eBRAIN
Epidemiology of Brain Resilience to Aging

Does Motivation Promote Physical Activity in Older Adults With Chronic Musculoskeletal Pain?

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METHODS n = 919

Cross-sectional analysis from year 5 of the Cardiovascular Health Study (CHS)

Sample: 65+ years old with *chronic musculoskeletal pain (CMP)* in at least one of the following locations: foot, knee, hip, back

Outcome: Physical activity – composite kCal/week in five roughly even groups

Positive states, predictors:

(1) *self-reported motivation:* composite variable of perceived effort, difficulty getting going in the morning, & difficulty concentrating

(2) *social network* - Lubben Social Network scale

Covariates:

(1) Demographics: age, sex, race

(2) Biomechanical function: BMI, gait speed

(3) Other pain characteristics: number of medications, number of pain sites

(4) Brain integrity: cognitive function and white matter hyperintensities via MRI

Analysis: multivariable ordinal regression

What is the problem?

US Adults over 65 years old → 33% with chronic pain[1] → Over 30% are physically active[2]

Who? Why?

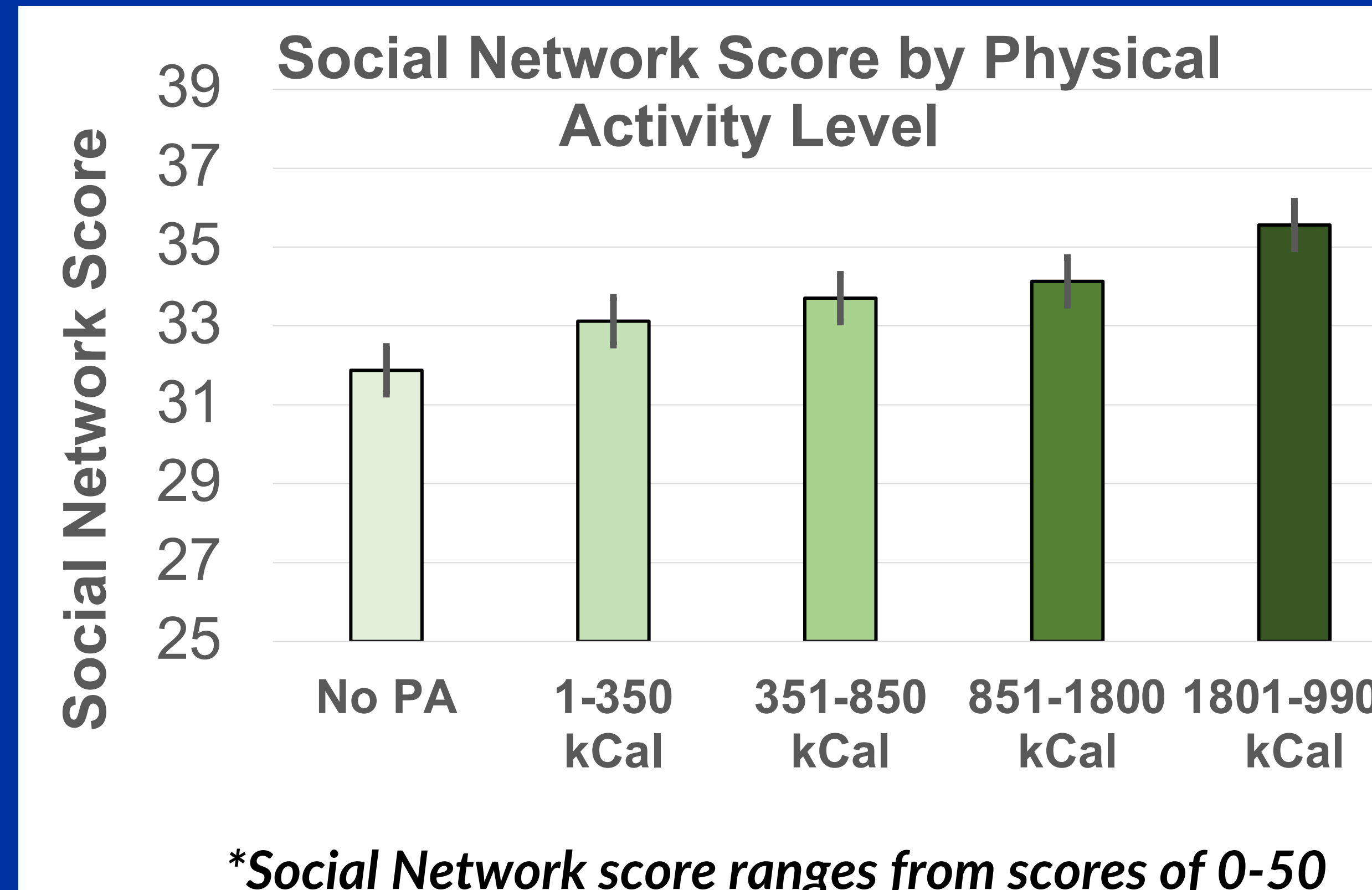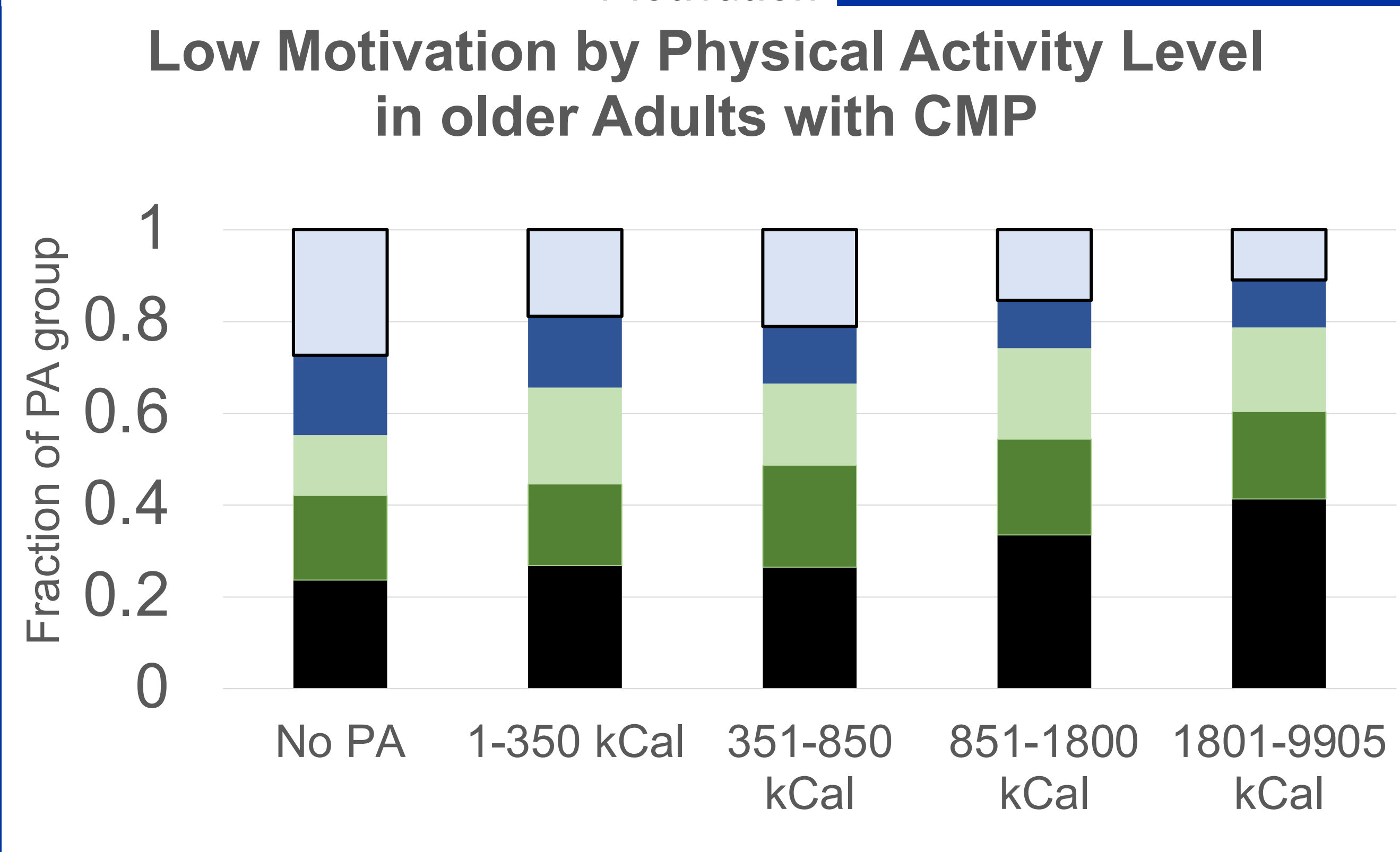Hypothesis: Physical Activity ⟵ Positive states

What did we find?

RESULTS

Self-reported motivation (β = -0.061, p = 0.007) and larger social networks (β = 0.02, p = 0.007) were separately associated with higher levels of physical activity in older adults with CMP using multivariate ordinal regression models. These results remained significant after controlling for depression (CES-D).

	No PA (N=190)	1-350 kCal (N=186)	351-850 kCal (N=186)	851-1800 kCal (N=182)	1801-9905 kCal (N=175)	Total (N=919)
Age (years)						
Mean (SD)	75.3 (5.01)	74.1 (4.81)	74.4 (4.88)	73.8 (4.09)	73.9 (4.17)	74.3 (4.64)
Median [Min, Max]	75.0 [67.0, 92.0]	73.0 [66.0, 91.0]	73.0 [66.0, 92.0]	73.0 [66.0, 86.0]	73.0 [65.0, 89.0]	73.0 [65.0, 92.0]
Gender						
Female	148 (77.9%)	142 (76.3%)	122 (65.6%)	108 (59.3%)	78 (44.6%)	598 (65.1%)
Male	42 (22.1%)	44 (23.7%)	64 (34.4%)	74 (40.7%)	97 (55.4%)	321 (34.9%)
Race						
White	151 (79.5%)	147 (79.0%)	164 (88.2%)	162 (89.0%)	164 (93.7%)	788 (85.7%)
Non-white	39 (20.5%)	39 (21.0%)	22 (11.8%)	20 (11.0%)	11 (6.3%)	131 (14.3%)
Depression						
Mean (SD)	6.83 (5.56)	6.03 (4.88)	6.50 (5.44)	5.51 (4.86)	4.68 (4.18)	5.93 (5.07)
Median [Min, Max]	6.00 [0, 29.0]	4.50 [0, 26.0]	5.00 [0, 28.0]	4.72 [0, 22.0]	4.00 [0, 20.0]	5.00 [0, 29.0]
Missing	0 (0%)	0 (0%)	1 (0.5%)	0 (0%)	0 (0%)	1 (0.1%)
Number of Pain Sites						
Mean (SD)	2.18 (1.11)	2.04 (1.06)	1.96 (0.994)	2.03 (1.06)	1.96 (1.02)	2.04 (1.05)
Median [Min, Max]	2.00 [1.00, 4.00]	2.00 [1.00, 4.00]	2.00 [1.00, 4.00]	2.00 [1.00, 4.00]	2.00 [1.00, 4.00]	2.00 [1.00, 4.00]
Pain in Back						
No	75 (39.5%)	82 (44.1%)	83 (44.6%)	78 (42.9%)	78 (44.6%)	396 (43.1%)
Yes	115 (60.5%)	102 (54.8%)	100 (53.8%)	101 (55.5%)	90 (51.4%)	508 (55.3%)
Missing	0 (0%)	2 (1.1%)	3 (1.6%)	3 (1.6%)	7 (4.0%)	15 (1.6%)
Trouble Falling Asleep						
Mean (SD)	0.253 (0.436)	0.270 (0.445)	0.317 (0.467)	0.211 (0.409)	0.189 (0.392)	0.249 (0.432)
Median [Min, Max]	0 [0, 1.00]	0 [0, 1.00]	0 [0, 1.00]	0 [0, 1.00]	0 [0, 1.00]	0 [0, 1.00]
Missing	0 (0%)	1 (0.5%)	3 (1.6%)	2 (1.1%)	0 (0%)	6 (0.7%)

Symptoms of low motivation
■ 0 ■ 1 ■ 2 ■ 3 ☐ 4+
High Motivation ———— Low Motivation

Low Motivation by Physical Activity Level in older Adults with CMP

Social Network Score by Physical Activity Level

Social Network score ranges from scores of 0-50

What does this mean?

DISCUSSION

• A motivational signature of self-reported motivation & social network may be important in resiliency to CMP-related physical inactivity

• There is **emerging support** for the importance of resiliency in chronic pain

• Other literature supports these results:

   • Support for a role for positive psychosocial factors in pain resiliency[3]

   • Animal models support causal mechanism between CMP & dysfunction in motivational circuitry[4]

   • 1st line treatment options for CMP in older adults target nonpharmacological psychosocial factors, such as motivation, mood, and attention[5]

FUTURE QUESTIONS

• Does this finding generalize to non-"W.E.I.R.D" older adults?

• Does resilience to physical inactivity confer resilience to other potential consequences of CMP, such as dementia?

Citations

1. Zelaya CE, Dahlhamer JM, Lucas JW, Connor EM. Chronic pain and high-impact chronic pain among US adults, 2019. 2020.
2. Larsson C, Ekvall Hansson E, Sundquist K, Jakobsson U. Impact of pain characteristics and fear-avoidance beliefs on physical activity levels among older adults with chronic pain: a population-based, longitudinal study. BMC geriatrics. 2016;16(1):1-8.
3. Musich, Shirley, et al. "Association of resilience and social networks with pain outcomes among older adults." *Population health management* 22.6 (2019): 511-521.
4. Taylor, Anna MW, et al. "Mesolimbic dopamine signaling in acute and chronic pain: implications for motivation, analgesia, and addiction." *Pain* 157.6 (2016): 1194.
5. Skelly, Andrea Clare, et al. "Noninvasive nonpharmacological treatment for chronic pain: a systematic review." (2018). APA

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