Is Sleep Quality Associated with Subjective and Physiological Markers of Pain Risk in Native Americans: Preliminary Results from the Oklahoma Study of Native American Pain Risk III

Corbin M. Woosley, BS[1], Brandon W. Jones, MS[3], Claudia N. Vore, MA[3], Taylor V. Brown, MA[3], Kayla N. Trevino, MS[1], Alondra Quirino, BS[1], Aleiyah M. Fields, BS[1], Travis S. Lowe, PhD[3], Joanna O. Shadlow, PhD[2], & Jamie L. Rhudy, PhD[1]

TSET Health Promotion Research Center

[1]University of Oklahoma Health Sciences, [2]Oklahoma State University, [3]The University of Tulsa

INTRODUCTION

- Native Americans (NAs) have the highest rates of chronic pain in the United States.
- Having poorer sleep quality is associated with higher pain sensitivity.
- Our laboratory has previously shown that poor sleep quality may contribute to this pain disparity.

OBJECTIVE

- To better understand the mechanisms linking sleep and pain in NAs, this study examined the relationship between self-reported sleep quality and subjective and physiological markers of chronic pain risk.

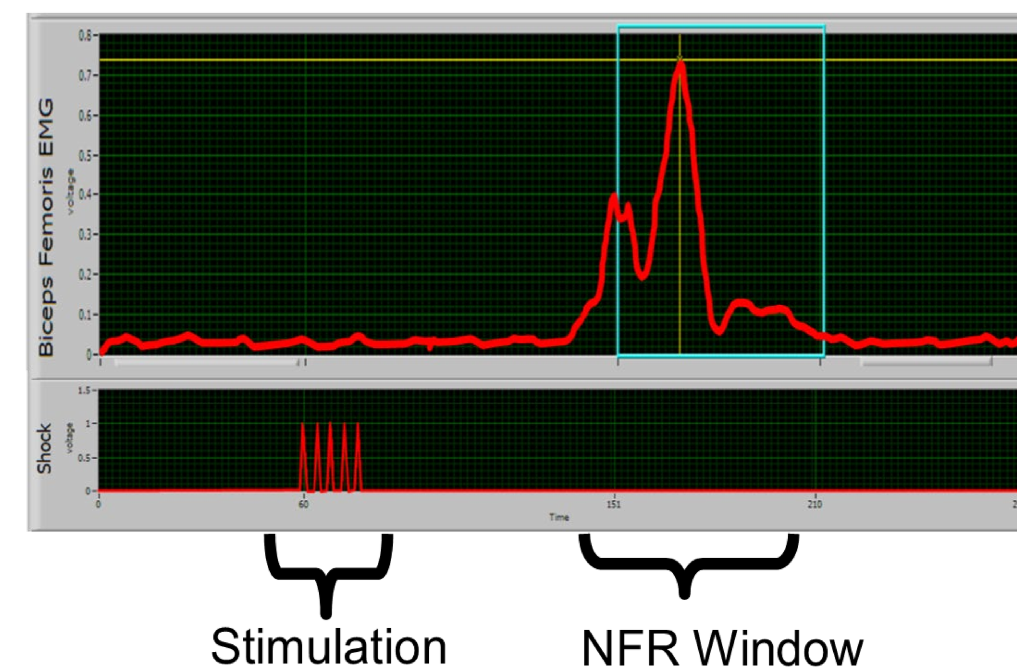
PARTICIPANT CHARACTERISTICS

- Participants were 112 currently pain-free NA adults who participated in the Oklahoma Study of Native American Pain Risk III. (OK-SNAP III).
- Exclusion criteria for OK-SNAP III: (1) <18 years old, (2) self-reported history of cardiovascular, neuroendocrine, musculoskeletal, and/or neurological disorders, (3) current chronic or acute pain, (4) current substance dependence, (5) medication use that could interfere with pain testing (e.g., analgesics, anti-depressants, anti-anxiety, stimulants), (6) current psychotic symptoms, (7) serious cognitive impairment (<20 on the Montreal Cognitive Assessment), (8) abnormal nerve conduction result (e.g., amplitude ≤4 and conduction velocity ≤40), indicating possible neuropathy; and (9) an inability to speak or read English.
    - Average Age = 31.58 years (SD = 11.85)
    - Female (57.5%), Male (42.5%)
- Procedures were approved by the University of Oklahoma Health Sciences, Cherokee Nation, Indian Health Service Oklahoma City Area Office institutional review boards (IRBs).

METHODS

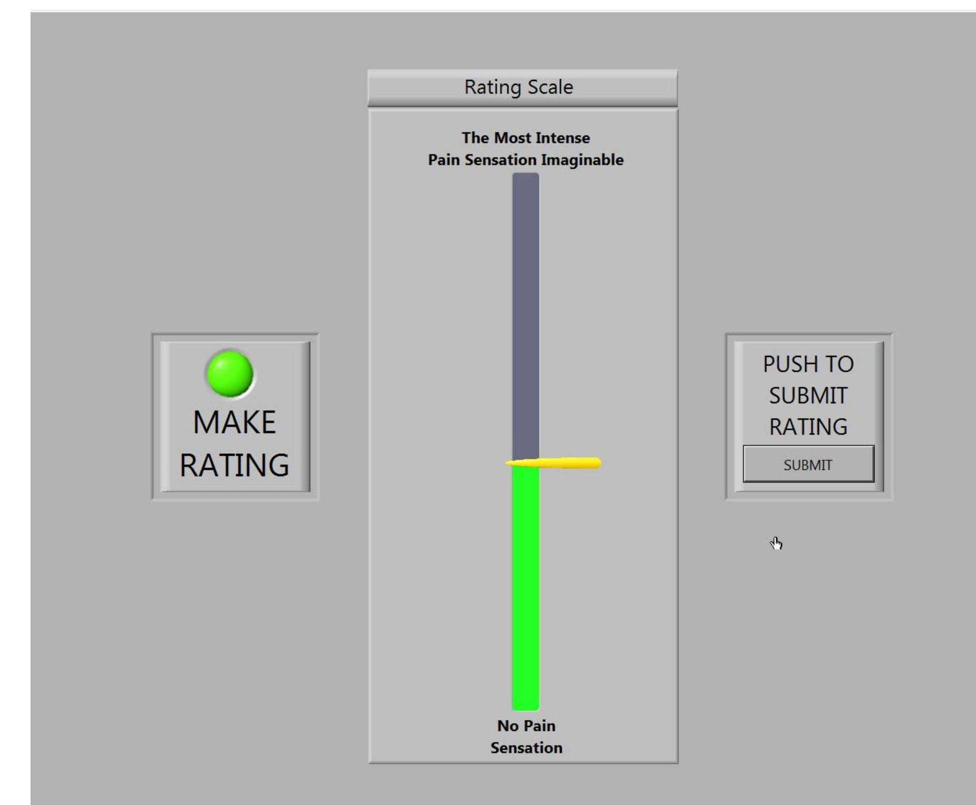
- Laboratory based markers of pain risk nociceptive flexion reflex (NFR), temporal summation of NFR (TS-NFR), conditioned pain modulation of NFR (CPM-NFR), NFR pain ratings, TS-NFR pain ratings, and CPM-NFR pain ratings.

Nociceptive Flexion Reflex (NFR) and Subjective Pain Responses



The three NFR tasks measured participants' protective withdrawal reflex threshold of the biceps femoris via EMG in response to electrical stimulations to Aδ fibers in their left ankle under different conditions.

The three subjective pain variables measured participants' survey and verbal responses on a scale from 0 to 100 during the three NFR tasks.



NFR-Thr and NFR pain: This task had participants receive electrical simulations of increasing intensity in an ascending staircase pattern, until a measurable EMG reflex was detected. Participants rated their pain after each stimulation.

TS-NFR and TS-Pain: This task had participants receive three electrical simulations within half a second. Participants rated their pain for each of the three stims after the third stimulation.

CPM-NFR and CPM-Pain: This task had participants receive electrical stimulations of the same intensity that elicited a reflex in the NFR task, while their hand was in warm (26°C) and then in cold (10°C) water. Participants verbally rated their pain after each stimulation.

Pittsburg Sleep Quality Index (PSQI)

- The PSQI is a self-report measure of sleep quality, latency, duration, efficiency, disturbance, medication, and dysfunction over the last month.
- The time between administration of the PSQI and the NFR tasks, which were always conducted at least two days apart, was not controlled for.
    - PSQI mean score: 6.48 (SD=2.59)
    - 64.2% of responses were clinically significant

DATA ANALYSIS

- Regression analyses were performed on each pain risk outcome using the PSQI as the focal predictor, controlling for age, sex, and income.
- Standardized coefficients of the regressions are reported below.

	Pain Outcome Variables					
Predictors	NFR-Thr	TS-NFR	CPM-NFR	NFR-Thr Pain	TS of Pain	CPM of Pain
Age	**0.262***	0.094	0.009	0.152	0.007	**0.307***
Sex	-0.098	**-0.261***	-0.037	-0.152	0.029	0.067
Income	-0.028	0.059	0.024	-0.088	0.047	-0.086
PSQI	-0.128	0.065	0.114	-0.160	-0.072	0.008

Note: (*p<0.05) Higher coefficient values indicate higher risk of chronic pain, except NFR-Thr where lower values indicate higher risk of chronic pain.

RESULTS & CONCLUSIONS

- While some of the regression models yielded significant results, past month's sleep quality did not influence the subjective or physiological markers of chronic pain risk.
- Future studies are needed to examine the role of other sleep variables (e.g., sleep architecture, sleep continuity) and/or utilize sleep assessments more proximal to the pain testing session (e.g., previous night) on chronic pain risk among NAs.

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