

Stressors of Long-Term Care Facility Nursing Assistants During the COVID-19 Pandemic Utilizing Ecological Momentary Assessment, Wearable Sensors, and End-of-Day Reconstruction

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Background

- Long-Term Care Facility (LTC) workers experience high emotional exhaustion and stress.
- Stress levels increased during and post COVID-19 pandemic.
- Stressors include fear of exposure to COVID-19 infection, decreased quality of health, depression, and burnout.
- Increased stress can lead to high turnover, understaffing, adverse effects on LTC residents (e.g. falls, medication errors, and other safety issues).

Purpose

- To gain comprehensive understanding of stress and the effect of COVID-19 pandemic affecting LTC workers

Design

- Quantitative/qualitative mixed pilot study design
- Single long-term care facility site
- Assisted living, dementia care, and memory care units
- 8 Nursing assistant participants
- Inclusion criteria: 1. Worked at the facility as nursing assistants, and 2. had smartphone accessibility
- Exclusion criteria: 1. had acute heart disease, and 2. were taking heart rhythm medications

Methods

Participant Demographics (n=8)			
	N	%	Mean (SD)
Age			54 (11.7)
Tenure (yrs)			19 (10.5)
Female	8	100	
Race			
Non-Hispanic African American	6	75	
Non-Hispanic White	1	12.5	
Prefer not to	1	12.5	
Typical shift worked			
Day (7 am to 3 pm)	3	18.8	
Evening (3 pm to 11 pm)	11	68.8	
Night (11 pm to 7 am)	2	12.5	
Sleeping hours			5.6 (0.9)

Note: SD=Standard Deviation

Measurement

I. Ecological Momentary Assessment (EMA) Surveys

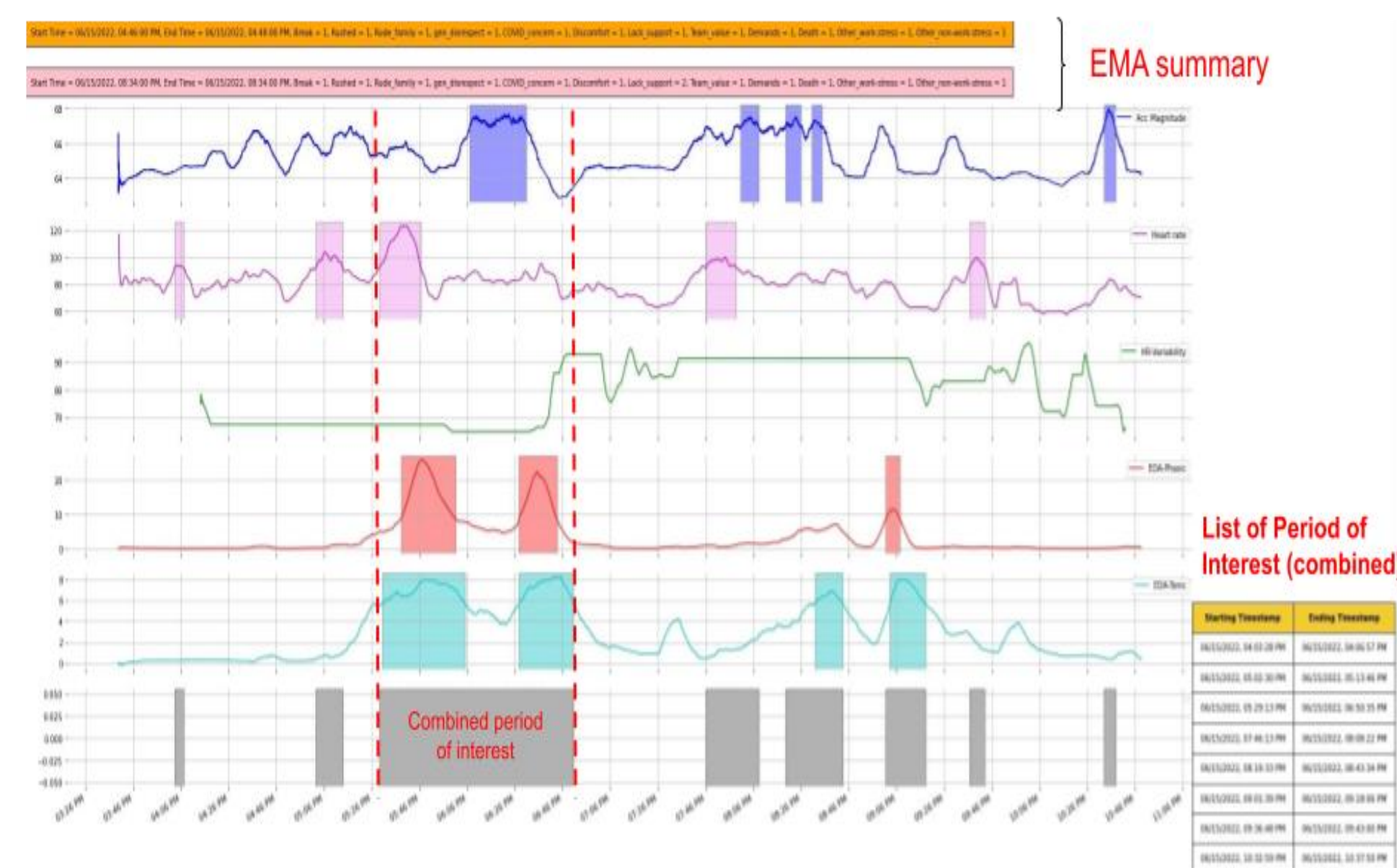
- Two 8-working hour periods survey assessing on-the-job stress
- Adapted questions from daily stress inventory

II. End-of-Day Review

- The Day Reconstruction Method (DRM) was used to provide cues to help individuals vividly re-experience earlier events (minimizing recall bias); virtual meeting with a research team member after each 8-hour shift

III. Wearable Sensor/watch Data Collection

- Three types of sensors including a PPG (Photoplethysmography) sensor, EDA (Electrodermal Activity) sensor, and an accelerometer sensor.
- Visualization plot with periods of interest highlighted to guide the focus and questions for the end-of-day reviews.
- Processing the raw signals into variables (e.g. heart rate, heart rate variable, and Phasic/Tonic component of EDA)
- Computing movement magnitude to contextualize the biophysical signals.



Data Analysis

- All EMA survey data, wearable sensor/watch data, and end-of-day review data compiled in excel.
- All end-of-day interview data coded by two team members independently. Discrepancies were resolved by the team leader.
- Coded in three aspects: who was involved, what caused the stressor, and where the stressor occurred
- 30 causes identified, then condensed into 10 categories.

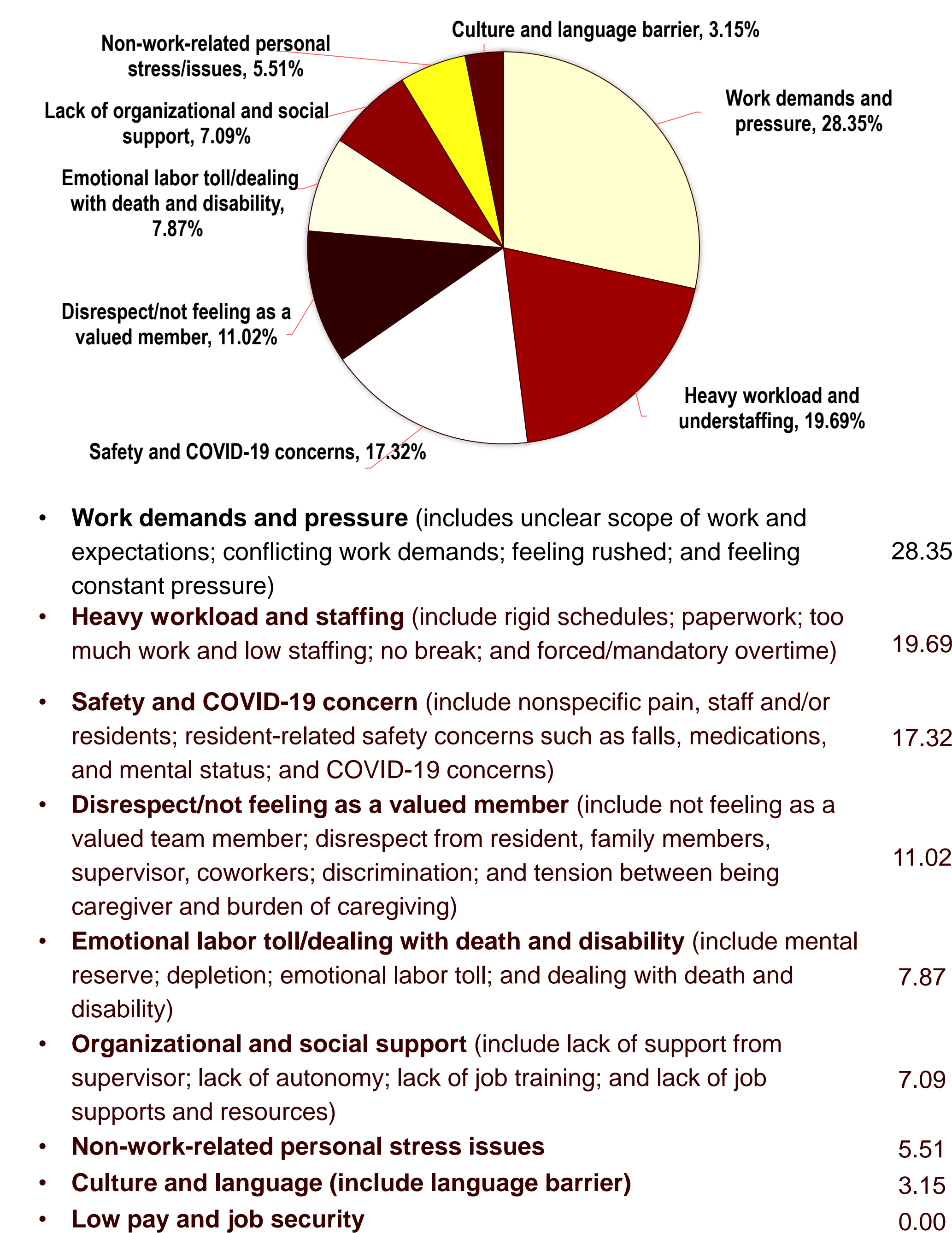
Results

Events and Stress Level by Shifts and Data Sources

ID	# of Events	Stress intensity	E	D	E and D	I
15	13	3.37	3	1	9	0
16	4	1.25	1	3	0	0
17	12	1.57	5	6	1	0
18	11	2.05	6	2	3	0
19	13	2.13	7	0	5	1
20	14	2.11	3	5	6	0
21	11	2.07	1	7	2	1
22	5	1.75	2	3	0	0
Total	83	2.20	28	27	26	2
Average Stress Intensity			2.46	1	3.27	1
Average Events per shift	5.19		3.50	3.38	3.25	0.25
%			33.73	32.53	31.33	2.42

Note: E=EMA only; D=wearable sensor/watch data only; E and D=overlapped with EMA and watch data; I=only from the end-of-day interview

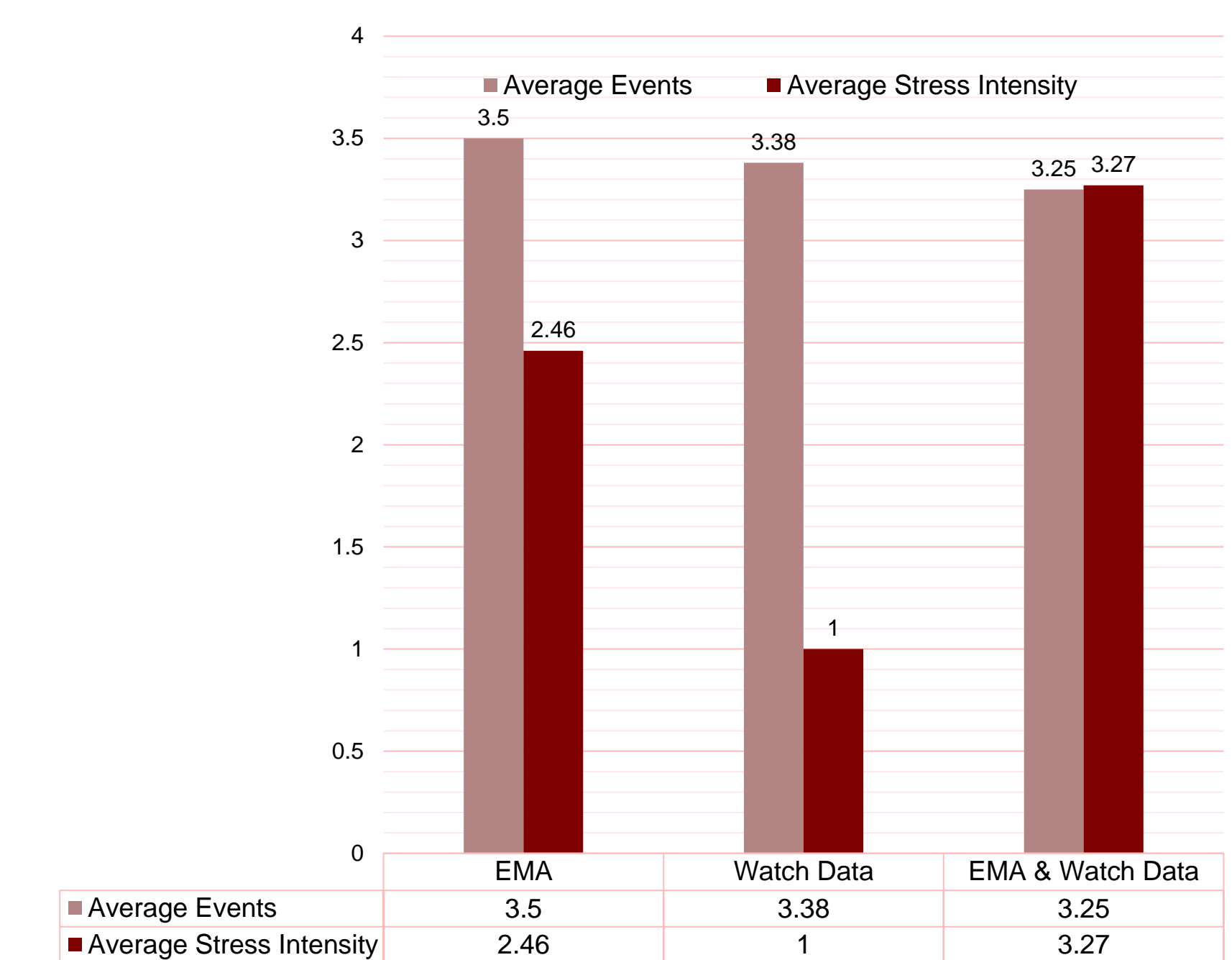
Stressors by Frequency (%)



Stress By Shifts

Shift	# of Events	Stress Intensity	Most Reported stressor	%
Day	18	2.56	Disrespect from residents	22.73
Evening	56	1.89	Feeling rushed	22.47
Night	9	2.09	Feeling rushed	38.46
Total	83	2.18		

Average Events and Stress Level by Data Sources



Challenges

- Small sample from a single LTC site
- Possible sample bias may limit generalizability

Conclusions

- One of the first studies to use EMA and objective measures of stress while working in real time
- Constant stress and pressure among the LTC workers
- Negative impacts of COVID-19 on stress level
- Mild to low moderate stress level during on-the-job assessment
- Stressors differed by shifts
- Possible utilization of sensor/watch data to pick up low to mild grade stressful events before accumulated and development of wellness intervention

Next Steps

- Future study to find feasible solutions to reduce on-the-job stress among LTC workers
- Future study to evaluate time to recover to baseline from stressful events
- Shift specific wellness development for LTC workers

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