Age and Supraspinal Modulation of Pain: Emotional Controls of Nociception (ECON)

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Introduction
Advanced age is associated with increased pain, and because pain is influenced by regulatory factors that inhibit or enhance incoming pain signals, pain experienced by older adults may stem from a dysfunction of pain regulatory mechanisms. Unfortunately, there is little well-controlled research addressing this issue.

In our laboratory we are interested in psychological factors that lead to pain modulation. In particular, we are interested in the ways that emotion can regulate pain and physiological pain responses. Three independent experiments from our lab have found that emotional picture viewing reliably modulates pain and its associated reflexes.

Objective
The present study was designed to determine if there are differences in emotional modulation of pain across age groups.

Participants
- 120 Healthy Participants Divided into 4 Groups
  - Young: mean = 20; range = 18-22
  - Mid-young: mean = 25.5; range = 23-28
  - Mid-older: mean = 56; range = 49-65
  - Older: mean = 56; range = 49-83

Procedure
Participants rated 40 pictures (unscrambled) for emotion and pain intensity.

Subjective Emotional Evaluation
- Self-Assessment Manikin
  - 1 = (unhappy)
  - 9 = (happy)

Results: Pain-evoked SCR
- Skin Conductance Response (SCR)
  - SCR = 12.13 microSiemens
  - Noxious stimulations to sural nerve evoked a SCR average = 12.13 microSiemens

Results: Pain-evoked Physiological Responses
- Heart Rate Response
  - HR: average HR in the 5 s post-shock interval minus average HR in 1 s pre-shock interval
  - Power Spectral Density (PSD)
  - PSD: average PSD in the 5 s post-shock interval minus average PSD in 1 s pre-shock interval

Results: Emotional Modulation of NFR
- Nociceptive Flexion Reflex (NFR)
  - NFR magnitude correlates with pain ratings

Results: Emotional Modulation of Pain
- Pain Ratings made follow-ping each stimulation
  - Intensity = 1.2 x NFR threshold

Results: Emotional Modulation of the NFR
- Nociceptive Flexion Reflex (NFR) Magnitude
  - NFR = 1.00 1.20

Pain-evoked Physiological Responses
- Skin Conductance Response (SCR): average SC in the 1-6 s post-shock interval minus average SC in 1 s pre-shock interval
  - Power Spectral Density (PSD)
    - PSD: average PSD in the 5 s post-shock interval minus average PSD in 1 s pre-shock interval

Pain-evoked HR Acceleration
- HR Acceleration
  - HR: average HR in the 5 s post-shock interval minus average HR in 1 s pre-shock interval

Data Analysis
- To correct for skewness, a log transformation of Picture-SCR and Pain-SCR was conducted (log [SCR+1]).

Conclusions
- Future research should potentially avoid use of autonomic reactions with older age groups.

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