JOEM-21–8942: Associations between work-related factors and psychological distress among construction workers

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Abstract

Objective: Identify work-related factors associated with the mental health and well-being of construction workers.

Methods: We completed eight key informant interviews, six worker focus groups, and a survey, informed by the interviews and focus groups, of 259 construction workers on five construction sites. Negative binomial regressions examined associations between psychological distress and work-related factors including safety climate, work-to-family conflict, psychological demands, social support, harassment, and job security.

Results: Three themes emerged from the interviews and focus groups, job demands and structure, social support and workplace relations, and job precarity. From the survey higher psychological demands, higher work-to-family conflict, lower supervisor support, higher discrimination, and higher likelihood of losing a job were associated with higher psychological

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distress. When combined into a single model job demands and work-to-family conflict remained significant.

Conclusions: Work-related factors were associated with high levels of distress.

Keywords

Occupational Mental Health; Total Worker Health; Occupational Health Psychology

Introduction:

Mental health and well-being among construction workers is a significant public health burden in the United States and elsewhere. Previous research indicates that psychological distress is higher (16%) among commercial construction workers than among the general male population.[1] Rates of suicide among construction workers were second highest among all occupations at 53.3 suicides per 100,000 persons, which is sizably higher than the fatal occupational injury rate of 10.1 fatalities per 100,000 full-time construction workers.[2] Construction workers also have the highest prevalence of smoking (39%), heavy alcohol use (17%), and illicit drug use (14%) of all occupational groups,[3] which may also be related to mental health and well-being.[4,5] In Massachusetts the rate of opioid overdose deaths among construction workers is 5 times the rate for all occupational groups. Further, construction workers have 10 times the rate for fatal occupational injuries compared to other occupational groups.[6]

The commercial construction industry is highly dynamic, with diverse psychosocial factors and significant physical hazards that may be contributing to negative mental health outcomes.[7] It is evident that construction workers have a high prevalence of work-related injuries and high-risk health behaviors that limit their overall work ability and productivity.[8,9] However, it is unclear how work influences their mental health and well-being. Worker mental health and substance outcomes may share similar work-related pathways as on-the-job injuries.[10–12] For example, these pathways included psychosocial factors such as psychological demands, job strain, and job insecurity and their associations with depression among workers.[13–15]

The aim of this study was to identify and examine work-related factors associated with mental health and well-being in a convenience sample of commercial construction workers. Our approach was to first identify potential work-related factors through interviews of safety and health leaders in the industry and through focus groups of construction workers, and then test for associations between identified work factors and psychologic distress in a survey of workers on construction sites.

Methods:

We used a qualitative to quantitative sequential approach to identify work-related factors associated with construction workers' mental health and well-being. The study consisted of key informant interviews of construction health and safety content experts, focus groups of construction workers, and a survey of workers on construction sites that was informed

by the interviews and focus groups. All protocols and data collection methods including recruitment, scripts, surveys, and consent procedures were approved by the Office of Human Subject Research Protection, Northeastern University's Institutional Review Board. The formative research occurred during the winter-spring of 2017 with worker surveys collected summer to fall of 2017.

Key Informant Interviews

We first conducted eight key informant interviews to identify broad work-related themes to guide our focus group script and worker survey design. We recruited volunteers for these interviews from our connections in the construction industry. The participants included four safety directors from general contractors, one project manager from a local subcontracting company, one technical coordinator from a local union, and two national health and safety directors from a union.

The semi-structured interviews aimed to understand key stakeholders' perceptions about the mental health and well-being of construction workers. Specifically, we asked about the current state of workers' mental health at the construction site-level and across the industry, more broadly as well as characteristics of the work environment that may contribute to workers' mental health and well-being.

Audio of these interviews were recorded and transcribed. The research team members reviewed the transcripts and notes and identified broad themes that informed the focus group scripts and worker survey questions.

Focus Groups

To understand the workers' experiences, we recruited 36 construction workers (16 apprentices, 9 journeymen/workers, 14 foremen) across six focus groups, ranging in size from four to twelve participants. Two focus groups consisted of apprentices only and two other groups consisted of foreman only. Participants were recruited from worksites, including one non-union, and from a local union's training facility. We provided a $10.00 gift cards to each worker thanking them for their participation.

All focus groups were conducted in private rooms. The focus groups included semi-structured questions designed to explore (a) aspects of the worksite that influence workers' well-being; (b) aspects of the worksite that promote workers' well-being; and, (c) workers' recommendations for worksite policies and practices to support well-being.

Transcripts from the audio recordings of the focus groups were analyzed using Braun and Clark's method of thematic analysis.[16] First, two researchers underlined tags, which included words and phrases, relevant to the research questions. Tags consisted of words or phrases addressing the constructs of interest. The researchers then met and reviewed their tags for agreement. Tags were then included in a master list and sorted into groups of related tags. The research team met to review tag groups and generate a list of codes. The two researchers then coded all the transcripts in Nvivo11 (QSR International Pty Ltd).

The research team then met to organize the coded focus group data into emerging themes guided by the transcripts from the key informant interviews, and a conceptual framework of the workplace for worker safety, health and well-being.[11]

Worker Survey

We surveyed workers from five active commercial construction sites located in Boston. Participants were recruited on a volunteer basis during site visits that took place during lunch and or coffee breaks. All apprentices, journeymen, and foremen on site were eligible to complete the survey. The surveys took 10–15 minutes for participants to complete, and we provided a $10 gift card for their participation. The primary outcome in the survey was the K6 psychological distress scale, which measures distress in the previous four weeks; its score is the number of signs of psychological distress each respondent reports at a given frequency, resulting in scores ranging from 0 (no signs of frequent distress) to 24 (a highest number and frequent signs of distress).[17]

The survey measured 13 work-related factors organized into three groups based on themes from the interviews and focus groups. As described in the results, the three groups that emerged from the qualitative data included job design/structure, relational factors, and job precarity.

Job design/structure factors included: psychological demands (5 items) and decision authority (4 items) from the Job Content Questionnaire (JCQ);[18] organizational safety climate (4-items);[19] worksite conditions, and the abbreviated measures of work-family and family-work conflict.[20] Worksite conditions consisted of six questions assessing amenities such as fresh water supplies, toilets, hand washing stations, break spaces, worksite clutter/housekeeping, and thermal comfort resources (see the Appendix). The response categories for these questions used a 5-point Likert scale ranging from strongly disagree to strongly agree.

Relational factors included a modified version of the JCQ supervisor and co-worker support scales (5 items);[21] the *Chronic Work Discrimination* scale (3 items);[22] a single item *we have a 'we are in it together' attitude* from the Team Climate Inventory Scale,[23] and the three types of workplace harassment.[24] The response categories for these questions used a 5-point Likert scale ranging from strongly disagree to strongly agree. The harassment component asked about three types of harassment (yelled at, talk down, and treatment) and was scored based on the number of harassment-types the respondent had experienced (0, 1, 2, or 3).[24]

Job precarity factors included: how likely one is to lose a job or be laid off (job insecurity) and how likely one to find another job with similar benefits (labor market security) with four possible responses of not at all likely to very likely.[25]

Associations between each work environment scale from the worker survey and the K6 psychological distress scale were tested using negative binomial regression models that included a random effect for construction worksite and were adjusted for age and job title. Multivariable models allowed us to determine which parameters accounted for the most variation in the psychological distress scale. Variables were removed by hand through a

manual backwards elimination procedure. All work-related factors within a sub-group of interest (see results) were included in the model. The variable with the largest p-value was then eliminated from the model until all parameters in the model had p-values of 0.05 or less or did not confound any relationships between significant predictors and the outcome of interest.

RESULTS

Findings from the interviews and the focus groups:

Three work-related themes emerged from the interviews and focus groups. These included: (a) job design and structure, including production pressures and work hours; (b) social support and relationships at work, including supervisor support and harassment; and (c) job security and precarity.

Job design and job structure—Both interviewees and focus group participants described job demands and production pressures as contributing to stress and impacting their health. One interviewee summed it up with: *"There's a tremendous amount of stress in construction."* They continued*: "demanding jobs, which take a toll on your body, and all of that takes a mental toll, takes a toll on mental health and well-being and contributes to exhaustion, contributes to, to anxieties, and depression and all of those influence one's overall health."* Workers often felt personally responsible for production, as though it was "*on [their] back*". For example, one journeyman said *"It's on you."* Another journeyman described: "*One of the things that I find difficult is where we're responsible—I feel responsible for the actual production whether I'm doing the work or not and that kind of stresses me out."* In addition, participants described how production pressures impacted their personal lives. Several described long commute times and hours which impacted their ability to spend time with their families. A journeyman said, "*The start time is huge, really is, makes a difference*" And an apprentice noted "*something that does affect my family is, uh, working overtime, on like a Saturday."*

Social Support and Relationships—Interpersonal dynamics on job sites were discussed repeatedly during focus groups. Journeymen and apprentices described the how interactions with foremen and other authority figures on the work site shaped their experience at work in both negative and positive ways. As one apprentice said, "*you've got a lot of other people way higher up in the food chain than you, like, yelling at you. Sometimes, some foremen will take it out on apprentices or just people lower on the food chain."* Others described being yelled at or blamed for problems on the site. These dynamics were often shaped by the position-hierarchy in construction, with foremen feeling pressure from site managers, and workers feeling pressure from foremen.

Foremen described the positive role that supervisors could play in supporting workers on the job sites. One foreman said, "*Being a foreman you have to maintain the hierarchy… but also having that ability to comfort the guys if they needed to come talk to you… even if, we're not gonna be therapists, but we could listen to them and maybe just direct them in the direction they need to go."* These positive roles included listening and shuffling duties to lighten the load when appropriate. For example, when talking about a worker who was

struggling in his personal life, one foreman described: "*Don't give 'em a stressful job, you know something that is stressing them out. You know, take the load off a little bit.*"

Job precarity—Several focus group participants described that job precarity contributed to their stress. As an apprentice described, "*Friday, Saturday, and Sunday, he [foreman] was telling me I'm laid off.*" Workers also had to work through sickness because the consequences of missing a day of work meant that they could lose future opportunities for work. One apprentice described: "*If attendance is low, you know, you're sick all the time, you gotta work all day in the pouring, freezing rain and you get sick from that, and then you can't go to work for the next 3 or 4 days, when it comes time for lay-offs, they go damn, you gone.*" Participants directly related job precarity to their wellbeing, as one apprentice stated:" *when you don't have any sense of security you can never really relax. You can never really be comfortable.*"

Findings from the Worker Survey

A total of 259 workers were recruited for the survey across the five construction sites from four general contractors in the Boston metropolitan area. These workers were mostly union members and men with an average age of 40 years (Table 1). Of these workers, 19 (7%) reported severe psychological distress (K6 score of 13 or higher), 82 (32%) reported moderate levels (K6 of 5 or higher but less than 13) and 154 (60%) reported little to no distress having K6 psychological distress scores less than 5. The majority had experienced workplace harassment (59%). More than half (65%) reported that they were not likely to lose their job soon and most (83%) said that they would likely find another job (Table 2).

There were significant associations between psychological distress and work factors in all three factor groups (Table 3). For job design and structural factors, higher job demands and higher values of the two work-family conflict scales were significantly associated with higher psychological distress scores. For every one-point increase in these factors, there was a 40 to 60 % increase in our measure of psychological distress. Among relational factors, higher levels of supervisor support were associated with lower psychological distress scores. Discrimination and harassment were associated with higher psychological distress scores. Among the job precarity factors, those who reported they were likely to lose their jobs or were not too likely to find another job also reported higher levels of distress.

In multivariate analyses, backwards elimination identified a subset of work-factors that best fit the data for inclusion in a model within each of the three factor groups (Table 4). For the job design and structure factors, both psychological job demands and work to family conflict remained significant. To avoid collinearity problems, we included only the work to family conflict variable and not the family-to-work conflict variable (guided by the qualitative data, which emphasized the former as more salient). For the relational factors, both supervisor support and discrimination remained significant. For the job precarity factors, job security (how likely to lose a job) remained in the model.

When all five of these parameters were included in the same multivariable model and backwards elimination was applied, the final model included only psychological

job demands and work-to-family conflict. In the combined model supervisor support, discrimination, and how likely to lose your job were non-significant (p>0.05).

DISCUSSION:

Our goal was to identify work-related factors associated with the mental health and well-being of commercial construction workers, and then examine the quantitative associations between these factors and psychological distress in a survey of workers. Three work-related themes emerged from the focus groups that affect mental health and well-being: job design and structure, social support and relations at work, and job precarity. Analysis of the survey data supported the themes with many but not all factors demonstrating robust associations with psychological distress in the regression analysis. However, for the multi-factor models only the job design/structure factors of psychological job demands and work-family conflict remained significantly associated with psychological distress.

The interviews, focus groups, and surveys further support the importance of investigating mental health among construction workers. For example, the percentage of participants reporting severe (7%) and moderate (32%) mental distress in this convenience sample of construction workers was higher than in the US adult populations, with studies reporting prevalence of 3% for severe distress levels and 24% for moderate levels of distress.[26,27] This is consistent with previous studies that have shown high prevalence of adverse mental health outcomes such as mental distress, depression anxiety, and psychological strain among construction workers.[1,28] Furthermore, both the interview and focus groups mention the increasing prevalence and impact on construction workers.

The qualitative and survey data both indicated the impact of job design and structural factors on worker mental health and well-being, especially psychological job demands and work-family conflict. Previous reviews have linked increased psychological demands with increased risk of depression, including construction workers.[14,28] In a national sample of workers, job demands have been associated with mortality, which can be mediated with job control (decision authority).[29] Work-family conflict was significant in all models supporting the qualitative data collected in both the interviews and the focus groups. This corroborates findings linking work-family conflict with depression in cross-sectional and longitudinal studies of workers across a broad set of industries[20,30] as well as in construction.[28] The scheduling demands of construction work often require working from early morning into the evening. Many focus group participants reported long commutes, often traveling well over an hour each way. As a result, workers miss critical family interactions and parental activities as they are often out of the house before 6 am and not home until after 6 pm. This may also affect their access to social support at home.

The fact that only two factors remained in the final model (demands and work-family conflict) need not indicate that other factors are not important. Indeed, these results need to be taken within the context of the limitation of this study. These limitations included that the sample of workers was relatively small and primarily consisted of unionized workers in a single metropolitan area undergoing a construction boom at the time of data collection.

Our results may also be limited by the fact that the partners who provided us access to workers on their construction sites for the survey are often the early adapters of safety and health programs in construction. The safety climate values were higher (safer) than typical construction sites.[31] This may have limited our ability to detect significant associations between safety and worksite conditions and distress in the survey even though much of the qualitative data supported this association. As noted, these data were collected during a buoyant time in the construction industry, where workers may be less concerned about not finding work or losing their jobs, limiting generalizability to less favorable economic periods. Other limitations include the cross-sectional design, lack of diversity of participants (mostly white male workers), and sites and participants that included geographical union-based populations of Boston. Finally, the backwards elimination process tends to choose one factor among many highly correlated factors limiting our understanding of the multi-factorial complex associations.

Therefore, the results also need to be viewed within the context of the growing literature of mental health and well-being of workers in general and construction workers.[28] Across many employed populations, reviews have shown increased social support as protective for depression.[14] Among ambulance workers, lower psychological distress has been associated with higher manager support.[32] Our qualitative data did identify supervisor support and discrimination as impinging on psychological distress, though the factors did not remain significant in the final regression model. Discrimination was associated with higher levels of psychological distress, consistent with other construction research and described in the focus groups.[24] Finally, the association between job precarity and psychological distress also emerged as a theme in our focus groups, which has also been widely reported in the literature.[15]

Many of these factors associated with psychological distress are embedded in the organization of work in the construction field. For example, location of the work changes as projects progress through the construction cycle. Workers have to follow the location of the next project (and retain the confidence of supervisors) to remain employed.[33] Workplace-based approaches for improving worker mental health and well-being need innovative solutions that can examine many of these factors as well as address the challenge of the mobile and dynamic workforce.

These results have direct implications for workplace policies, programs, and practices. Evidence suggests that the health of many service workers is adversely affected by unpredictable or unstable work schedules, which may affect family life. Our data extends that finding into the construction industry. Having clear and consistent communications [34] about scheduling as well as allowing some flexibility can allow workers to plan family duties and create more certainty, reducing work to family conflict. With improved scheduling and project management, workers can have more certainty about their next job assignment and where they will be working.[15] In addition, understanding issues surrounding job demands and the resources and time to support workers can be an approach to impact the psychological demand metrics that could reduce stress.

Interventions that target social support and relational factors at work identified in the process may help address the issue. More and more studies are demonstrating that training managers to be supportive of workers who are struggling with safety and health issues is an effective approach, especially or more marginalized workers.[35,36] These approaches often train managers and foreman to take on transformational leadership surrounding worksite safety and health.[37] Participatory approaches could be used to identify root causes of the psychological job demands.[38] Workplace harassment and adequate resources to prevent harassment and discrimination could also help reduce stressors.[39]

In conclusion, more efforts and industry support are needed to increase awareness and access to mental health resources for construction workers.[40] Indeed more is being done and industry in the United States and abroad. There is a growing recognition of the issue with a efforts to increase awareness and increase access to care.[41,42] These emerging efforts need to be evaluated in order to build the evidence that addressing workplace factors will lead to improved health outcomes.[43]

Acknowledgments:

APPENDIX

The six worksite conditions assessing amenities that support worker safety, health, and well-being. The response scales for these questions was a 5-point Likert from strongly disagree to strongly agree.

Worksite clutter (equipment, debris, tools, etc.) gets in the way of doing the job.

- If I was to get too cold or too hot, I would be able to take a break to warm up or cool down.

- There is fresh drinking water provided on site.

- The site I work on has functioning toilets.

- The site I work on has functioning hand washing stations.

- There is a dedicated space for me to sit for my coffee and lunch breaks.

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Table 1:

Characteristics of the 259 Commercial Construction Workers Surveyed Across the Five Construction Sites.

Gender	N.	Percent
Male	240	96
Female	11	4
Job title		
Foreman	56	23
Journeyman	119	49
Apprentice	39	16
Other [*]	29	12
Race		
White	208	83
Hispanic	19	8
Black	14	6
Other	5	2
Native American	2	1
Asian	1	<1
Union		
Union	211	81
Non-Union	48	19
Employer		
General	55	23
Sub-Contractor	157	65
Other	29	12
	Mean	*SD*
Age (years)	40	11
Psychological Distress K6 (0– 24)	4.8	5.1

*The Other category included superintendent (6), project manager/engineer (10), operator/laborer (5), safety/medical (2), or missing (6)

Table 2:

Average (SD: Standard Deviation) and n (%) of the work-related factors assessed in the survey

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Job Design/Structure Factors	*Mean*	*SD*
Organizational Safety Climate	3.9	0.8
Psychological Job Demands	3.3	0.7
Decision Authority	3.5	1.0
Worksite Conditions (see appendix)	3.7	0.8
Family to Work Conflict	3.0	0.9
Work to Family Conflict	2.5	0.8
Relational Factors		
Coworker Support	4.0	0.9
Supervisor Support	3.9	0.8
Team ("we're all in it together")	3.9	1.0
Discrimination	2.3	0.9
Workplace Harassment	*Number*	*%*
None	104	41
1 Type	54	21
2 Types	32	13
3 Types	63	25
Job Precarity Factors		
How likely to lose job		
Not at all likely	47	29
Not too likely	93	36
Fairly Likely	61	24
Very Likely	27	11
How likely to find another job		
Not at all likely	16	6
Not too likely	27	11

	:		
Job Design/Structure Factors		*Mean*	*SD*
	Fairly Likely	102	40
	Very Likely	108	43

Data are from the 259 construction worker surveys– all continuous variables are the average of the 1 to 5 Likert scale responses. For the non-continuous variables, the categorical responses are listed in *italics*.

Table 3:

Relative Risk (RR) and 95% confidence interval (CI) range from negative binomial models for K6 score and each work-related factor. Adjusted for age and job title.

: Job Design/Structure Factors	RR	LCI (2.5%)	UCI (97.5%)
Organizational Safety Climate	0.83	0.67	1.01
Psychological Job Demands	*1.61*	*1.27*	*2.04*
Decision Authority	0.94	0.78	1.13
Worksite Conditions (see appendix)	0.82	0.67	1.02
Family to Work Conflict	*1.45*	*1.19*	*1.76*
Work to Family Conflict	*1.38*	*1.17*	*1.63*
Relational Factors			
Coworker Support	0.84	0.69	1.02
Supervisor Support	*0.77*	*0.63*	*0.94*
Team ("we're all in it together")	0.87	0.74	1.02
Discrimination	*1.27*	*1.07*	*1.52*
Workplace Harassment	*1.20*	*1.06*	*1.36*
Job Precarity Factors			
How likely to lose job			
Not at all likely	1	-	-
Not too likely	1.36	0.93	1.97
Fairly Likely	1.37	0.88	2.12
Very Likely	*1.97*	*1.1*	*3.52*
How likely to find another job			
Not at all likely	1.01	0.05	2.04
Not too likely	*1.77*	*1.08*	*2.92*
Fairly Likely	1.24	0.88	1.73
Very Likely	1	-	-

Bold and Italics indicates significance set at alpha = 0.05

Table 4:

Relative Risk (RR) and 95% confidence interval (CI) range for backwards elimination multivariable negative binomial models within each of the three factor groups. Models were adjusted for age and job title.

:			
Job Design/Structure Factors	**RR**	**LCI (2.5%)**	**UCI (97.5%)**
Psychological Job Demands	1.52	1.20	1.91
Work to Family Conflict	1.33	1.13	1.56
Relational Factors			
Supervisor Support	0.81	0.66	0.99
Discrimination	1.22	1.02	1.46
Job Precarity Factors			
How likely to lose job	1.21	1.02	1.44