

# A Mixed Methods Approach to Understanding Leisure-Time Physical Activity and Musculoskeletal Pain among Construction Workers: Findings from a Pilot Study

Alberto Caban-Martinez, Kincaid Lowe, Anne Stoddard, Jamie Becker, Robert Herrick, Jack Dennerlein, and Glorian Sorensen

<sup>1</sup>Department of Environmental Health, Harvard School of Public Health; <sup>2</sup>New England Research Institute; <sup>3</sup>Laborers’ Health & Safety Fund of North America; and <sup>4</sup>Dana-Farber Cancer Institute  
Funding Support for this study was provided by the National Institute for Occupational Safety and Health (NIOSH) grant U19 OH008861 (PI: Sorensen) and the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) grant T32 AR055885



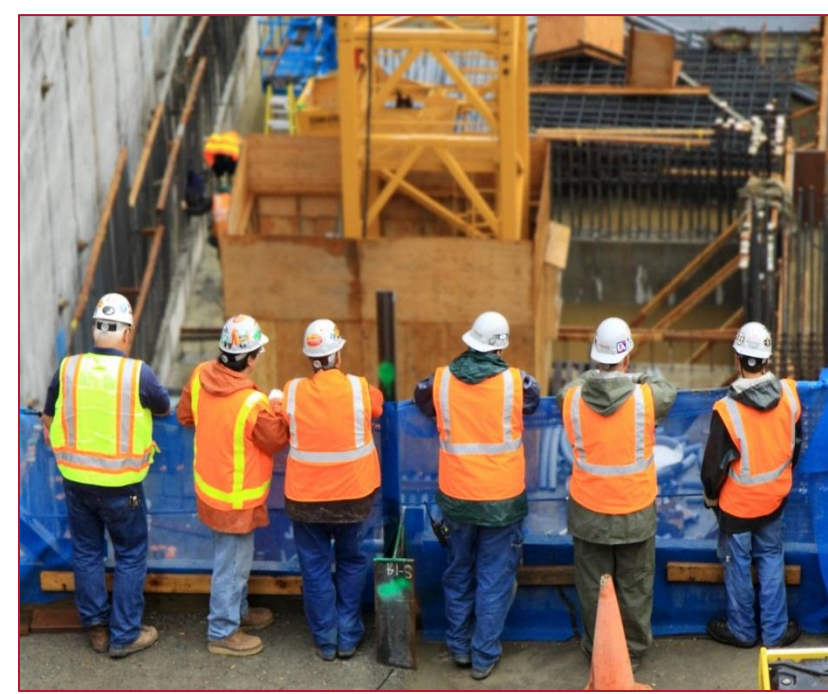
## SUMMARY

**Objective:** Exercise is beneficial for some musculoskeletal pain conditions. In a small pilot study, we investigate the association between musculoskeletal pain and leisure-time physical activity (LTPA) among construction workers.

**Methods:** A sequential explanatory mixed-methods design was employed using a jobsite-based survey (n=43) among workers at two commercial construction sites and one focus group (n=5).

**Results:** Over 93% of these construction workers engaged in LTPA and 70% reported musculoskeletal pain. Lower levels of LTPA were associated with higher age, lower education, being married, and having health insurance, although not statistically significant. Focus group analyses indicate “being too tired from work” and “no interest” as barriers and “insurance incentives” as potential motivators for LTPA.

**Conclusion:** Pilot study findings suggest that construction workers work in and through pain on the worksite and may experience pain during LTPA.



## WHAT’S THE PROBLEM?

- Exercise is beneficial for the majority of musculoskeletal pain conditions including chronic neck disorders, osteo-, and rheumatoid arthritis, and chronic low back pain.<sup>1-3</sup>
- Despite the known benefits of physical activity on these health conditions, individuals with musculoskeletal pain have been shown to have lower physical activity<sup>7</sup> and high obesity levels.<sup>4</sup>
- Workers employed in the construction sector frequently engage in labor-intensive and physically demanding job tasks.<sup>5</sup>
- Little is known about the relationship between workplace physical demands, musculoskeletal pain, and engagement in leisure-time physical activity.

## STUDY OBJECTIVE

- We examined the relationship of self-reported musculoskeletal pain with engagement in leisure-time physical activity (LTPA) among construction workers and further investigated the potential relationships of socio-demographic correlates and type of LTPA on this association.

## USING MIXED-METHODS

### STUDY DESIGN

- Sequential explanatory mixed-methods pilot study design was employed to investigate if self-reported musculoskeletal pain is associated with engagement in LTPA among construction workers.
- We collected anonymous, self-administered questionnaire data in calendar year 2011 from 43 workers employed at two large commercial construction sites in the New England area. In addition, one semi-structured focus group was conducted with five different construction workers at one of the worksites.

### SURVEY INSTRUMENT

- The survey instrument collected individual data on socio-demographic information, musculoskeletal pain, and leisure time physical activity utilizing measures from established survey instruments such as the National Health Interview Survey and the Nordic questionnaire.<sup>6-7</sup>

### FOCUS GROUPS

- To complement survey data, we recruited 5 construction workers for a one hour focus group utilizing a discussion guide that focused on four domains: workplace characteristics, ergonomics, physical activity/exercise, and musculoskeletal pain. The discussion guide was developed by project staff, including researchers and construction industry members.

### DATA ANALYSIS

- Survey data with continuous variables were expressed as mean the standard error of the mean, and categorical variables as frequency and percent.
- Characteristics of workers who engaged in LTPA were compared to those who did not using the independent sample t test or Mann-Whitney U test (continuously measured characteristics) or Pearson’s Chi-square test or Fisher Exact Chi-Square test for two groups (categorical measures).
- The study protocol was approved by the institutional review board of the Harvard School of Public Health.

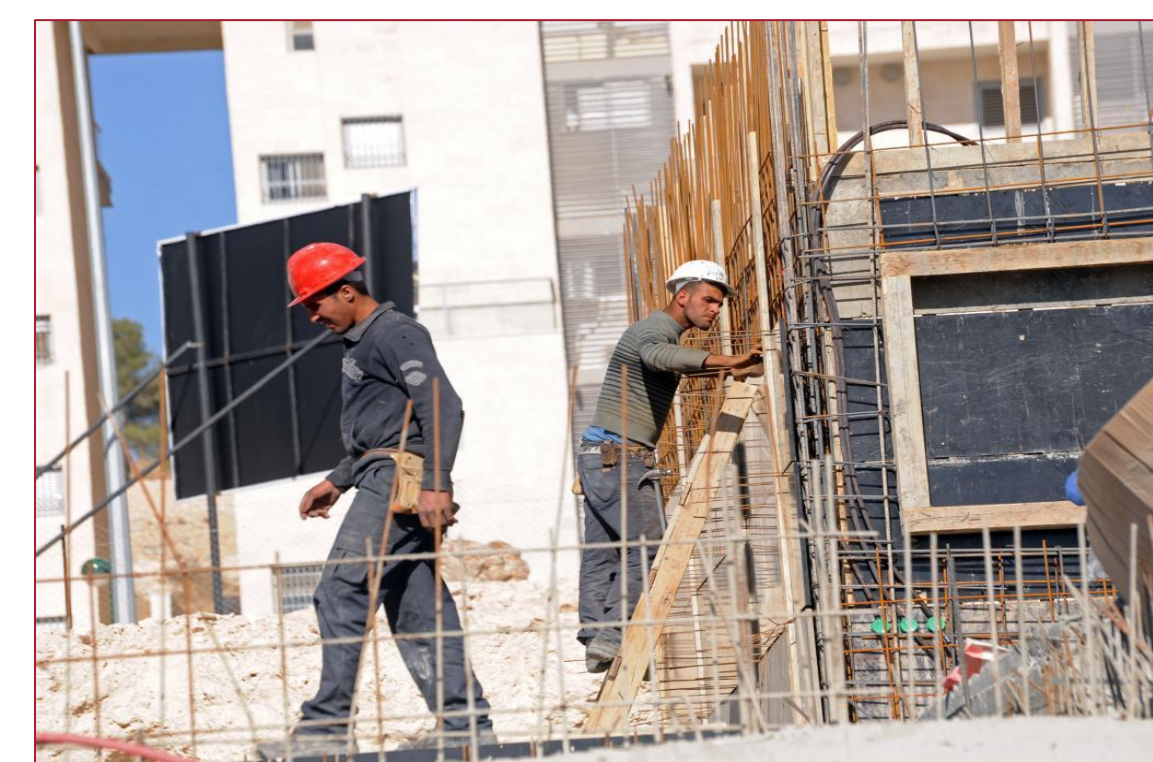
**Table 1.** Socio-demographic characteristics, musculoskeletal pain, and leisure-time physical activity (LTPA) among construction workers at a New England commercial construction site, 2011 (n=43).

| Socio-demographic Characteristics | Overall Sample (N=43) | Workers Engaged in Any LTPA* (N=40) |         | % Meeting Either Moderate or Vigorous LTPA† (N=28) |         |
|-----------------------------------|-----------------------|-------------------------------------|---------|--|---------|
|                                   | N (%)                 | (%)                                 | p-value | (%)  | p-value |
| <b>Age</b>                        |                       |                                     |         |  |         |
| 18–39 years old                   | 14 (39%)              | 100%                                | 0.51    | 86%  | 0.08    |
| 40+ years old                     | 22 (61%)              | 91%                                 |         | 55%  |         |
| <b>Education</b>                  |                       |                                     |         |  |         |
| High School Diploma/GED or Less   | 16 (40%)              | 100%                                | 0.51    | 50%  | 0.09    |
| Some College or College Graduate  | 24 (60%)              | 92%                                 |         | 79%  |         |
| <b>Marital Status</b>             |                       |                                     |         |  |         |
| Married / Living with Partner     | 31 (78%)              | 94%                                 | >0.99   | 65%  | 0.69    |
| Unmarried / Widowed / Separated   | 9 (23%)               | 100%                                |         | 78%  |         |
| <b>Race</b>                       |                       |                                     |         |  |         |
| White (Non-Hispanic)              | 35 (88%)              | 94%                                 | >0.99   | 66%  | >0.99   |
| Non-White                         | 5 (13%)               | 100%                                |         | 80%  |         |
| <b>Health Insurance</b>           |                       |                                     |         |  |         |
| Has Health Insurance              | 34 (85%)              | 94%                                 | >0.99   | 65%  | 0.64    |
| No Health Insurance               | 6 (15%)               | 100%                                |         | 83%  |         |
| <b>Job Title</b>                  |                       |                                     |         |  |         |
| General Foreman / Foreman         | 12 (32%)              | 100%                                | 0.68    | 58%  | 0.54    |
| Journeyman                        | 18 (49%)              | 89%                                 |         | 61%  |         |
| Apprentice                        | 7 (19%)               | 100%                                |         | 86%  |         |
| <b>Type of Work</b>               |                       |                                     |         |  |         |
| Carpenter                         | 11 (26%)              | 100%                                | 0.32    | 64%  | 0.71    |
| Demolition Worker                 | 7 (17%)               | 86%                                 |         | 57%  |         |
| Electrical Worker                 | 6 (14%)               | 83%                                 |         | 67%  |         |
| General Laborer                   | 2 (5%)                | 100%                                |         | 100%   |         |
| Plumbers                          | 3 (7%)                | 100%                                |         | 33%  |         |
| All Others                        | 13 (31%)              | 100%                                |         | 77%  |         |
| <b>Musculoskeletal Pain</b>       |                       |                                     |         |  |         |
| Any Pain                          | 30 (70%)              | 70%                                 | >0.99*  | 71%  | > 0.99* |
| Upper Extremity Pain              | 22 (51%)              | 50%                                 | 0.49*   | 57%  | 0.52*   |
| Lower Back Pain                   | 26 (60%)              | 60%                                 | 0.52*   | 64%  | 0.74*   |
| Lower Extremity Pain              | 19 (44%)              | 48%                                 | 0.49*   | 57%  | 0.05*   |

\*p-Value (Pain vs. No Pain)

\*Any physical activity = engagement in any physical activity outside of work in the past 30 days

† Moderate or Vigorous Physical Activity = defined by level of intensity CDC’s guidelines on general physical activities



**Table 2.** Top twenty self-reported leisure-time physical activities among construction workers at a New England commercial construction site, 2011 (n=43).

| Activity            | Count | Activity                    | Count |
|---------------------|-------|-----------------------------|-------|
| Walking             | 10    | Boxing                      | 2     |
| Bicycling           | 8     | Carpentry                   | 2     |
| Hockey              | 7     | Jogging                     | 2     |
| Weight lifting      | 7     | Raking Lawn                 | 2     |
| Gardening           | 6     | Skating - ice or roller     | 2     |
| Golf (w/o cart)     | 4     | Swimming                    | 2     |
| Calisthenics        | 3     | Basketball                  | 1     |
| Gym                 | 3     | Boating                     | 1     |
| Running             | 3     | Canoeing/Rowing             | 1     |
| Softball / Baseball | 3     | Chopping Wood / Hand-sawing | 1     |

## WORKING IN AND WITH PAIN

### SURVEY DATA

- Among the 43 workers who completed surveys (63% worksite response rate), approximately 70% of workers reported musculoskeletal pain in the 3 months prior to study interview, 54% experienced two or more body sites with pain, and 19% reported five or more sites [Table 1].
- Sixty-five percent of workers reported that in the seven days prior to survey administration their musculoskeletal pain interfered with their work from a “little a bit” to “quite a lot.” The top twenty most frequently engaged leisure-time physical activities are in Table 2.

### FOCUS GROUP DISCUSSION THEMES

- Content analysis of focus group discussions with the 5 construction workers revealed two major thematic domains across two main focus group topics: (1) musculoskeletal pain and (2) physical activity.
- During the musculoskeletal pain discussion, the first thematic domain that emerged was on the topic of having to work with pain and the second theme that emerged dealt with mechanisms to prevent and cope with pain.
- The second topic on physical activity also revealed two major thematic domains, the first of which dealt with exercise on the job and the second theme included a physical activity discussion topic on barriers and motivators to engagement in LTPA.

## TAKE HOME MESSAGE

- Construction workers work in and through pain on the worksite and experience musculoskeletal pain during their leisure-time physical activity.
- Workers engage in varying levels of either moderate or vigorous physical activity during their leisure-time despite reporting musculoskeletal pain.

## REFERENCES

1. Esser S, Bailey A. Effects of exercise and physical activity on knee osteoarthritis. Curr Pain Headache Rep. 2011 Dec;15(6):423-30.
2. Allen J, Morelli V. Aging and exercise. Clin Geriatr Med. 2011 Nov;27(4):661-71.
3. Standaert CJ, Friedly J, Erwin MW, Lee MJ, Rehtine G, Henrikson NB, Norvell DC. Comparative effectiveness of exercise, acupuncture, and spinal manipulation for low back pain. Spine (Phila Pa 1976). 2011 Oct 1;36(21 Suppl):S120-30.
4. Holth HS, Werpen HK, Zwart JA, Hagen K. Physical inactivity is associated with chronic musculoskeletal complaints 11 years later: results from the Nord-Trøndelag Health Study. BMC Musculoskelet Disord. 2008 Dec 1;9:159.
5. Hunting KL, Haile E, Nessel L, Welch LS. Validity assessment of self-reported construction tasks. J Occup Environ Hyg. 2010 May;7(5):307-1.
6. National Center for Health Statistics, Centers for Disease Control and Prevention, National Health Interview Survey. [http://www.cdc.gov/nchs/nhis/about\\_nhis.htm/](http://www.cdc.gov/nchs/nhis/about_nhis.htm/) (accessed 5 August 2012).
7. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Andersson G, Jørgensen K. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. Appl Ergon. 1987 Sep;18(3):233-7.