (−2.51 to 0.21)	**−1.57 (−2.95 to −0.19)**
Transportation	−0.31 (−1.59 to 0.96)		0.70 (−0.62 to 2.02)	−0.38 (−1.84 to 1.07)	−0.29 (−1.76 to 1.17)
Coworker gender					
About even (ref)					
Mostly men	0.94 (−0.31 to 2.19)			0.95 (−0.42 to 2.33)	0.87 (−0.50 to 2.24)
Mostly women	**1.43 (0.03 to 2.83)**			0.62 (−0.70 to 1.93)	0.65 (−0.66 to 1.96)
Coworker race/ethnicity					
Mostly same (ref)					
Mostly different	−0.83 (−2.14 to 0.48)			−0.97 (−2.24 to 0.30)	−1.06 (−2.32 to 0.20)
About even	−0.91 (−2.35 to 0.53)			−0.62 (−1.97 to 0.73)	−0.77 (−2.13 to 0.58)
Job strain					
High (ref)					
Low	−0.44 (−1.52 to 0.64)		−0.26 (−1.29 to 0.76)		0.38 (−0.60 to 1.36)
Response to unfair treatment					
Do something/talk (ref)					
Do something/quiet	0.86 (−0.85 to 2.57)			0.34 (−1.25 to 1.93)	0.29 (−1.33 to 1.91)
Accept/talk	**1.34 (0.10 to 2.57)**			0.56 (−0.59 to 1.71)	0.61 (−0.56 to 1.79)
Accept/quiet	1.29 (−0.21 to 2.78)			0.53 (−0.90 to 1.96)	0.66 (−0.76 to 2.09)
Smoking					
Never (ref)					
Current	**2.00 (0.85 to 3.15)**	**1.89 (0.67 to 3.11)**	**2.24 (1.05 to 3.44)**	**1.90 (0.75 to 3.06)**	**1.74 (0.55 to 2.93)**
Body mass index	−0.01 (−0.08 to 0.06)	0.03 (−0.04 to 0.10)	0.03 (−0.04 to 0.10)	0.02 (−0.05 to 0.09)	0.02 (−0.05 to 0.09)
R^2		0.1821	0.1662	0.3124	0.3357

IPV, intimate partner violence ;LGB, lesbian, gay, bisexual.
Parameter estimates where the 95% CI exclude 0 are in bold.
*In multivariable models to all parameter estimates are mutually adjusted for all the other included variables in that column.

prevalent in the study cohort. Two findings stand out. The first is that in models containing all three types of hazards, several hazards from these three domains continued independently to be associated with psychological distress: A. among women and men: workplace abuse and racial discrimination, B. among men only: being the perpetrator of IPV, and C. among women only: poverty, high exposure to occupational hazards and smoking. Second, in these same models, other hazards associated with psychological distress when only one domain was considered (eg, high exposure to occupational hazards among men, IPV among women), were no longer significantly associated in the model containing all three types of hazards. Supporting the a priori hypothesis, these latter findings suggest that important confounding due to omitted variables could affect exposure-outcome associations in analyses examining only singly the occupational, relationship, or social hazards. The larger implication is that it is critical to reckon with the joint and embodied reality of diverse types of hazards involving how people live and work.

Several study limitations, however, merit consideration. First, a cross-sectional design was employed; nevertheless, prospective studies indicate that increased psychological distress is associated with current adversity, above and beyond prior adverse exposures,[34] thereby suggesting that cross-sectional associations can be informative. Second, self-report data were relied on; however, only validated instruments were used[5 14–30] and validated ACASI methodology,[14] along with appropriate imputation techniques.[33] Third, the present findings might not be generalisable to other populations with a wider range of exposures (eg, from unskilled labourers to high-salary professionals, managers and business owners)[5 8]; however, the high response rate of 72% reduces problems associated with selection bias for the specified cohort of employed low-income working class adults, a group important to study because they comprise over half the US workforce.[35]

Of note, other studies likewise attest to the salience of jointly investigating the health consequences of the co-occurrence of occupational, social and relationship hazards, including in relation to psychological distress. Examples include research documenting associations: A. between type of occupation and risk of perpetrating IPV,[36 37] with risk among male construction workers (26%) highest among workers exposed to job strain, interpersonal workplace conflict and racial discrimination,[36] B. between being a target of IPV and being a target of racial discrimination and sexual harassment,[38–40] C. between unsafe sex and being a target of social oppression or racial discrimination[41 42] and D. between psychological distress and IPV,[3 43] sexual harassment[21 44] and discrimination based on race/ethnicity and sexuality.[4 41]

Indicative of omissions due to not considering the joint distribution and health consequences of occupational, social and relationship hazards, among the 20 'work-family/work-life measures' included in the first-ever compendium of measures of discrimination, harassment and work-family issues relevant to psychosocial work environment,[45] issued by the National Institute of Occupational Safety and Health in December 2007, none contained any questions on IPV. Similarly, among recent studies focused on associations between smoking and IPV, none included any measures of social or occupational hazards,[43 46] nor have recent studies designed to investigate associations between racial discrimination and smoking included any measures of IPV or other social or occupational hazards.[47 48]

In summary, the present study addresses an important gap in the literature and provides provocative evidence on why rigorous research on population health necessitates thinking systemati-

cally about the 'inverse hazard law'[5] and hence the range of hazards to which people may be exposed. Just as studies focused on occupational health should, as warranted, obtain data on relevant social and relationship hazards, studies focused on social and relationship hazards should obtain data on relevant occupational hazards. After all, it is not as if we are one day a woman or a man, another day white or a person of colour, another day straight or gay, another day working class or

What is already known on this subject

▶ Few studies have simultaneously collected data on occupational hazards, relationship hazards (eg, intimate partner violence), and social hazards (eg, racial discrimination) to assess their joint impact on health, especially in low-income working class multiracial/ethnic populations, even as the 'inverse hazard law' suggests it is likely that the co-occurrence of these exposures is high, with the potential to increase health risks independently and interactively.

▶ Although extensive research documents intimate partner violence increases risk of psychological distress, much more limited, albeit suggestive, evidence indicates that sexual harassment, racial discrimination and possibly other adverse workplace conditions can also elevate risk of psychological distress.

▶ Confounding due to omitted variables can bias effect estimates, raising questions as to whether research that has not simultaneously considered workplace, relationship and social hazards might yield biased estimates of their impact on health, within the context of the range of exposures evident in different study populations (eg, low-income versus high-income).

What this study adds

▶ This study is the first to report on data simultaneously obtained on exposure to occupational hazards, social hazards (workplace abuse, sexual harassment, racial discrimination), and relationship hazards (intimate partner violence and unsafe sex) among a US low-income employed working class multiracial/ethnic population.

▶ It was found that each type of hazard was: A. highly prevalent (82% exposed to at least one occupational hazard, 79% to at least one social hazard and 32% of men and 34% of women, respectively, reported they had been the perpetrator or target of intimate partner violence) and B. associated with increased risk of psychological distress in models including only one type of hazard.

▶ However, in models containing all three sets of hazards, associations with increased risk of psychological distress consistently significantly occurred: A. among women and men, only for workplace abuse and racial discrimination, B. among men only, also for being a perpetrator of IPV and C. among women only, also for exposure to poverty, high levels of occupational hazards and smoking.

▶ The present results demonstrate that research needs to consider the full range of occupational, social, and relationship hazards to which workers are exposed, so as to yield unbiased estimates of the health impacts of these hazards.

a professional, and still another day in a relationship with an intimate partner or not: we are all of these at once.[5 8 12] Our bodies literally integrate and embody, biologically, these diverse facets of our lives each and every day[49 50]; research, clinical and public health practice should do the same, conceptually and analytically, so as to produce valid knowledge about the distributions and determinants of population health and provide the basis for appropriate clinical care, interventions and prevention.

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