Is resting blood pressure associated with temporal summation of pain and NFR?

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Introduction
Blood pressure (BP) is associated with pain processing and pain modulation. For example, resting BP is associated with the effectiveness of endogenous pain modulation tasks (e.g., conditioned pain modulation, emotional modulation of pain). To our knowledge, no study has investigated the relationship between resting BP and temporal summation of pain (TS-Pain) and temporal summation of a nociception flexion reflex (TS-NFR), both of which are markers of central sensitization.

Objectives
To determine whether resting blood pressure is related with temporal summation of NFR and temporal summation of pain.

Participants
- Healthy Participants: N = 159
  - Participant Characteristics: Male (50.3%), White, non-Hispanic (45.3%), Native American (45.3%), Single (72.3%), average age=28.86 years (SD=12.27)
  - Exclusion Criteria:
    - <18 years of age
    - Cardiovascular, neurological, circulatory problems, or chronic pain
    - Recent use of analgesic medication
    - Current use of anxiolytic, antidepressant, or antihypertensive medication

Procedures
- These data were taken from a parent study investigating pain processing in Native American individuals
- Resting blood pressure (systolic/diastolic) readings were taken before pain testing procedures began
- Temporal summation of pain and nociception flexion reflex (NFR) were among the experimental pain procedures assessed

Methods: Resting Blood Pressure
- Systolic and diastolic blood pressure was assessed using a DINAMAP ProCare monitor attached to the participants left arm
- Blood pressure was recorded three times while participants were at rest

Methods: Temporal Summation of Pain/NFR
- Temporal summation is the increase in nociceptive responses associated with repetitive stimulations of the same intensity
- 5 trials of 3 electrosensory stimulations were delivered to the sural nerve to assess TS-Pain and TS-NFR
- The nociceptive flexion reflex (NFR) is a protective withdrawal reflex used as an indicator of spinal nociception
- Baseline Biceps Femoris EMG (60ms pre-stimulation window) was subtracted from NFR window Biceps Femoris EMG (70-150ms post-stimulation) of each stimulation to compute NFR magnitudes

Data Analysis
- Systolic (M=116.0, SD=12.91)/Diastolic (M=71.04, SD=9.27) BP and Stimulations were used as IVs in 4 Multilevel Models
- Age, BMI, and Trials were controlled for in the MLMs due to being positively correlated with Systolic and Diastolic BP
- Outliers over 2.5 or below -2.5 SDs were Winsorized
- After analysis, Systolic/Diastolic BP were divided into quartiles for ease of graphical presentation

Results
- Simple effect suggests that high systolic blood pressure is associated with greater TS-Pain
- Simple effect suggests that high diastolic blood pressure is associated with greater TS-NFR

Conclusion
- The results suggest that resting BP is associated with pain processing, such that high resting blood pressure is generally associated with increased TS-Pain and TS-NFR. The results may reflect that people with high blood pressure have a pain system which facilitate nociceptive signaling.

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