# Negative or no correlations between subjective effort surveys and objective directly-measured workloads in Hispanic migrant farmworkers

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Abstract

## Introduction

Migrant farmworkers…

Refer to past works…

## Methods

### Participants

Twenty-four…

### Data collection

#### Heart rate monitors

Polar…

#### Electromyography

Local muscle activities… collected at 1,000 Hz

#### Subjective ratings: Borg RPE, Omni RPE and Borg CR10

Questionnaires…

Measurement time…

### Data processing

#### Metabolic load: percent of heart rate reserve

HRmax = 220 – age

HRrest = HR measured while sitting before start working

% HRR = (HRmax – HRwork) / (HRmax – HRrest)

% HRR was square-root transformed to meet the assumption of normality, verified by Shapiro-Wilk test.

#### Muscle fatigue: EMG median power frequency

Raw EMG signal were filtered with the 20-450 Hz bandpass filter. Converting a time domain signal into frequency domain, median power frequency of the EMG was calculated for every 10 minutes.

Regression to adjusted for dominant side and individual effect

Slope of time () from the equation:

#### Effort survey

Difference, i.e. increase or decrease, compared to the beginning of work shift

### Statistical analysis

Overall effort: correlation between % HRR and Borg RPE, correlation between % HRR and Omni RPE

Local discomfort: correlation between EMG MPF and Borg CR10

## Results

### Data distribution and transformation

Based on the Shapiro-Wilk test, initial % HRR was not normally distributed (p = 0.013). However, after the % HRR was square-root transformed, the data became normally distributed (p = 0.48). Figure X shows histograms and the QQ-plots of data before and after transformed.

The EMG MDF in 10-minute windows of all participants had a bi-modal distribution (Figure X) due to the difference between dominant and non-dominant side of muscles and the difference across harvesting methods as well as across the time of the day. These differences were adjusted using linear regression. After removing, i.e. adjusting for, the effects of muscle side () and the effects of the participants () who were different across the harvesting methods, the slope of the time variable () was used for analysis to find correlation between EMG MDF and Borg CR10. Figure X shows the distribution of the while the Shapiro-Wilk test indicated that the data could be normally distributed (p-value = 0.059).

### Overall effort: % HRR as metabolic load, Borg RPE and Omni RPE

% HRR

Borg RPE

Omni RPE

### Association between objective metabolic load and subjective overall effort

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### Local discomfort: EMG MPF as muscle fatigue and Borg CR10

Muscle fatigue, i.e. the EMG MPF, reduced over time as shown by the negative slopes in the regression. This is in accordance to the results of muscle activity from the previous study (Thamsuwan and Johnson, 2022).

Borg CR10

### Association between objective muscle fatigue and subjective local discomfort

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## Discussions

Based on the results…

  

















