

## BACKGROUND

- Chronic pain is a debilitating condition, thought to affect 50 million people world wide (Dana Foundation, 2005)
- The fear-avoidance model of chronic pain developed by Vlaeyen & Linton (2000) describes how chronic pain develops or, alternatively, how one recovers from an injury (Figure 1)



Figure 1. Fear-avoidance model of chronic pain development (adapted from Vlaeyen & Linton, 2000), with motivational systems location in red

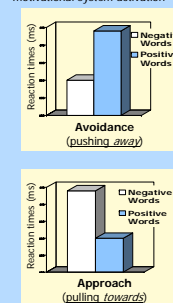
- A central part of this model is the role of motivational system activation
- Motivational systems influence our decisions about what actions to make in all areas of life (Elliot, 1999)
- Two fundamental motivational systems:
  - Avoidance Motivational System** (Behavioral Inhibition System) - activated when pain or punishment cues exist (Gray, 1987)
  - Approach Motivational System** (Behavioral Activation System) - responsible for responses to reward cues in the environment and motivational engagement (e.g., Elliot & Covington, 2001)

- Based on the fear-avoidance model and previous research (e.g., Leeuw et al., 2007) we hypothesized that chronic pain patients would show:
  - heightened activation of the avoidance motivational system
  - decreased activation of the approach motivational system

## METHOD

- Participants are chronic pain patients and non-pain controls from a diverse, urban public hospital population.
- Psychometric Assessment** (N=70)
  - Behavioral Inhibition/Behavioral Activation System - BIS/BAS (Carver & White, 1994)
  - Fear of Pain - Fear of Pain Questionnaire-III (McNeill & Rainwater, 1998)
  - Fear of Movement - Tampa Scale for Kinesiophobia (Kori et al., 1990)
  - Anxiety - Burns Anxiety Inventory (Burns, 1984)
  - Depression - Beck Depression Inventory-II (Beck et al., 1996)
- Subgroup of participants (N=35) completed a **Behavioral Measure of Approach and Avoidance**
  - Joystick reaction time paradigm** - Participants responded to a word presented on a computer screen by either always pulling the joystick towards them or always pushing the joystick away from them as quickly as they can
    - Past research has shown that participants are faster to push the lever away in the presence of a negative stimulus (avoidance) and faster to pull the lever towards them in the presence of a positive stimulus (approach) (adapted from Chen & Bargh, 1999)
    - Words are randomly presented and positive or negative
    - Evaluation of words occurs rapidly and outside of awareness (Chen & Bargh, 1999)

Figure 2a and 2b. Reaction time outcomes displaying approach and avoidance motivational system activation



## RESULTS

Table 1. Demographic Characteristics

	Chronic Pain Patients (N=55)	Non-pain Controls (N=15)
Male (N)	29	12
Age (mean in years)	51 (SD=7.6)	45 (SD=11.4)
Education (mean in years)	13.2 (SD=2.1)	12.2 (SD=2.6)
Employment (% employed)	20	26.6
Ethnicity (%):		
African American	41.8	40
Caucasian	29	26.7
Asian American	3.6	6.7
Latino	16.4	13.3
Native American	5.5	0
Other	1.8	6.7
Chronic Pain (mean # years)	8.4 (SD=8.4)	--
Current pain rating (1-10 scale, mean)	6.0 (SD=2.6)	--

Figure 3a and 3b. Self report measures revealing significant differences between chronic pain sufferers and controls for Fear of Pain Questionnaire and Tampa Scale for Kinesiophobia (fear of movement)

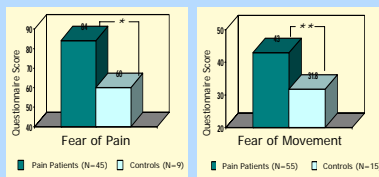
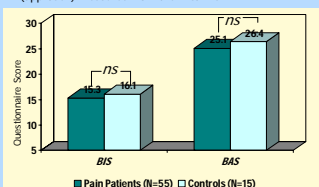


Figure 4. Self report measures of Behavioral Inhibition System (avoidance) and Behavioral Activation System (approach) measured from the BIS/BAS



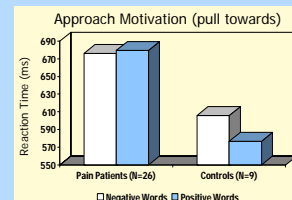
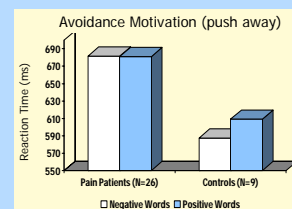
- Chronic pain patients reported significantly higher levels of fear of pain, fear of movement, depression, and anxiety (all  $p$ 's < .05) between groups (Figures 3a and 3b, Table 2)
- The behavioral measure yielded expected trends in data, although differences were not significant. A small N in the control group may be responsible for the lack of significant findings (Figures 5a and 5b)

Table 2. Self-report measures of anxiety and depression, showing significant differences between groups

	CP Mean (SD)	Control Mean (SD)	t-score
Anxiety	42.3 (26.8)	13.8 (13.7)	3.9**
Depression	20.3 (12.2)	6.8 (6.2)	3.9**

\*\*p < 0.01

Figures 5a and 5b. Preliminary behavioral results showing mean reaction times for pushing (avoidance) and pulling (approach) during both positive and negative word presentation.



## DISCUSSION

- Significant differences found in fear of pain and fear of movement supports the importance of identifying those high in fear-avoidance and possibly incorporating treatments to address these fears. For example, focus of treatment may encourage the patient to view pain as a normal part of the healing process.
- Preliminary results indicate the possibility of decreased approach motivation and an increased avoidance motivation in behavior but not in personality.
- That is, BIS/BAS results indicate that trait approach/avoidance are similar for chronic pain patients and controls, but differences may exist in current behavior.
- If confirmed, potential treatment implications would be:
  - Heightened activation of avoidance** may indicate that treatment should focus on exposure to stimuli that evoke fear or avoidance of pain (such as fear of specific movement or activities)
  - Decreased activation of approach** may indicate that treatment emphasis may be placed on behavioral activation
- Future research should investigate whether the fear of pain, movement, increased avoidance, & decreased approach are a cause or a consequence of chronic pain through prospective studies.