



### (316) Hypervigilance to pain and differences in responses to laboratory pain stimuli among older adults with symptomatic knee osteoarthritis

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The aim of the present study was to determine the role of pain hypervigilance in clinical pain intensity and experimental pain sensitivity in individuals with symptomatic knee osteoarthritis (OA). Participants were 168 community-dwelling adults between the ages of 45 to 85 with knee OA based upon the American College of Rheumatology clinical criteria. Low pain hypervigilance (LPHV) and high pain hypervigilance (HPHV) groups were determined by performing a median split on the Pain Vigilance and Awareness Questionnaire (PVAQ) scores. Clinical pain intensity over the past 48 hours was measured by the Western Ontario McMaster Universities Osteoarthritis Scale (WOMAC) pain subscale. Sensitivity to heat pain, mechanical pressure pain, and cold-pressor pain were measured by quantitative sensory testing (QST). HPHV and LPHV groups significantly differed on the PVAQ ( $p < 0.001$ ). The HPHV group reported higher WOMAC clinical pain intensity than the LPHV group ( $p < 0.01$ ). In QST, the HPHV group exhibited lower mechanical pressure pain thresholds at the knee and forearm ( $p < 0.05$ ), and lower cold-pressor pain tolerance at all measured temperatures ( $p < 0.001$ ). In addition, the HPHV group reported greater pain intensity ratings at tolerance (60 sec max) during 16° and 12° C temperatures ( $p < 0.05$ ), as well as greater pain unpleasantness ratings at 12° and 8° C ( $p < 0.05$ ). There were no group differences in heat pain, suggesting the steadily increasing noxious stimulus produced by mechanical pressure pain and cold-pressor pain may be more relevant to OA pain than heat pain, which influences receptors closest to the muscle surface. To conclude, among persons with knee OA, variations in pain hypervigilance are associated with variations in clinical knee pain, as well as mechanical pressure and cold-pressor responses. Thus, pain hypervigilance may be an important psychosocial contributor to the reported and expressed pain sensitivity of persons with knee OA. This research was supported by NIH grant R01AG033906-08.

### (317) Lesser evil paradigm: evaluating pain unpleasantness by a novel cross-modality matching technique

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Psychophysical evaluations of evoked pain sensations target two dimensions - intensity or unpleasantness. This study developed alternative, behavioral measures of unpleasantness by directly matching two stimulus modalities. In each of two paradigms, subjects receive both an aversive non-nociceptive stimulus (loud sound) and painful blunt pressure applied to the thumb. For each pair, subjects determine the least aversive stimulus (the lesser evil) and, based on subject choice, the intensity of the pressure stimulus is adjusted by a tracking algorithm to match two (low and high) specified levels of unpleasantness of auditory stimulation. The two paradigms differ in the temporal presentation of the stimulus pair. In the "Escape" method, an auditory and a pressure stimulus are delivered simultaneously, while in the "Choice" method, these stimuli are delivered separately in a random counterbalanced order. Eighteen women with fibromyalgia (FM) and 17 healthy control women (HC) completed both methods. The results of each method did not differ for either FM ( $p = 0.43$ ) or HC ( $p = 0.57$ ). The effect of stimulus level (low, high) was significant for both methods ( $p < 0.001$ ) with no interaction between stimulus level and method ( $p = 0.19$ ). Correlational analyses revealed significant associations between stimulus levels for each method and group ( $r = 0.65$  to  $0.93$ ,  $p < 0.001$  to  $p = 0.004$ ). Interestingly, the Escape measure was the only measure associated with clinical pain magnitude, both with current pain ( $r = -0.74$ ,  $p < 0.001$ ) and pain over the last two weeks ( $r = -0.56$ ,  $p = 0.024$ ). In the Escape method, greater clinical pain in FM was associated with decreased pressure matches to a constant auditory sound, suggesting a facilitatory modulation of low pressure pain sensitivity by concomitant clinical pain and aversive sound. Our results show that behavioral paradigms can discriminate levels of unpleasantness of evoked painful and non-painful sensations and may provide a sensitive indirect measure of pain modulation in patients with fibromyalgia or other pain conditions.

### (318) Obesity is related to clinical pain severity and pressure pain sensitivity among older adults with and without knee osteoarthritis

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Studies have shown that obesity is an important risk factor for knee osteoarthritis (KOA) incidence and associated pain sensitivity. However, less is known about whether obesity is also related to pain sensitivity among individuals without KOA. The purpose of this study was to examine whether obesity is related to reports of OA pain as well as mechanical pain sensitivity among older adults with and without KOA. The sample consisted of older (age 45-85), community-dwelling adults and included 168 participants (74% women) with KOA and 101 participants (66% women) without KOA. Weight and height measurements were collected from each participant in order to calculate Body Mass Index (BMI). Participants completed the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and underwent algometry to determine pressure pain thresholds (PPTs). PPTs were assessed at the medial and lateral joint lines of the most affected knee for participants with KOA; PPTs were assessed at a randomly selected knee for those without KOA. Additional testing sites included the quadriceps, forearm, and trapezius ipsilateral to the knee. Obese (BMI  $\geq 30$ ) KOA participants reported significantly greater symptoms (pain, stiffness, and dysfunction) on the WOMAC compared to non-obese (BMI  $< 30$ ) KOA participants ( $p < 0.001$ ). Similarly, obese KOA participants demonstrated significantly lower PPTs at the medial ( $p < 0.01$ ) and lateral ( $p = 0.024$ ) knee joint, but not at other testing sites. Interestingly, obese participants without KOA also demonstrated significantly lower PPTs at the medial ( $p = 0.015$ ) and lateral ( $p = 0.04$ ) knee joints compared to non-obese participants without KOA. Results suggest that obesity may be a risk factor for enhanced pain sensitivity localized at the knee irrespective of KOA status. Future research should focus on expanding knowledge about mechanisms of the relationship between obesity and pain in samples with and without KOA.

### E24 Sex and Gender Differences

#### (319) The role of race and sex on experimental pain sensitivity in individuals with symptomatic knee osteoarthritis

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Evidence suggests that experimental pain sensitivity varies across race and sex, with African Americans exhibiting increased perceptual responses to noxious stimuli when compared to non-Hispanic whites, and women demonstrating greater pain sensitivity than men. However, few studies have systematically assessed these differences in individuals with knee osteoarthritis (OA). Therefore, the aim of this study was to examine differences in experimental pain sensitivity across race (African Americans vs. non-Hispanic whites) in men and women with severe knee OA. Participants included 106 African Americans and 100 non-Hispanic whites (63 males, 143 females) who completed multiple experimental pain measures including contact heat, cold pressor, mechanical pressure, and punctate stimuli. Thresholds and tolerances to painful stimuli were measured, in addition to intensity and unpleasantness ratings. Results indicated that African Americans demonstrated lower pain thresholds and tolerances in response to multiple pain stimuli relative to non-Hispanic whites, and rated these stimuli as significantly more unpleasant and intense. Further, women exhibited lower heat and cold pressor pain tolerances, lower mechanical pain thresholds, and higher punctate pain intensity ratings than men. Results also indicated a significant Race X Sex interaction revealing that African American men rated noxious stimuli as more unpleasant and intense than non-Hispanic white men; however, these effects were only observed for cold pressor pain. Overall, these findings provide evidence of race and sex differences in experimental pain responses among individuals with symptomatic knee OA and suggest that race differences in cold pressor pain may be more marked for men than women. Further research is warranted to determine the specific mechanisms underlying these effects.