Assessing Emotional Processing in Persons with Fibromyalgia: Emotional Picture-Viewing and the Acoustic Startle Reflex

Emily J. Bartley, M.S., Amy E. Williams, M.A., & Jamie L. Rhudy, PhD
Department of Psychology, The University of Tulsa, 800 South Tucker Drive, Tulsa, OK 74104

Fibromyalgia Syndrome (FMS) is a chronic pain disorder associated with musculoskeletal pain, tenderness, and fatigue. Moreover, affective dysregulation is commonly noted to be a factor. Given that emotion is known to influence pain modulation, deficits in emotional processing could contribute to the enhanced pain observed in persons with FMS. The present study assessed the influence of emotionally-charged picture stimuli on the acoustic startle reflex (ASR), facial EMG, and skin conductance response (SCR). Participants were 16 patients with FMS and 16 gender and age-matched healthy control (HC) participants. During experimental testing, each participant viewed pictures varying in emotional valence and aroused, with acoustic startle probes being delivered during 66% of pictures. Because startle and pain are modulated by similar neural circuitry (i.e., amygdala, PAG), any abnormalities in startle modulation may influence abnormalities in pain modulation.

**Introduction**

Fibromyalgia syndrome (FMS) is a chronic pain disorder associated with musculoskeletal pain, tenderness, and fatigue. Moreover, affective dysregulation is commonly noted to be a factor. Given that emotion is known to influence pain modulation, deficits in emotional processing could contribute to the enhanced pain observed in persons with FMS. The present study assessed the influence of emotionally-charged picture stimuli on the acoustic startle reflex (ASR), facial EMG, and skin conductance response (SCR). Participants were 16 patients with FMS and 16 gender and age-matched healthy control (HC) participants. During experimental testing, each participant viewed pictures varying in emotional valence and aroused, with acoustic startle probes being delivered during 66% of pictures. Because startle and pain are modulated by similar neural circuitry (i.e., amygdala, PAG), any abnormalities in startle modulation may influence abnormalities in pain modulation.

**Participants**

- 16 Fibromyalgia Participants and 16 Healthy Control Participants
  - Fibromyalgia Demographics: 1 Male, 15 Females; White non-Hispanic (93.7%), married (80%), employed full-time (56.3%), single (21%), employed part-time (43.8%), single (21%), employed part-time (43.8%)
  - Healthy Control Demographics: 1 Male, 15 Females; White non-Hispanic (93.7%), single (21%), employed full-time (56.3%), single (21%), employed part-time (43.8%)

- Exclusion Criteria:
  - < 18 years of age
  - Current acute illness
  - Cardiovascular, neurological, circulatory or hearing problems
  - Diagnosis of hypothyroidism, amyotrophic lateral, lupus erythematosus, osteoarthritis, vascular, Lyme disease, Epstein-Barr virus, spinal arachnoid, cerebellar myelopathy
  - Other chronic pain conditions in a migraine, tinnitus
  - Recent use of analgesics and/or antidepressant medication
  - Recent surgery or procedure within 2 weeks of participation
  - Specific problem with asepsis or urination due to picture-viewing
  - Recent psychiatric issues
  - Raynaud’s disease

- Self-Assessment Mankin (Bradley & Long, 1994):
  - Valence (Pleasure) Ratings: 1 (unhappy) to 9 (happy)
  - Attack Neutral Erotic

**Procedure**

- Used to assess emotional processing
- Inter-species response to abrupt, unexpected stimulus
- Short burst of non-noxious, 35-mm acoustic probe
- Measured from contraction of orbicularis oculi muscle in humans
- Magnitude of startle eyeblink response covaries with affective valence

**Data Analysis**

- Analyses: 2 (Group: FMS v. Controls) x 3 (Picture Content: unpleasant, neutral, pleasant) repeated measures ANOVAs
- Planned simple effects tests conducted to examine group differences
- Greenhouse-Geisser corrections used to overcome sphericity
- Mean comparisons made using 1-tailed Fisher’s LSD tests

**Objective**

- To determine if deficits in emotional processing exist in FMS by assessing physiological (startle magnitude, corrugator EMG, skin conductance response) and subjective (patients’ visceral reactions to emotional stimuli)

**Subjective Emotional Evaluation**

- Valence (Pleasure) Ratings: 1 (unhappy) to 9 (happy)
- Attack Neutral Erotic

**Results: Measures of Arousal**

- Arousal Ratings: The Picture Content x Group interaction was significant (F(2, 60) = 8.27, p < .01, η2 = .22)
  - FMS participants rated attack pictures as more arousing (p < .05, d = .71) and neutral pictures as less arousing (p < .05, d = .71) than HC.
  - SCR: The Picture Content x Group interaction was not significant (F(2, 60) = 2.10, p = .02, η2 = .05)
  - There were no group differences in skin conductance response.

**Results: Acoustic Startle Reflex (ASR)**

- The main effect of Picture Content was significant. Relative to neutral pictures, startle was larger during attack pictures (p < .01, d = .87) and smaller during erotic pictures (p < .01, d = 1.46)
  - However, the Picture Content x Group interaction was not significant (F(2, 60) = .68, p = .42, d = .02)

**Conclusions**

- Results suggest individuals with FMS have abnormalities in emotional processing (corrugator EMG, subjective evaluation).
  - However, given the lack of group differences in startle modulation, the amygdala and PAG may not play a significant role in symptom maintenance or exacerbation in FMS.