# Examining the Differences in Veterans and Non-Veterans at the Chronic Pain Management Unit

Alisha Jiwani (alisha.jiwani2@gmail.com)
McMaster University

## Abstract

The CPMU consists of both veterans and non-veterans who exhibit a wide range of chronic pain problems. In this study, it is hypothesized that veterans and non-veterans will score better at discharge than at admission, based on expected trends. In addition, due to their combat exposure, it is predicted that veterans will score differently than non-veterans on a variety of pain-related measures. It is predicted that veterans will exhibit more anxiety and fear-related symptoms than non-veterans. Patient information was extracted from the CPMU database in order to obtain demographics, program evaluation scores, and MMPI-2 scores. Fifteen veterans were matched with fifteen non-veterans based on age, gender, time of admission, and pain duration. A two-way ANOVA with repeated measures on one factor was conducted on each of the measures at admission and discharge for veterans and non-veterans. Paired t-tests were used for MMPI-2 scores and discharge only variables to assess any differences between veterans and non-veterans. Intuitively, many of the significant results illustrated that upon discharge, most subjects performed better on measures that were encouraged by multidisciplinary treatment programs. Results also indicated that scores on the Pain Catastrophizing Scale (PCS), and on both task persistence and seeking social support dimensions of the Chronic Pain Coping Inventory (CPCI) were different for veterans and non-veterans depending on when they completed the questionnaires. Veteran scores were consistent with our hypothesis across measures that detected significant group by session interactions. Further studies need to be conducted to gain a better understanding of the differences between veteran and non-veteran profiles.

Keywords: chronic pain management, veterans, pain measurement, pain treatment models

Extensive research has been conducted regarding the relationship between PTSD and chronic pain in war veterans. Pain is defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage" (Merskey & Bogduk, 1994). Sometimes, the pain does not subside and persists for extended periods of time. Pain is considered to be chronic if it has persisted for six months or longer, and had initially begun with a bodily injury or disease related problem that had already been successfully treated (Lew et. al., 2009).

The Diagnostic and Statistical Manual of Mental Disorders IV-TR defines PTSD as follows:

> Diagnostic criteria for PTSD include a history of exposure to a traumatic event meeting two criteria and symptoms from each of three symptom clusters: intrusive recollections, avoidant/numbing symptoms, and hyperarousal symptoms. A fifth criterion concerns duration of symptoms and a sixth assesses functioning (American Psychiatric Association, 2000).

PTSD is an anxiety disorder that follows an actual or perceived trauma, and is characterized by recurrent thoughts of the trauma that lead to variations in affect (Otis et. al., 2003). Flashbacks and nightmares are common manifestations of the underlying trauma, and tend to be triggered by environmental cues that are related to the traumatic event (Otis et. al., 2003). Avoidance behaviours are another main symptom of PTSD, as individuals use this as a coping mechanism in order to avoid any triggers that may be associated with the trauma (Otis et. al., 2003). More often than not, PTSD sufferers become isolated and sever ties with close family members and friends. Consequently, this leaves them feeling even more depressed, angry, and hopeless (Otis et. al., 2003). In addition to the anger and irritability that is commonly observed in PTSD, individuals also display signs of hyper arousal, as they are often on edge and easily startled. (Otis et. al., 2003) Difficulty sleeping and deficits in attention are also manifestations of the heightened sensitivity that is observed in people suffering from PTSD (Otis et. al., 2003). Moreover, these individuals usually exhibit high levels of anxiety, depression, panic, and substance abuse (Otis et. al., 2003). Although PTSD often occurs following a traumatic event, it has been suggested that the effect of the trauma on the individual has to do with personal vulnerabilities, such as family instability prior to combat exposure, age at the time of combat exposure, and additional life stressors (Otis et al., 2003). This would explain why some people who experience trauma do not develop PTSD, as they may not have the associated psychosocial factors and personal characteristics that would contribute to the development of the disorder. (Otis et. al., 2003)

The Chronic Pain Management Unit (CPMU) located at Chedoke Hospital in Hamilton, Ontario, Canada offers a four-week program that is based upon cognitive behavioural therapy (Williams et. al., 2007) The program offers both residential and inpatient treatment in order to provide flexibility to those in need. A multidisciplinary team consisting of occupational therapists, psychologists, pool therapists, a social worker, psychiatrist, physiotherapist, pharmacist, and nutritionist all work together to develop a program specifically tailored to each patient (Williams et. al., 2007). The purpose of program activities is to educate patients and encourage them to develop new behaviours that will help them to effectively self-manage their pain. Certain techniques, including but not limited to group therapy and relaxation, provide alternate ways of coping with pain that patients are able to take with them upon discharge from the program. Patients that excel most in the CPMU program are those that enter with an open mind and a willingness to be open to having some element of control over their own lives. Throughout their four week stay, patients are exposed to relaxation, anger management, nutrition, positive self-affirmation, medication use, activity pacing, and communication skills. These techniques are meant to increase esteem and change their current perception of pain from a negative view to a positive one. Over time, these coping strategies are meant to increase independence on new self-management behaviours and decrease independence on medication. Some of the patients who enrol in the CPMU program are referred by Veterans Affairs. In addition to chronic pain, combat exposure has contributed to a PTSD diagnosis in some

veterans. Therefore, the CPMU program consists of patients who are non-veteran chronic pain patients, as well as veteran chronic pain patients.

Individuals suffering from PTSD often report chronic pain, which is believed to be their most common physical complaint (Shipherd et. al., 2007).War veterans undergo extreme physical exertion and high susceptibility to injury, so it is not surprising that most veterans who are returning home from battle are diagnosed with chronic pain (Lew et. al., 2009). In addition, the pain literature suggests that chronic pain is related to family instability, educational and career problems, and underlying psychological issues (Lew et. al., 2009). Studies have shown that both PTSD and chronic pain are co-dependent in nature, in that both can worsen the symptom severity of one another (Otis et. al., 2003).

The purpose of this study is to examine the differences in profiles of veterans and non-veterans. Differential scoring on a variety of pain-related measures may contribute to a greater understanding of the differences between chronic pain patients who have been exposed to combat and those that have not. It is hypothesized the veterans non-veterans will have more favourable scores at discharge than at admission, based on expected trends. In addition, it is predicted that veterans will exhibit more anxiety and fear related symptoms than non-veterans. The background will briefly cover the epidemiology of PTSD and chronic pain, the co-morbidity of these conditions, psychological theories, and some of the treatment options offered at the CPMU.

## Epidemiology

Studies have demonstrated that approximately 1 in every 5 individuals report chronic pain to their primary health care provider, making it a common health issue in the population (Tang & Crane, 2006). Moreover, approximately 10% of the general population is affected by some type of chronic pain problem that has been present for a minimum of three to six months (Shipherd et. al., 2007). In addition, 80% of veterans undergoing outpatient treatment for PTSD reported also experiencing chronic pain (Shipherd et. al., 2007). Therefore, compared to the general population, the rate of chronic pain diagnoses in patients also suffering from PTSD is significantly higher.

In the United States alone, PTSD affects approximately 6% of males and 12% of females (Shipherd et. al., 2007). More importantly, the prevalence of PTSD increases significantly in combat veterans or in populations where there is a higher susceptibility of exposure to potential trauma (Shipherd et. al., 2007). Results of the National Vietnam Veterans Readjustment Study illustrated a present PTSD rate as 15% and an approximate lifetime rate of PTSD as 30% (Otis et. al., 2003). Suicidal ideation is even more prevalent in patients suffering from chronic pain; suicidal ideation is three times more likely to occur in individuals suffering from chronic pain as opposed to individuals without a chronic pain diagnosis (Tang & Crane, 2006). A similar trend is illustrated in suicide attempts, which are twice as likely to occur in chronic pain patients as opposed to non-chronic pain patients (Tang & Crane, 2006).

## Co-morbidity

There are many conditions where one can see a co-occurrence of PTSD and chronic pain, such as depression, anxiety, substance abuse, and other anxiety disorders (Shipherd et. al., 2007). Lew et al (2009) found that a depressive effect is frequent in both chronic pain and PTSD. In general, the rate of PTSD increases with each patient referral for the examination of a chronic pain problem, usually resulting from a traumatic event (Otis et. al., 2003). Benedikt and Kolb (as cited in Otis, 2003) found that 10% of 225 veterans who were referred to a pain clinic also received PTSD diagnoses. Furthermore, White and Faustman (as cited in Otis, 2003) illustrated that in a sample of 543 veterans, one quarter exhibited general or musculoskeletal pain. Beckham et al (1997)

sought to examine Vietnam veterans with PTSD and chronic pain. Results from this study found that 80% of combat veterans with PTSD reported having chronic pain (Otis et. al., 2003). Since there is a high co-morbidity of PTSD and chronic pain, studies have suggested that the occurrence of both disorders may influence how individuals perceive both conditions (Otis et. al., 2003).

Results indicate that compared to pain patients who do not suffer from trauma or PTSD, those afflicted by chronic pain related to trauma or PTSD tend to report greater difficulty coping with life, higher pain levels, and more psychological discomfort (Otis et. al., 2003). Combat returnees frequently report symptoms of both chronic pain and PTSD or acute combat stress disorder (Lew et. al., 2009). Similar to PTSD, acute combat stress disorder occurs after being exposed to military conditions for a short period of time (Lew et. al., 2009). However, after 30 days, the symptoms of acute combat stress disorder usually fade away (Lew et. al., 2009). Any symptoms present after 30 days may qualify for a potential diagnosis of PTSD (Lew et. al., 2009). These findings have clinical implications for diagnosis and treatment, as the symptom overlap may cause havoc for the practitioner who is trying to deduce an accurate diagnosis (Lew et. al., 2009). Therefore, the eventual outcome and potential treatments for individuals who present with signs indicative of both PTSD and chronic pain may be impacted unfavourably (Otis et. al., 2003).

## Theories and Treatments

### Cognitive Behavioural Fear-Avoidance Model

There is a great deal of literature on PTSD and chronic pain. In order to explain the fear-avoidance behaviours that are frequently seen in the preservation of chronic pain, a cognitive behavioural-based model was proposed by Linton and Vlaeyen (Vlaeyen & Linton, 2000). This theory proposes that individuals perceive their chronic pain as exaggerated and uncontrollable, and that this process is referred to as “catastrophizing” (Otis et. al., 2003). Pain research has consistently found that “catastrophizing”negatively influences outcomes in pain patients by contributing to a worsening of symptoms (Otis et. al., 2003). The rationale here is that perceiving pain to be life threatening and uncontrollable will lead to other symptoms, including heightened sensitivity to bodily sensations, numbing, and behaviours that are elicited specifically to avoid pain (Otis et. al., 2003). Moreover, the avoidance behaviours lead to an overall depressive effect and functional deficits (Otis et. al., 2003). Therefore, it becomes a negative feedback loop, whereby the avoidance behaviours initiated in order to stray from the pain lead to depressive symptoms, which eventually lead to increased pain and fear (Otis et. al., 2003). Intuitively, individuals who avoid the process of catastrophizing and focus on managing their pain are more likely to sustainably recover, as they are more likely to partake in everyday activities (Otis et. al., 2003).

### Fear-Avoidance Model

Shortly after the development of the cognitive behavioural-based fear-avoidance model, Asmundson and Norton acknowledged its credibility, but also the need for the inclusion of arousal and physiological symptoms (Norton & Asmundson, 2003). Individuals may experience higher pain levels as a result of misinterpreting physiological symptoms. These misinterpretations then lead them to conclude that their negative ideas and beliefs about pain must be true (Otis et. al., 2003). As a result of this confirmation, they will continue to engage in avoidance behaviours more frequently in order to protect themselves from perceived physical, emotional, or mental harm (Otis et. al., 2003). Since individuals may have a tendency to respond to physical sensations with fear, it is possible for them to misinterpret physical tension in the body as some form of serious chronic pain (Otis et. al., 2003). Therefore, all of these skewed perceptions and misinterpretations contribute to an increased sense of overall fear and anxiety to everyday situations, as well as those physical sensations within our own body (Otis et. al., 2003).

## Classical Conditiong: Two-factor Learning Theory

A two factor learning model developed by Mowrer illustrates how classical conditioning has contributed to fear as a learned behaviour (Mowrer, 1960). He suggests that the first stage uses classical conditioning in order to maintain fear-based learning, even in the face of buffers that would normally diminish the learning or stop it from occurring altogether (Otis et. al., 2003). The second part of his model focuses on avoidance behaviours and how they are used to stray from the fear, which leads to isolation from the conditioned cues, and therefore interferes with eliminating the learned fear from the mind (Otis et. al., 2003). Keane, Zimmering, and Caddell have suggested that an unconditioned stimulus could be represented by a traumatic event. This traumatic event has the capacity to establish contingencies with various environmental stimuli (as cited by Otis et. al., 2003). After these associations have been made, strong emotional and physiological reactions can occur that take the individual back to the traumatic event because the previously neutral cues are now associated with trauma and fear (Otis et. al., 2003). Therefore, individuals start to engage in isolation behaviours in order to avoid these stimuli (Brewin & Holmes, 2003).

## Bio-informational Theory of Emotion

From a cognitive perspective, Lang has devised a model to explain PTSD known as the bio-informational theory of emotion (Lang, 1979). This model focuses on fear networks, which act as internal schema that allow an individual to store information in their memory regarding certain events or times in their life that have elicited fear or anxiety (Brewin & Holmes, 2003). Some of this stored knowledge concerns the individual's personal response to the fear, the symbolism and meaning of the fearful situation, and how they have interpreted or perceived the fear or anxiety (Brewin & Holmes, 2003). It is believed that when the fear network has been damaged and is unable to store correct information that is relevant to our surroundings, anxiety disorders develop as it is easier to interpret or perceive the world in a fearful way (Otis et. al., 2003). Moreover, Foa and Kozak have suggested that in PTSD, the fear network itself is substantially bigger, and that the connections within the network have a lower threshold for activation (Otis et. al., 2003).

## Mutual Maintenance Model

One of the main theoretical models devised to explain the co-occurrence of PTSD and chronic pain is known as the mutual maintenance model that was proposed by Sharp and Harvey (Sharp & Harvey, 2001). This model identifies seven processes for the joint preservation of chronic pain and PTSD, including attentional biases, anxiety sensitivity, pain-related triggers, avoidance behaviours, fatigue, general anxiety, and cognitive demands (Otis et. al., 2003). One of the commonalities in PTSD and chronic pain patients is that there is a tendency to focus on environmental stimuli that are perceived as dangerous or threatening to oneself. (Otis et. al., 2003) This is not surprising as PTSD patients are already hyper vigilant and highly aroused, and individuals suffering from chronic pain are already seeking to avoid anything that may potentially worsen there conditions. (Otis et. al., 2003) These signs and symptoms are characteristic of anxiety sensitivity, which is hypothesized to play a role in the individual's likelihood of catastrophizing. (Otis et. al., 2003) Initial avoidance of pain may serve to block out any memories or triggers that are related to the trauma. However, this avoidance may increase subsequent avoidance behaviours, instigate flashbacks of the trauma, and hence stimulate a response which makes them extremely uncomfortable and highly anxious. (Otis et. al., 2003) Therefore, these avoidance behaviours may be used as a coping mechanism in order to emotionally escape and alleviate any potential distress. (Otis et. al., 2003) Since depression is dually noted in both PTSD and chronic pain, symptoms associated with depression, including sleep disturbances and lethargy, may be present in these disorders. (Otis et. al., 2003) In addition to depression related symptoms, anxiety may also be present in both PTSD and chronic pain, which may worsen symptom severity. (Otis et. al., 2003) One last factor that Sharp & Harvey (2001) discuss are the effects of cognitive demands on coping mechanisms. They suggest that the reason the coping skills of

PTSD and chronic pain sufferers are limited is because the cognitive effort that could be put toward developing positive ways to deal with the pain are instead focussed on negative symptoms that are elicited from the pain. (Otis el. al., 2003)

## Shared Vulnerability Model

The shared vulnerability model is another theoretical model that was developed by Asmundson et al, shortly after they had critically assessed and analyzed the mutual maintenance model (Asmundson, Coons, Taylor & Katz, 2002). They suggested that a heightened sensitivity to anxiety acts as a catalyst to the progression of both disorders (Otis et. al., 2003). A person who has a higher level of anxiety sensitivity is more likely to catastrophize and become more fearful of any physical or physiological symptoms, like breathlessness or a racing heart (Otis et. al., 2003). The reasoning is that in the presence of pain or a traumatic stressor, individuals that are more likely to perceive physical symptoms as fearful and catastrophic are allowing this anxiety to contribute to the progression of both PTSD and chronic pain (Otis et. al., 2003).The anxiety eventually gets perpetuated by avoidance, as the avoidance behaviour is the negative reinforcement. Individuals are more likely to develop PTSD if a combination of catastrophic physiological responses and anxiety-provoking stressors cause an emotional response that is unbearable and intensified with each occurrence (Otis et. al., 2003). In chronic pain, a cycle begins whereby the initial anxiety sensitivity elicits fear that leads to avoidance behaviours in order to cope with the painful feelings, which then in turn increases pain and its odds of persisting over time (Otis et. al., 2003).

## Triple Vulnerability Model

One last theoretical model that has been proposed in order to explain the development of both PTSD and chronic pain is the triple vulnerability model that was developed by Keane and Barlow (as cited in Otis et. al., 2003). This theory states that three different prerequisites are necessary in order for an anxiety disorder to develop. The first vulnerability is a broad psychological vulnerability, which usually stems from control issues as a younger child over significant events (Otis et. al., 2003). Secondly, a more distinct psychological vulnerability is necessary, and usually this develops early on when an individual learns to angle their fear and anxiety toward particular situations (Otis et. al., 2003). Lastly, the presence of a generalized biological vulnerability is fundamental in the development of an anxiety disorder (Otis et. al., 2003). In addition, PTSD is explained separately from anxiety, using reasoning that involves true and false alarms and their relation to the development of anxiety (Otis et. al., 2003). Keane and Barlow (2002) suggest that although true or false alarms arise subjectively when an individual is faced with reminders that symbolize the trauma, this sense of anxiety is not enough to develop PTSD. Instead, they propose that PTSD is more likely to progress when the individual perceives the anxiety as unmanageable, which leaves the individual feeling powerless (Otis et. al., 2003). This logic can also be applied to chronic pain, as most chronic pain patients also interpret their pain as something they cannot control, which leaves them in a state of utter helplessness (Otis et. al., 2003). The negative feedback loop underlying this process is similar to ones that have already been discussed, which is simply that the initial perceived uncontrollable feelings lead to avoidance behaviours, which lead to a more skewed perception of the anxiety (Otis et. al., 2003).

## Dissociation

Dissociation has also been used to better understand the underlying processes of PTSD. According to the American Psychiatric Association, dissociation is defined as a “disruption of the usually integrated functions of consciousness, memory, identity or perception of the environment” (Holmes et. al., 2005; American Psychiatric Association, 2000). Holmes et al (2005) suggested that the processes of detachment and compartmentalization occur together in certain conditions; one of these conditions being PTSD. Detachment is commonly referred

to as an out-of-body experience, incorporating symptoms of depersonalization and derealization, which often occur together as opposed to in isolation (Holmes et. al., 2005). Depersonalization is marked by a sense of separation from oneself, whereas derealization is marked by a sense of detachment from the outside world (Holmes et. al., 2005). On the other hand, compartmentalization phenomena can all be defined as a "deficit in the ability to deliberately control processes or actions that would normally be amendable to such control" (Holmes et. al., 2005). One of the fundamental differences between detachment and compartmentalization is that unlike detachment, compartmentalization is able to safeguard disordered functions by continually influencing the individual's emotions and thought processes (Holmes et. al., 2005). In PTSD, episodes of detachment, depersonalization, or derealization, are viewed as a means of numbing out emotionally, and this symptom is frequently reported in patients with the disorder (Holmes et. al., 2005). In addition, studies have found that peri-traumatic dissociation plays an important role in the development of successive PTSD related symptoms (Holmes et. al., 2005). It has been suggested that peri-traumatic detachment accounts for the memory deficits that are exhibited in people suffering from PTSD, as it is responsible for the insufficient encoding of information at the time of the trauma (Holmes et. al., 2005). Moreover, compartmentalization is also indicative of a retrieval deficit, in that certain memories may be stored away and unable to be brought to conscious awareness because of the pain and fear instilled from the trauma (Holmes et. al., 2005). Therefore, in the case of PTSD, differentiating between detachment and compartmentalization is often very complex.

## Opioid Therapy

Opioid therapy has been considered a common form of treatment for the management of chronic pain. Clinicians at the CPMU may suggest this treatment option to patients, as it is an effective way to manage chronic pain. The use of opioids in the pain medicine field came to be a form of treatment as studies have shown that opioids can improve mood and diminish pain symptoms (Ballantyne & Mao, 2003). Clinical studies have found that it is possible for chronic pain patients to achieve analgesia, provided that their pain is not related to a known terminal disease (Ballantyne & Mao, 2003). In addition, research has pointed to a continual maintenance in cognitive functioning over time (Ballantyne & Mao, 2003). Howeover, prolonged high-dose opioid therapy does not prove to be effective in the long-term treatment of chronic pain (Ballantyne & Mao, 2003). Once maximal analgesia is reached with the least amount of side effects, the opioid dose should not be increased (Ballantyne & Mao, 2003). Also, studies have shown that long-term opioid usage is associated with an abnormal sensitivity to pain, in both addicts and pain patients (Ballantyne & Mao, 2003). Over time, two processes develop with continual opioid administration; a sensitization and desensitization process (Ballantyne & Mao, 2003). Paradoxically, one's sensitivity to pain increases as tolerance increases (Ballantyne & Mao, 2003).

Although the minority view is that prescribing opioids is an ineffective treatment for chronic pain, most physicians support it and stress a standardized approach when implementing this type of therapy (Ballantyne & Mao, 2003). A standardized approach for the administration of opioids consists of a detailed medical history and a full physical examination, which is intended to provide essential information regarding whether or not non-opioid therapy has worked for the patient in the past (Ballantyne & Mao, 2003). If it has not, then the individual is a potential candidate. Generally, practitioners prefer to rule this out before resorting to pharmacological therapy (Ballantyne & Mao, 2003). Once opioid therapy is considered to be the best form of treatment, the physician is required to discuss all of the short-term and long-term risks and benefits, as well as an agreed upon treatment program that both the patient and physician are comfortable with (Ballantyne & Mao, 2003). A follow-up should be conducted in order to assess if the intended goals are being achieved, whether or not there is potential substance abuse, and to discuss a potential termination of opioid treatment if necessary (Ballantyne & Mao, 2003).

### Cognitive-Behavioural Therapy

The CPMU program is one that rests on a CBT foundation (Williams et. al., 2007). This form of therapy has been successful in treating individuals who suffer from chronic pain problems (Turner, Holtzman, & Mancl, 2007). CBT is effective in altering patient's perceptions of pain, as it targets negative ideas and beliefs and transforms them into more positive cognitions and behaviours (Turner et. al., 2007). This treatment was developed to increase positive coping strategies and self-management behaviours, decrease catastrophizing behaviours, and promote esteem building and self-affirmations (Turner et. al., 2007). Studies have shown that patients treated with CBT demonstrate greater improvement if they have less catastrophizing behaviours, less depressive symptoms, and belief in self-control over their chronic pain (Turner et. al., 2007). Additional research indicates that CBT reduces anxiety sensitivity, which also reduces PTSD symptoms (as cited by Otis et. al., 2003). Therefore, CBT may serve as an effective treatment option for chronic pain and PTSD. In addition, it has been suggested to include specific CBT techniques including cognitive restructuring, relaxation, and coping skills training when treating a patient with chronic pain and PTSD (Otis et. al., 2003). Furthermore, multidisciplinary treatment programs that employ CBT have been encouraged to educate patients on the consequences of cognitive and behavioural avoidance, as well as how to perform situational and interoceptive exposure exercises (Otis et. al., 2003).

## Method

Participants in this study were patients who completed the program at the CPMU. There were two independent variables, group (veteran and non-veteran) and session (admission and discharge). The dependent variables were MMPI-2 scales and program evaluation measures. The study consisted of 30 subjects (24 males and 6 females). The mean age for all subjects was 43 years (SD= 9.26 years; minimum-maximum= 22-63 years). There were 15 paired groups, and each group consisted of one veteran who had been matched with one non-veteran based on age, gender, time of admission, and pain duration. A database containing all of the CPMU patients' information was accessed in order to extract information from the patients' files. Each file provided patient demographics, program evaluation results, and MMPI-2 scores. Demographics of the subjects are displayed in Appendix A.

### Measures

Consisting of 567 items, the MMPI-2 was developed to assess personality trends and aid in the diagnosis of mental illness (Butcher et. al., 2001). Administration of the MMPI-2 requires individuals to have a sixth grade reading comprehension level, as well as a willingness to complete the entire inventory (Butcher et. al., 2001). It is imperative that the MMPI-2 administrator identifies any signs indicative of learning disorders, visual or reading problems, neurological impairments, physical disorders, or substance abuse issues that may interfere with the final scores (Butcher et. al., 2001). Since the validity and clinical scales are scored using the first 370 items, individuals are encouraged to complete the entire inventory so that the content scales, validity indicators, and supplementary scales can also be included (Butcher et. al., 2001). For the purposes of this study, only the following 20 scales will be considered; Variable Response Inconsistency Scale, True Response Inconsistency Scale, Infrequency Scale, Back F Scale, Infrequency-Psychopathology Scale, Fake Bad Scale, Lie Scale, Correction Scale, Superlative Self-Presentation Scale, Hypochondriasis Scale, Depression Scale, Hysteria Scale, Psychopathic Deviate Scale, Masculinity-Femininity Scale, Paranoia Scale, Psychasthenia Scale, Schizophrenia Scale, and Hypomania Scale. For additional scale descriptions, please see Appendix B.

Patients enrolled in the CPMU program fill out a variety of questionnaires that are designed to provide a clear picture of where the patient is at with their pain difficulties. These psychological tests are meant to increase the clinicians' understanding of the patient's condition, and therefore aid in the development of appropriate treatment options. The Pain Intensity scale (PIS) is based on an 11 point numerical scale that was designed to

assess pain intensity (Williams, Hapidou, Lin, & Abbasi, 2007). Patients that take part in treatment programs are expected to score lower at discharge than at admission. Another measure used in this study is the Center for Epidemiologic Studies-Depression Scale (CES-D), which was developed to assess depressive symptoms (Williams et. al., 2007). Many of the items on this scale relate to negative beliefs about oneself, sleep problems, and appetite loss (Williams et. al., 2007). The CES-D focuses on how individuals have felt in the past week. Moreover, lower discharge scores are encouraged by treatment programs (Williams et. al., 2007). The Pain Catastrophizing Scale (PCS) is another measure used at the CPMU, and was developed to assess pain related catastrophic thinking. This scale follows the same trends as the PIS and CES-D, as health professionals encourage lower scores at discharge.

Intuitively, the Clinical Anxiety Scale (CAS) was designed to assess the patient's current level of anxiety. CAS discharge scores that are lower than admission scores are indicative of patient improvement. Moreover, Patient Questionnaires (PQ) are designed to help clinicians gain a better understanding of the individual's medical conditions. Upon completing a treatment program, it is expected that patients will report improvement in their initial health problems.

One of the most common scales used in pain treatment programs is the Pain Disability Index (PDI), which measures the effect of pain on daily activities. The items are designed to detect pain interference in daily activities, occupation, sexual behaviour, and family life (Williams et. al., 2007). PDI scores are also encouraged to be lower at discharge than at admission. The Patient Program Satisfaction Questionnaire (PPSQ) is only completed by patients when they complete the program. This questionnaire assesses the patient's satisfaction with the treatment program they had participated in. It is expected that patients will feel like they benefited from the program they took part in. Another measure that is only competed upon discharge is the Self Evaluation Scale (SES), which measures individual's ratings of themselves. In addition, the Tampa Scale of Kinesiphobia (TSK) measures the patient's fear of movement and (re)injury, while the Subjective Happiness Scale (SHS) assess the patient's current level of happiness. The TSK discharge scores are encouraged to be lower than admission scores, while the SHS discharge scores are expected to be higher at admission than at discharge.

The Chronic Pain Coping Inventory (CPCI) consists of two types of coping strategies, those that are illness-focused and those that are wellness-focused (Hadjistavropoulos et. al., 1999). This inventory is designed to assess which coping strategies patients had been using in the week prior to testing (Nielson et. al., 2001). The illness-focused strategies are guarding, resting , and asking for assistance, and the wellness-focused strategies are exercise/stretching, relaxation, task persistence, pacing, coping, and seeking social support (Nielson et. al., 2001) Generally, wellness-focused strategies are encouraged and illness-focused strategies are discouraged by treatment programs (Hadjistavropoulos et. al., 1999). Therefore, upon completion of a treatment program, patient discharge scores for wellness-focused strategies are encouraged to increase, while patient discharge scores for illness-focused strategies are encouraged to decrease.

The Pain Stages of Change Questionnaire (PSOCQ) is another measure used in this study. The PSOCQ was developed to assess the level of willingness to adopt a new behaviour when approaching chronic pain (Williams, Hapidou, Lin, & Abbasi, 2007). The questionnaire is made up of four different stages known as pre-contemplation, contemplation, action, and maintenance (Williams et. al., 2007) The pre-contemplation stage is one where the patient assigns all responsibility to the clinician, as they perceive there chronic pain to be medical; one that they are unable to deal with on their own (Williams et. al., 2007). The contemplation stage occurs when the patient still believes that their chronic pain is medical, but they have a new willingness to consider adopting new behaviours specifically targeted toward their chronic pain (Williams et. al., 2007). The third part of the PSOCQ is the action stage, where patients begin to amend their behaviours in a positive way to help them manage their pain (Williams et. al., 2007). Lastly, the maintenance stage is where patients commit to doing the work necessary to maintain their new behaviours post treatment (Williams et. al., 2007). Health profes-

sionals encourage higher discharge scores for contemplation, action, and maintenance, and encourage lower discharge scores for pre-contemplation.

The Chronic Pain Acceptance Questionnaire (CPAQ) was developed to assess the degree of acceptance in individuals who suffer from chronic pain (McCracken, Vowles, & Eccleston, 2004). The questionnaire consists of items relating to the patient's opinions of their pain, as well as their participation in daily activities (McCracken et. al., 2004). The CPAQ is divided into two measures, activities engagement and pain willingness. Activities engagement is defined as the extent to which patients take part in normal activities, regardless of pain (McCracken et. al., 2004). Pain willingness is when patients exhibit a readiness to receive pain without attempting to manage it (McCracken et. al., 2004) Activities engagement and pain willingness are also combined in order to assess the degree of chronic pain acceptance. Moreover, the patient's acceptance of chronic pain should increase with increasing scores. Therefore, scores for both measures are encouraged to be higher at discharge than at admission. Additional descriptions of program evaluations are displayed in Appendix C.

## Statistical Analysis

A two-way ANOVA with repeated measures on one factor was conducted on each of the session variables for veterans and non-veterans. For MMPI-2 scores and discharge only variables, paired t-tests were used to determine if there were any significant differences in scores between veterans and non-veterans. SPSS 17, a statistical software package for social sciences, was used to analyze the data. Graphs, figures, and tables were computed using Microsoft Excel 2007.

## Results

Veterans' mean CES-D scores at admission and discharge were 31.66 (SD=12.33) and 20.28 (SD=12.46) respectively, while non-veterans' mean scores at admission and discharge were 29.42 (SD=10.19) and 23.73 (SD=9.50) respectively. A main effect of session was found for the CES-D ($F(1, 26) = 13.973$, $p<0.05$). Also, a significant group by session interaction was found for the PCS ($F(1, 27) =4.277$, $p<0.05$), as well as a main effect of session ($F(1, 27) = 50.994$, $p<0.05$). At admission and discharge, veterans' mean scores were 25.66 (SD=14.15) and 19.21 (SD=12.32) respectively. PCS mean scores for non-veterans' were 32.93 (SD=9.78) at admission and 18.80 (SD=8.96) at discharge. Average CAS admission scores were 31.57 (SD=19.92) for veterans and 40.53 (SD=19.24) for non-veterans, while mean discharge scores were 23.46 (SD=19.67) for veterans and 24.28 (SD=10.22) for non-veterans.

Analysis of the CAS found a significant main effect of session ($F(1, 24) = 16.725$, $p<0.05$). Moreover, mean PDI admission scores for veterans and non-veterans were 42.50 (SD=10.30) and 50.33 (SD=5.88) respectively. Veterans (SD=13.06) and non-veterans (SD=13.64) shared the same mean score of 39.93 on the PDI at discharge. Moreover, a main effect of session was found for the PDI ($F(1, 26) =9.050$, $p<0.05$). Also, TSK analysis found a main effect of session ($F(1, 7) = 5.898$, $p<0.05$).Veterans' mean TSK scores at admission and discharge were 24.50 (SD=8.78) and 24.20 (SD=12.02), while non-veterans' average scores at admission and discharge were 27.40 (SD=3.71) and 23.00 (SD=6.58).

Mean CPAQ_AE scores indicated that veterans scored 25.98 (SD=10.46) at admission and 34.14 (SD=15.04) at discharge, and non-veterans scored 23.53 (SD=9.07) at admission and 33.60 (SD=11.54) at discharge. Also, a main effect of session found for the CPAQ-AE ($F(1, 27) =14.900$, $p<0.05$). Interestingly, there was a marginally significant main effect of session found for the CPAQ-PW ($F(1, 27) = 4.227$, $p=0.05$). Upon admission, veterans' mean score was 19.40 (SD=7.53) and non-veterans' mean score was 14.86 (SD=4.74). At discharge, the average score for veterans was 19.50 (SD=5.99) and the mean score for non-veterans was 21.13 (SD=6.25). CPAQ-T

average scores for veterans and non-veterans upon admission were 45.33 (SD=13.82) and 38.40 (SD=10.78) respectively, while mean scores at discharge were 53.64 (SD=17.56) and 54.06 (SD=14.53) respectively. Moreover, a main effect of session was found for the CPAQ-T ($F(1, 27) = 14.591$, $p<0.05$).

Significant main effects of session were found for the PSOCQ-PCON ($F(1, 26) = 11.930$, $p<0.05$), the PSOCQ-ACT ($F(1, 26) =26.158$, $p<0.05$), and the PSOCQ-M ($F(1, 26) = 42.747$, $p<0.05$). Average PSOCQ-PCON scores for veterans were 2.56 (SD=0.57) at admission and 2.17 (SD=0.71) at discharge. For non-veterans, mean scores were 2.67 (SD=0.60) at admission and 2.10 (SD=0.65) at discharge. Mean PSOCQ-ACT scores at admission were 3.44 (SD=0.55) for veterans and 3.22 (SD=0.92) for non-veterans. Veterans' (SD=0.50) and non-veterans' (SD=0.54) shared the same mean score of 4.12 at discharge. For the PSOCQ_M, veterans scored 2.91(SD=0.73) and non-veterans scored 2.90 (SD=0.78) at admission, while veterans scored 4.07 (SD=0.51) and non-veterans scored 3.94 (SD=0.67) at discharge.

Guarding admission scores for veterans and non-veterans were 28.20 (SD=25.94) and 28.67 (SD=25.32) respectively, while discharge scores were 26.51 (SD=25.12) and 27.77 (SD=23.97) respectively. In addition, a main effect of session was found for CPCI_GAR ($F(1, 26) = 4.854$, $p<0.05$). Moreover, there was a significant group by session interaction found for CPCI_TP ($F(1, 26) =5.059$, $p<0.05$). Veterans' and non-veterans' admission scores were 22.50 (SD=20.79) and 19.97 (SD=18.48), while discharge scores were 21.08 (SD=18.76) and 22.14 (SD=20.25). Significant main effects of session were found for CPCI-ES ($F(1, 26) = 26.022$, $p<0.05$), CPCI-REL ($F(1, 26) = 23.281$, $p<0.05$), CPCI-COP ($F(1, 26) =11.866$, $p<0.05$), and CPCI-PACING ($F(1, 12) =8.765$, $p<0.05$). Average exercise/stretch scores at admission were 21.53 (SD=21.50) for veterans and 26.38 (SD=24.77) for non-veterans, while mean discharge scores were 30.34 (SD=27.32) and 32.12 (SD=29.23) respectively. CPCI-REL admission mean scores were 21.98 (SD=21.61) for veterans and 25.76 (SD=24.28) for non-veterans, while average discharge scores were 31.98 (SD=29.94) and 34.90 (SD=31.34) respectively. Mean coping scores at admission were 23.91 (SD=22.45) for veterans and 24.04 (SD=22.08) for non-veterans, while mean discharge scores were 26.27 (SD=23.79) for veterans and 28.98 (SD=26.58) for non-veterans. Also, veterans' mean pacing scores at admission and discharge were 51.42 (SD=4.99) and 56.00 (SD=4.65), while non-veterans' average discharge scores were 52.37 (SD=5.42) and 58.37 (SD=4.13) respectively.

Furthermore, veterans' mean seeking social support scores were 27.38 (SD=26.57) at admission and 24.52 (SD=24.24) at discharge, while non-veterans' mean scores were 25.65 (SD=23.89) at admission and 29.64 (SD=26.21) at discharge. Lastly, a significant group by session interaction was found for CPCI-SSS ($F(1, 25) =4.935$, $p<0.05$). Additional results for all variables are displayed in Appendix D. Figures illustrating these results are displayed in Appendix F.

There was a significant difference between veterans (mean = 51.76, SD=6.41) and non-veterans (mean = 58.30, SD=6.03) on the MMPI-L scale ($t(12) = -2.452$, $p < 0.05$). Also, there was a marginally significant difference between veterans (mean = 61.15, SD=12.01) and non-veterans (mean = 51.84, SD=8.42) on the MMPI-Ma scale ($t(12) = 2.108$, $p= 0.057$). In addition to the PPSQ and SE, none of the other MMPI-2 scales showed significant differences between veterans and non-veterans. Additional results for all variables are displayed in Appendix E. Figures illustrating these results are displayed in Appendix G. Please refer to Appendix H for all MMPI-2 scores for veterans and non-veterans.

## Discussion

Results of this study indicated that the CES_D scores for all subjects were different at admission and discharge. Specifically, patients had lower scores on the CES_D at discharge than at admission. As expected, these findings indicate that they reported less depressive symptoms upon completing the program and more depressive symptoms upon admission. Therefore, it is likely that patients may be in more positive emotional states due to

the impact of the CPMU program. Analysis of the PCS revealed that non-veterans scored higher than veterans upon admission, and non-veterans scored lower than veterans at discharge. Therefore, although there was an overall decrease in PCS scores from admission to discharge, the change in scores was larger for non-veterans than the change for veterans. It is possible that veterans with combat exposure may experience heightened anxiety, which would play a role in catastrophizing thoughts (Otis et. al., 2003). This vulnerability to catastrophize may be the reason why the veterans PCS scores did not drop as much as the non-veterans scores did. Moreover, CAS scores were higher at admission and lower at discharge for all subjects, indicating that they reported more anxiety at the beginning of the program and less upon completing the program. Intuitively, the substantial drop in anxiety upon discharge can be attributed to the CPMU program and its multidisciplinary team. The CAS findings support the prediction that patients will report less anxiety at discharge than at admission, as illustrated by their CAS scores. All subjects scored lower on the PDI upon leaving the program than at admission, demonstrating that their overall disability and effects of pain on daily activities decreased over the course of the 4-week CPMU program. Studies have found that chronic pain patients who are enrolled in cognitive behavioural therapy based treatment programs report less distress, and disability, and pain intensity (Jensen, Turner, Romano, & Strom, 1995). This further supports the effectiveness of the CBT based program at the CPMU and follows the expected trends. The TSK scores at admission and discharge also share the common theme of what would be expected upon finishing the program. Patient's TSK scores were significantly lower at discharge than at admission. However, it is important to note that there were many missing patient scores for this particular questionnaire, so the small sample size may not allow us to yield accurate results or generalize the results to the population.

As predicted, the CPAQ scores for all subjects were higher at discharge than at admission, with patients scoring higher on activities engagement and pain willingness. However, it is important to note that the pain willingness results were only marginally significant. Upon discharge, patients were more willing to participate in daily activities regardless of pain, and more willing to accept that control and avoidance are maladaptive ways of coping with their current pain problems (McCracken, Vowles, & Eccleston, 2004). Therefore, the increase in scores on both factors demonstrates that after finishing the CPMU program, patients were more accepting of their pain problems.

Results of the PSOCQ followed the general trends that would be expected upon discharge from a pain program. The pre-contemplation scores decreased in all subjects throughout the program, with patients scoring higher upon admission and lower as discharge. Therefore, upon discharge, patients did not believe that their pain problems were up to the attending physicians to fix. Perhaps, as a result of the program and its foundation in cognitive behavioural therapy, they were able to change their old ideas and beliefs and become more willing to accept their circumstances and help themselves. In addition, both action and maintenance scores were higher at discharge, following the same pattern that would be expected after participation in a treatment program. Therefore, maintenance scores indicate that patients were more likely to accept a self-management approach, as well as establish a firm self-management plan with an intention to continue it upon leaving the program.

Guarding, which is one of the illness –focused subscales of the CPCI, was the only illness focused strategy to yield significant results, with all subjects reporting lower scores at discharge. This subscale is one in which developers tend to discourage, as guarding behaviour is associated with poorer adjustment to pain (Hadjistavropoulos, MacLeod, & Asmundson, 1999). Therefore, the decrease in guarding scores upon discharge indicates that patients have taken advantage of what the CPMU program has to offer.

Moreover, for all subjects, scores regarding exercise/stretch, relaxation, coping, and pacing strategies increased at discharge. These wellness-focused strategies are encouraged by multidisciplinary treatment programs, and these results provide support for the effects of the CPMU program. However, it is important to note that the

sample size for the pacing subscale was much smaller due to missing values. Moreover, literature suggests that Task Persistence has shown to be effective in diminishing depressive symptoms and distress, as it is related to better adjustment to pain (Hadjistavropoulos et. al., 1999).

Interestingly, scores for the CPCI_TP demonstrated that veterans scored higher upon entering the program than at discharge, and non-veterans scored higher at discharge than at admission. Although the decrease in scores for veterans was small, this trend may be due to the fact that veterans have other psychological issues that may interfere with their ability to engage in everyday tasks in the midst of their pain (Nielson, Jensen, & Hill, 2001). It is quite possible that certain activities activate painful memories related to a traumatic event from their past, especially in patients with PTSD. Lastly, CPCI_SSS scores illustrated a difference between veterans and non-veterans depending on when they wrote the CPCI.

Veterans scored higher at admission and lower at discharge, and non-veterans scored lower at admission and higher at discharge. Seeking out a friend or loved one for support while in pain (Molton et. al., 2009) may be less likely to occur in veterans due to trauma from the past that has instilled fear and distrust of others. As previously mentioned, the avoidance behaviours seen in PTSD sufferers may result in severing family ties and relationships with close friends (Otis et al, 2003).

The differences in scores between veterans and non-veterans on the MMPI-L scale indicated that non-veterans scored higher than veterans. Although this is statistically significant, it is not meaningfully significant as veteran and non-veteran scores were still in the normal range. In addition, the significant difference in scoring between non-veterans and veterans on the MMPI-Ma scale was only marginal, with veterans scoring higher than non-veterans. Again, veteran and non-veteran scores, although different, were still in the normal range. Therefore, they cannot be interpreted as meaningfully significant.

There were a few major limitations to this study. First, due to the limited number of veterans enrolled in the CPMU program, the sample size was extremely small. Therefore, the results from this study may not accurately generalize to the greater population. Also, vast majority of CPMU patients that were used this study came from regions in Southern Ontario. Since the sample was local, the findings may not extrapolate to populations outside of these regions. Lastly, since there were very few female subjects, it did not make sense to test for gender in the data analysis. Therefore, the results did not test for any differences between men and women on the various questionnaires at different times throughout the program. In the future, a gender balanced sample may yield significant results that can be applied to both males and females in the general population. This study provides additional evidence to support the effectiveness of the CPMU program, as the favourable trends illustrated in the results can only be attributed to their 4 week treatment. Results of this study may have clinical applications for pain programs worldwide, as clinicians may have a better understanding of pain adjustment. In addition, clinicians may use these results in order to amend their treatment program or incorporate new testing at admission and discharge.

## Conclusions

The findings of this study support the effectiveness of the multidisciplinary chronic pain program at the CPMU. Although overall scoring did not indicate that veterans experience more anxiety and fear-related symptoms than non-veterans, scores on the PCS and CPCI did provide some evidence for this hypothesis. Moreover, the results allowed for better comprehension of veteran and non-veteran profiles, as well as their differences in testing scores. Future studies that incorporate gender may generate more findings that will lead to an increased understanding of chronic pain in male and female veterans and non-veterans.

## References

American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders (4th ed., text revision). Washington, DC: Author.

Asmundson, G.J. G., Coons, M. J., Taylor, S., & Katz, J. (2002). PTSD and the experience of pain: Research and clinical implications of shared vulnerability and mutual maintenance models. Can J Psychiatry , 47, 930-37.

Ballantyne, J.C., Mao, J. (2003). Opioid therapy for chronic pain. New England Journal of Medicine, 349, 1943-53.

Beck, J.G., & Clapp, J.D. (2011). A different kind of comorbidity: Understanding posttraumatic stress disorder and chronic pain. Psychological trauma: Theory, Research, Practice, and Policy,3(2), 101-108.

Butcher, J. M., Graham, J.R., Ben-Porath, Y.S., Tellegen, A., Dahlstrom W. G., & Kaemmer, B. (2001). MMPI-2 (Minnesota Multiphasic Personality Inventory-2)Manual for Administration, Scoring, and Interpretation (Revised Edition). Minnesota: NCS Pearson Inc.

Brewin, C.R., Holmes, E.A. (2003). Psychological theories of posttraumatic stress disorder. Clinical Psychology Review, 23, 339-376.

Geuze, E., Westenberg, H. G. M., Jochims, A., De Kloet, C. S., Bohus, M., Vermetten, E., et al. (2007). Altered pain processing in veterans with posttraumatic stress disorder. Arch Gen Psychiatry, 64, 76-85.

Hadjistavropoulos, H.D., MacLeod, F.K., & Asmundson, G.J.G. (1999). Validation of the chronic pain coping inventory. Pain, 80, 471-481. (CPCI2)

Holmes, E.A., Brown, R.J., Mansell, W., Fearon, R. P., Hunter, E.C.M., Frasquilho, F., et al. (2005). Are there two qualitatively distinct forms of dissociation? A review and some clinical implications. Clinical Psychology Review, 25, 1-23.

Jensen, M.P., Turner, J.A., Romano, J.M., & Strom, S.E. (1995). The chronic pain coping inventory: development and preliminary validation. Pain, 60, 203-216. (CPCI1)

Kerns, R.D., Rosenberg, R., Jamison, R.N., Caudill, M.A., & Haythornthwaite, J. (1997) Readiness to adopt a self-management approach to chronic pain: the pain stages of change questionnaire (PSOCQ). Pain, 72, 227-234. (PSOCQ Paper)

Lang, P. J. (1979). A bioinformational theory of emotional imagery. Psychophysiology, 52, 1048-60.

Lew, H. L., Otis, J. D., Tun, C., Kerns, R. D., Clark, M. E., & Cifu, D. X. (2009). Prevalence of chronic pain, posttraumatic stress disorder, and persistent postconcussive symptoms in OIF/OEF veterans: Polytrauma clinical triad. Journal of Rehabilitation Research and Development, 46, 697-702.

McCracken, L.M., Vowles, K.E., & Eccleston, C. (2004). Acceptance of chronic pain: component analysis and a revised assessment method. Pain, 107, 159-166. (CPAQ Paper)

Merskey, H., Bogduk, N., & editors. (1994). Classification of chronic pain; IASP task force on taxonomy. IASP Press, 209-14.

Molton, I.R., Stoelb, B.L., Jensen, M.P., Ehde, D.M., Raichle, K.A., & Cardenas, D.D. (2009). Psychosocial factors and adjustment to chronic pain in spinal cord injury: Replication and cross-validation. Journal of Rehabilitation Research and Development, 46, 31-42. (SSS Paper)

Mowrer, O. H. (1960). Learning theory and behaviour. New York: Wiley

Nielson, W.R., Jensen, M.P., & Hill, M.L. (2001). An activity pacing scale for the chronic pain coping inventory: development in a sample of patients with fibromyalgia syndrome. Pain, 89, 111-115. (CPCI3)

Norton, P. J., & Asmundson, G. J. G. (2003). Amending the fear-avoidance model of chronic pain: What is the role of physiological arousal? The Behaviour Therapist, 34, 17-30.

Otis, J.D., Keane, T.M., Kerns, R.D. (2003). An examination of the relationship between chronic pain and post-traumatic stress disorder. Journal of Rehabilitation Research and Development, 40, 397-406.

Potash, M. N., West, J. A., Corrigan, S., Keyes, M,.D. (2009). Pain management after hurricane katrina: Outcomes of veterans enrolled in a new orleans VA pain management program. Pain Medicine, 10, 440-446.

Sharp, T. J., Harvey, A. G. (2001). Chronic pain and posttraumatic stress disorder: Mutual maintenance? Clin Psychol Rev, 21, 857-77.

Shipherd, J. C., Keyes, M., Jovanovic, T., Ready, D. J., Baltzell, D., Worley, V., et al. (2007). Veterans seeking treatment for posttraumatic stress disorder: What about comorbid chronic pain? Journal of Rehabilitation Research and Development, 44, 153-166.

Tang, N.K,.Y., Crane, C. (2006). Suicidality in chronic pain: a review of the prevalence, risk factors and psychological links. Psychological Medicine 2006, 36, 575-586.

Turner, J.A., Holtzman, S., &Mancl, L. (2007). Mediators, moderators, and predictors of therapeutic change in cognitive-behavioural therapy for chronic pain. Pain, 127, 276-286.

Vlaeyen, J. W. S., & Linton, S. J. (2000). Fear-avoidance and its consequences in musculoskeletal pain: A state of the art. Pain, 85,317-32.

Williams, R.M., Hapidou, E.G., Lin, C.A., & Abbasi, H. (2007). Examining the pain stages of change questionnaire in chronic pain. Physiotherapy Canada, 59, 132-141.

## Author

**ALISHA JIWANI** received her honours bachelor of arts degree in psychology, neuroscience and behaviour from McMaster University. She conducted her undergraduate research with Dr. Eleni Hapidou, PhD, C. Psych., psychologist, at Chedoke Hospital's Chronic Pain Management Unit in Hamilton, Ontario, which offers exemplary interdisciplinary treatment of individuals in chronic pain. Specifically, they examined the differences between veterans and non-veterans who had completed this program. Moreover, Ms. Jiwani has mental health and stress management experience working with various populations. At present, she is completing her master of psychology in clinical psychology at Adler Graduate School in Toronto, Ontario, concurrently with a certificate in psychometric assessments.

# Appendix A

Table 1

*Patient Demographics*

| | **Veterans (*n*=15)** | **Non-Veterans (*n*=15)** |
|---|---|---|
| **Age (in years)** | 40.6 years | 44.7 years |
| **Gender** | Males (*n*=12)<br>Females (*n*=3) | Males (*n*=12)<br>Females (*n*=3) |
| **1Program** | Day (*n*=2)<br>Residential (*n*=13) | Day (*n*=6)<br>Residential (*n*=9) |
| **Insurance** | WSIB (*n*=0)<br>Other (*n*=15) | WSIB (*n*=11)<br>Other (*n*=4) |
| **Litigation** | Litigation (*n*=1)<br>No Litigation (*n*=14) | Litigation (*n*=4)<br>No Litigation (*n*=11) |
| **Years in Canada** | Born in Canada (*n*=11)<br>Born outside of Canada (*n*=4) | Born in Canada (*n*=13)<br>Born outside of Canada (*n*=1) ***** |
| **Marital Status** | Married or Common-law (*n*=6)<br>Single (*n*=4)<br>Divorced, Separated, or Widowed (*n*=5) | Married or Common-law (*n*=8)<br>Single (*n*=5)<br>Divorced, Separated, or Widowed (*n*=2) |
| **Occupation** | Military Personnel (*n*=3)<br>Retired Military Personnel (*n*=3)<br>Retired-Other (*n*=1)<br>Other (*n*=8) | Military Personnel (*n*=0)<br>Retired Military Personnel (*n*=0)<br>Retired-Other (*n*=0)<br>Other (*n*=15) |
| **Employed** | Employed (*n*=6)<br>Unemployed (*n*=9) | Employed (*n*=2)<br>Unemployed (*n*=13) |
| **Last Employed (in months)** | 58.07 months ***** | 47.86 months |
| **Years of Education (in years)** | 13.10 years | 11.14 years ***** |
| **Pain duration (in months)** | 137.13 months | 108.46 months |
| **Number of Injuries** | 1 injury (*n*= 2)<br>2 injuries (*n*= 4)<br>3+ injuries (*n*= 9) | 1 injury (*n*= 7)<br>2 injuries (*n*= 2)<br>3+ injuries (*n*= 6) |

*1 value missing

# Appendix B

Table 2

*MMPI-2 Scale Descriptions*

| MMPI-Scales | Definition |
|---|---|
| | |
| VRIN (Variable Response Inconsistency) Scale | Detects inconsistent responses (paired questions have similar or opposite content) |
| TRIN (True Response Inconsistency) Scale | Detects inconsistent responses (paired questions that are strictly opposite in content) |
| F (Infrequency) Scale | Identifies attempts of infrequent responding to items at the beginning of the test |
| Fb (Back F) Scale | Identifies attempts of infrequent responding to items that appear throughout the latter part of the test |
| Fp (Infrequency-Psychopathology) Scale | Detects the presence of severe psychopathology |
| FBS (Fake Bad Scale) | Measures negative response bias |
| L (Lie) Scale | Identifies deceit in the test-taking situation and the tendency of the test-taker to fake good |
| K (Correction) Scale | Identifies test-takers tendency to respond with defensiveness to items (restricted to the first part of the test) and corrects for the effect that this will have on the scores |
| S (Superlative Self-Presentation) Scale | Identifies test-takers tendency to responds with defensiveness to items that are spread throughout the test |
| Hs (Hypochondriasis) Scale | Identifies neurotic concern over bodily functioning |
| D (Depression) Scale | Detects depression as reflected by items pertaining to feelings of discouragement, pessimism, and hopelessness. It is further divided into 5 content subscales: Subjective Depression, Psychomotor Retardation, Physical Malfunctioning, Mental Dullness, and Brooding |
| Hy (Hysteria) Scale | Detects hysteria as reflected by items pertaining to denial of one's own problems and denial of social anxiety. It is further divided into 5 content subscales: Denial of Social Anxiety, Need for Affection, Lassitude-Malaise, Somatic Complaints, and Inhibition of Aggression |
| Pd (Psychopathic Deviate) Scale | Detects disobedience as reflected by items pertaining to willingness to acknowledge difficulties in school or with the law, lack of concern about social and moral standards of conduct, the presence of family problems, and the absence of life satisfaction. It is further divided into 5 content subscales: |

| | |
|---|---|
| | Familial Discord, Authority Problems, Social Imperturbability, Social Alienation, and Self-Alienation |
| Mf (Masculinity-Femininity) Scale | Detects homosexual tendencies and confusion regarding gender role |
| Pa (Paranoia) Scale | Detects a paranoid condition or state in the test-taker as reflected by items pertaining to psychotic behaviours, sensitivity, cynicism, asocial behaviour, excessive moral virtue, and complaints about other people. It is further divided into 3 content subscales: Persecutory Ideas, Poignancy, and Naivete |
| Pt (Psychasthenia) Scale | Detects obsessive compulsive disorder as reflected by items pertaining to compulsions, obsessions, unreasonable fears, and excessive doubts |
| Sc (Schizophrenia) Scale | Detects schizophrenic symptoms or various forms of schizophrenic disorder as reflected by items pertaining to bizarre thought processes, peculiar perceptions, poor familial relationships, difficulties in concentration and impulse control, sexual difficulties, and dissatisfactions. It is further divided into 6 content subscales: Social Alienation, Emotional Alienation, Lack of Ego Mastery (Cognitive), Lack of Ego Mastery (Conative), Lack of Ego Mastery (Defective Inhibition), and Bizarre Sensory Experiences |
| Ma (Hypomania) Scale | Detects characteristics indicative of hypomania as reflected by items pertaining to activity level, grandiosity, and elevated mood. It is further divided into 4 content subscales: Amorality, Psychomotor Acceleration, Imperturbability, and Ego Inflation |
| Si (Social Introversion) Scale | Detects ability to withdraw from social contacts as reflected by 2 general types of items, social participation, and general neurotic maladjustment and self-depreciation. It is further divided into three subscales: Shyness/Self-Consciousness, Social Avoidance, and Alienation-Self and Others |
| Pk (Post-traumatic Stress Disorder) Scale | Detects symptoms of PTSD as reflected by items pertaining to anxiety, sleep disturbance, worry, depression, guilt, and intrusive thoughts. It is important to note that this does not provide an accurate diagnosis of PTSD as people experiencing psychological distress may score high on this scale regardless of the diagnosis they receive |

# Appendix C

Table 3

*Program Evaluation Descriptions*

| | |
|---|---|
| PIS (Pain Intensity Scale) | Measures pain intensity level |
| CES-D (Center for Epidemiological Studies Depressed Mood Scale) | Measures depressive symptoms (during the past week) |
| PCS (Pain Catastrophizing Scale) | Measures pain related catastrophic thinking |
| CAS (Clinical Anxiety Scale) | Measures current level of anxiety |
| PQ (Patient Questionnaire) | Questionnaire helps your doctor better understand health problems that you may have |
| PDI (Pain Disability Index) | Measures the effect of pain on daily activities |
| PSOCQ (Pain Stages of Change Questionnaire) | Measures readiness to adopt a self-management approach to chronic pain |
| CPAQ (Chronic Pain Acceptance Questionnaire) | Measures acceptance of chronic pain |
| CPCI (Chronic Pain Coping Inventory) | Measures ability to cope |
| PPSQ (Pain Program Satisfaction Questionnaire) | Measures satisfaction with the pain program (only completed upon discharge from program) |
| SES (Self Evaluation Scale) | Measures the individual's rating of themselves (only completed upon discharge from program) |
| TSK (Tampa Scale of Kinesiophobia) | Measures fear of (re)injury and movement |
| SHS (Subjective Happiness Scale) | Measures current level of happiness |

# Appendix D

Table 4

*Group x Session ANOVA results*

| Measure | N | Admission Mean (SD) | Discharge Mean (SD) | p |
|---|---|---|---|---|
| PIS | Veteran=13<br>Non-veteran=14 | Veteran= 5.78 (1.50)<br>Non-veteran= 6.28 (1.48) | Veteran= 5.15<br>(1.61)<br>Non-veteran= 6.03 (1.68) | Group = 0.187<br>Session = 0.136<br>Group x Session = 0.217 |
| CES_D | Veteran=14<br>Non-veteran=14 | Veteran = 31.66 (12.33)<br>Non-veteran= 29.42 (10.19) | Veteran = 20.28 (12.46)<br>Non-veteran= 23.73 (9.50) | Group= 0.950<br>Session= 0.001<br>Group x Session = 0.220 |
| PCS | Veteran =14<br>Non-veteran=15 | Veteran = 25.66 (14.15)<br>Non-veteran= 32.93 (9.78) | Veteran = 19.21 (12.32)<br>Non-veteran= 18.80 (8.96) | Group = 0.485<br>Session = 0.000<br>Group x Session = 0.048 |
| CAS | Veteran = 13<br>Non-veteran=13 | Veteran = 31.57 (19.92)<br>Non-veteran= 40.53 (19.24) | Veteran = 23.46 (19.67)<br>Non-veteran= 24.28 (10.22) | Group = 0.532<br>Session = 0.000<br>Group x Session = 0.272 |
| PQ | Veteran= 9<br>Non-veteran=12 | Veteran= 10.40 (3.83)<br>Non-veteran= 12.33 (4.39) | Veteran= 8.42<br>(3.87)<br>Non-veteran= 11.33 (3.95) | Group = 0.084<br>Session = 0.052<br>Group x Session = 0.111 |
| PDI | Veteran = 13<br>Non-veteran=15 | Veteran = 42.50 (10.30)<br>Non-veteran= 50.33 (5.88) | Veteran = 39.93 (13.06)<br>Non-veteran= 39.93 (13.64) | Group = 0.181<br>Session = 0.006<br>Group x Session = 0.093 |
| TSK | Veteran = 5<br>Non-veteran=4 | Veteran = 24.50 (8.78)<br>Non-veteran= 27.40 | Veteran = 24.20 (12.02)<br>Non-veteran= 23.00 | Group = 0.997<br>Session = 0.046<br>Group x Session = |

| | | | | |
|---|---|---|---|---|
| | | (3.71) | (6.58) | 0.304 |
| SHS | Veterans= 4<br>Non-veterans=4 | Veteran= 4.45 (1.16)<br>Non-veteran= 2.56 (1.08) | Veteran= 4.87<br>(1.05)<br>Non-veteran= 4.25 (1.36) | Group = 0.120<br>Session = 0.081<br>Group x Session = 0.373 |
| CPAQ_AE | Veteran = 14<br>Non-veteran=15 | Veteran = 25.98 (10.46)<br>Non-veteran= 23.53 (9.07) | Veteran = 34.14 (15.04)<br>Non-veteran= 33.60 (11.54) | Group = 0.741<br>Session = 0.001<br>Group x Session = 0.787 |
| CPAQ_PW | Veteran = 14<br>Non-veteran=15 | Veteran = 19.40 (7.53)<br>Non-veteran= 14.86 (4.74) | Veteran = 19.50 (5.99)<br>Non-veteran= 21.13 (6.25) | Group = 0.431<br>Session = 0.050<br>Group x Session = 0.071 |
| CPAQ_T | Veteran = 14<br>Non-veteran=15 | Veteran = 45.33 (13.82)<br>Non-veteran= 38.40 (10.78) | Veteran = 53.64 (17.56)<br>Non-veteran= 54.06 (14.53) | Group = 0.504<br>Session = 0.001<br>Group x Session = 0.318 |
| PSCOQ_PCON | Veteran = 14<br>Non-veteran=14 | Veteran = 2.56 (0.57)<br>Non-veteran= 2.67 (0.60) | Veteran = 2.17 (0.71)<br>Non-veteran= 2.10 (0.65) | Group = 0.972<br>Session = 0.002<br>Group x Session = 0.656 |
| PSOCQ_CON | Veteran= 14<br>Non-veteran=14 | Veteran= 4.10 (0.42)<br>Non-veteran= 3.89 (0.62) | Veteran= 4.02<br>(0.44)<br>Non-veteran= 3.94 (0.68) | Group = 0.370<br>Session = 0.584<br>Group x Session = 0.648 |
| PSOCQ_ACT | Veteran = 14<br>Non-veteran=14 | Veteran = 3.44 (0.55)<br>Non-veteran= 3.22 (0.92) | Veteran = 4.12 (0.50)<br>Non-veteran= 4.12 (0.54) | Group = 0.569<br>Session = 0.000<br>Group x Session = 0.664 |
| PSOCQ_M | Veteran = 14 | Veteran = 2.91 (0.73) | Veteran = 4.07 (0.51) | Group = 0.719 |

| | | | | |
|---|---|---|---|---|
| | Non-veteran=14 | Non-veteran= 2.90 (0.78) | Non-veteran= 3.94 (0.67) | Session = 0.000<br>Group x Session = 0.441 |
| CPCI_GAR | Veteran = 13<br>Non-veteran=15 | Veteran = 28.20 (25.94)<br>Non-veteran= 28.67 (25.32) | Veteran = 26.51 (25.12)<br>Non-veteran= 27.77 (23.97) | Group = 0.798<br>Session = 0.037<br>Group x Session = 0.228 |
| CPCI_REST | Veteran= 13<br>Non-veteran=15 | Veteran= 29.47 (27.55)<br>Non-veteran= 27.56 (23.65) | Veteran= 27.01 (23.71)<br>Non-veteran= 28.55 (24.08) | Group = 0.831<br>Session = 0.406<br>Group x Session = 0.094 |
| CPCI_ASS | Veteran= 13<br>Non-veteran=15 | Veteran= 27.70 (26.19)<br>Non-veteran=29.38 (26.72) | Veteran= 27.18 (25.87)<br>Non-veteran= 30.06 (27.69) | Group = 0.697<br>Session = 0.907<br>Group x Session = 0.518 |
| CPCI_ES | Veteran = 13<br>Non-veteran=15 | Veteran = 21.53 (21.50)<br>Non-veteran= 26.38 (24.77) | Veteran = 30.34 (27.32)<br>Non-veteran= 32.12 (29.23) | Group = 0.627<br>Session = 0.000<br>Group x Session = 0.334 |
| CPCI_REL | Veteran = 13<br>Non-veteran=15 | Veteran = 21.98 (21.61)<br>Non-veteran= 25.76 (24.28) | Veteran = 31.98 (29.94)<br>Non-veteran= 34.90 (31.34) | Group = 0.618<br>Session = 0.000<br>Group x Session = 0.921 |
| CPCI_TP | Veteran = 13<br>Non-veteran=15 | Veteran = 22.50 (20.79)<br>Non-veteran= 19.97 (18.48) | Veteran = 21.08 (18.76)<br>Non-veteran= 22.14 (20.25) | Group = 0.966<br>Session = 0.921<br>Group x Session = 0.033 |
| CPCI_COP | Veteran = 13<br>Non-veteran=15 | Veteran = 23.91 (22.45)<br>Non-veteran=24.04 (22.08) | Veteran = 26.27 (23.79)<br>Non-veteran= 28.98 (26.58) | Group = 0.674<br>Session = 0.002<br>Group x Session = 0.103 |
| CPCI_PACING | Veteran = 6 | Veteran = 51.42 | Veteran = 56.00 | Group = 0.493 |

| | | | | |
|---|---|---|---|---|
| | Non-veteran=8 | (4.99)<br>Non-veteran= 52.37 (5.42) | (4.65)<br>Non-veteran=58.37 (4.13) | Session = 0.012<br>Group x Session = 0.792 |
| CPCI_SSS | Veteran = 12<br>Non-veteran=15 | Veteran = 27.38 (26.57)<br>Non-veteran=25.65 (23.89) | Veteran = 24.52 (24.24)<br>Non-veteran= 29.64 (26.21) | Group = 0.594<br>Session = 0.227<br>Group x Session = 0.036 |

# Appendix E

Table 5

*Paired T-test results*

| Measure | N | p | Veteran Mean (SD) | Non-Veteran Mean (SD) |
|---|---|---|---|---|
| PPSQ | 28 | 0.541 | 35.00 (5.21) | 33.57 (6.46) |
| SES | 28 | 0.500 | 3.50 (1.09) | 3.21 (0.89) |
| PEH_PHY | 18 | 0.230 | 6.66 (2.64) | 5.44 (1.66) |
| PEH_EMO | 18 | 0.442 | 5.88 (3.37) | 5.00 (1.87) |
| PEH_SOC | 18 | 0.501 | 6.33 (3.16) | 5.22 (2.53) |
| MMPI-2 (VRIN) | 26 | 0.652 | 53.69 (10.78) | 56.07 (9.95) |
| MMPI-2 (TRIN) | 26 | 0.484 | 58.92 (5.95) | 60.61 (6.41) |
| MMPI-2 (F) | 26 | 0.908 | 68.38 (16.83) | 69.23 (20.39) |
| MMPI-2 (Fb) | 26 | 0.867 | 67.07 (20.40) | 68.76 (26.31) |
| MMPI-2 (Fp) | 26 | 0.896 | 52.46 (14.39) | 53.00 (10.97) |
| MMPI-2 (FRS) | 26 | 0.219 | 69.76 (9.84) | 76.23 (10.24) |
| MMPI-2 (L) | 26 | 0.030 | 51.76 (6.41) | 58.30 (6.03) |
| MMPI-2 (K) | 26 | 0.550 | 43.38 (7.38) | 45.30 (7.55) |
| MMPI-2 (S) | 26 | 0.156 | 39.92 (8.70) | 43.61 (7.11) |
| MMPI-2 (Hs) | 26 | 0.986 | 80.23 (9.78) | 80.30 (12.17) |
| MMPI-2 (D) | 26 | 0.595 | 80.15 (11.99) | 82.53 (8.77) |
| MMPI-2 (Hy) | 26 | 0.287 | 78.15 (15.40) | 85.00 (13.26) |
| MMPI-2 (Pd) | 26 | 0.846 | 63.07 (12.14) | 62.23 (7.24) |
| MMPI-2 (Mf) | 26 | 0.936 | 51.38 (9.22) | 51.15 (6.42) |
| MMPI-2 (Pa) | 26 | 0.452 | 64.53 (14.76) | 69.15 (14.53) |
| MMPI-2 (Pt) | 26 | 0.519 | 71.46 (12.54) | 75.15 (14.30) |
| MMPI-2 (Sc) | 26 | 0.838 | 77.30 (13.58) | 75.61 (21.81) |
| MMPI-2 (Ma) | 26 | 0.057 | 61.15 (12.01) | 51.84 (8.42) |
| MMPI-2 (Si) | 26 | 0.181 | 55.69 (9.50) | 61.07 (8.91) |
| MMPI-2 (Pk) | 26 | 0.871 | 71.46 (16.07) | 72.46 (13.04) |

# Appendix F

Main Effects and Interactions

*Figure 1.* CES_D scores at admission and discharge for all subjects.

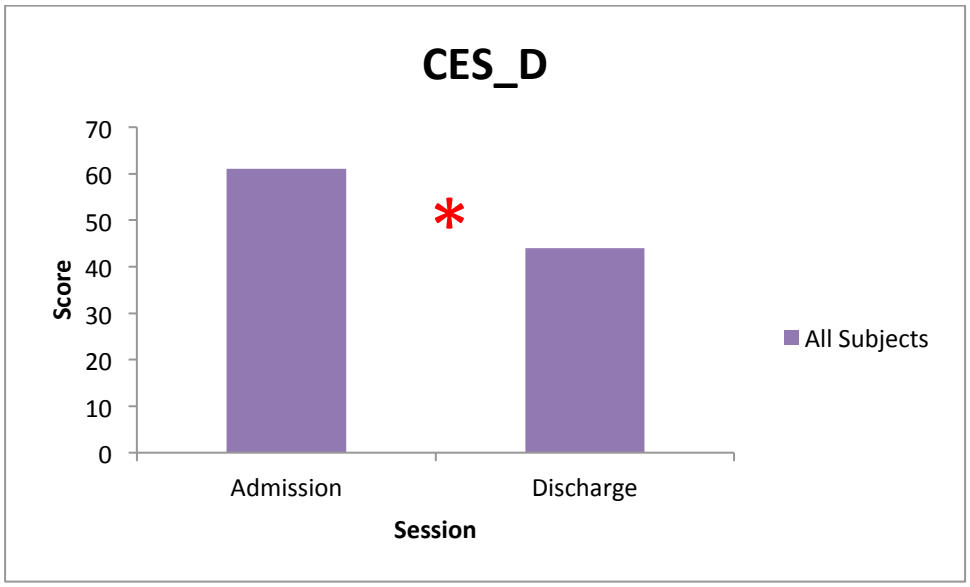



*Figure 2.* PCS scores at admission and discharge for veterans and non-veterans.

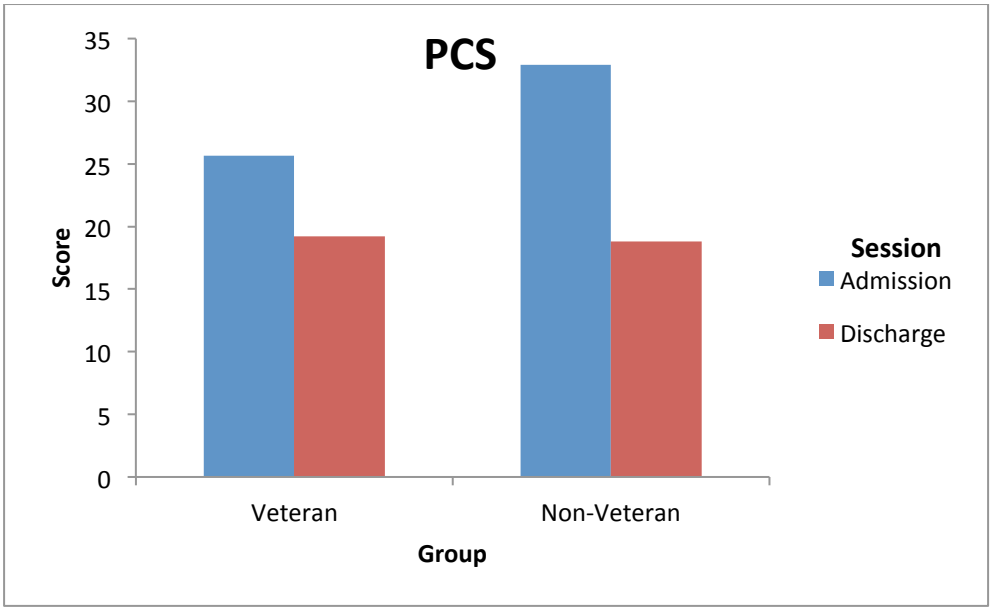



*Figure 3.* PDI scores at admission and discharge for all subjects.

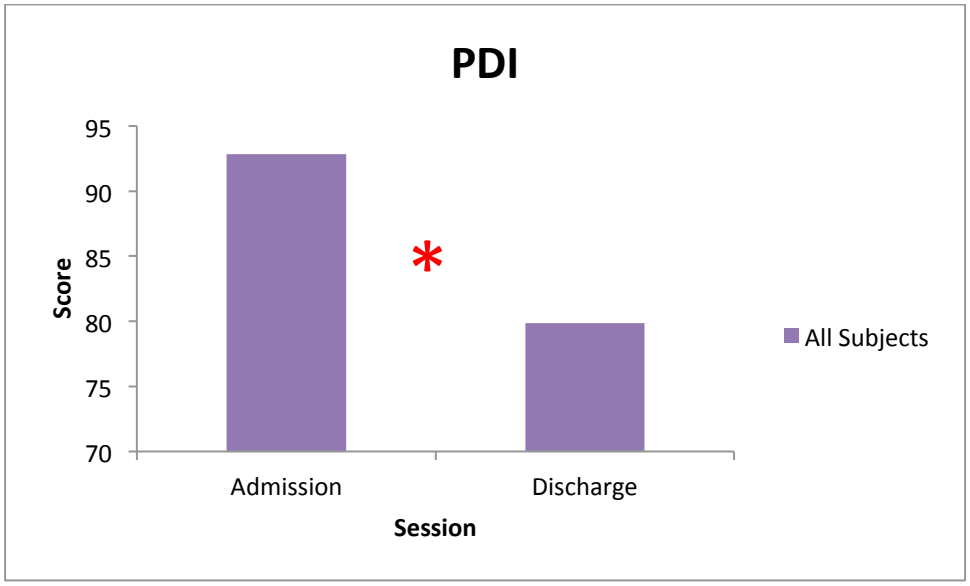



*Figure 4.* CAS scores at admission and discharge for all subjects.

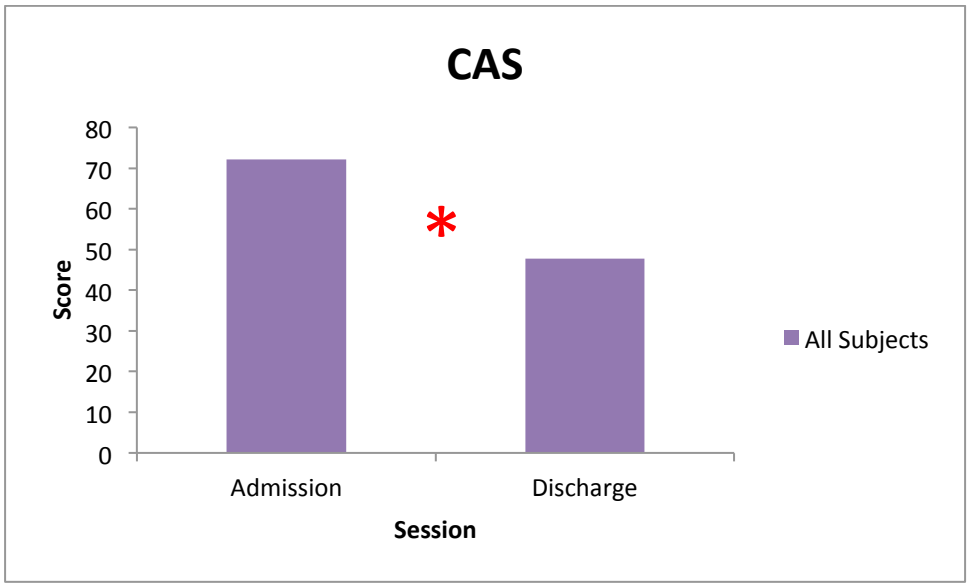



*Figure 5.* TSK scores at admission and discharge for all subjects.

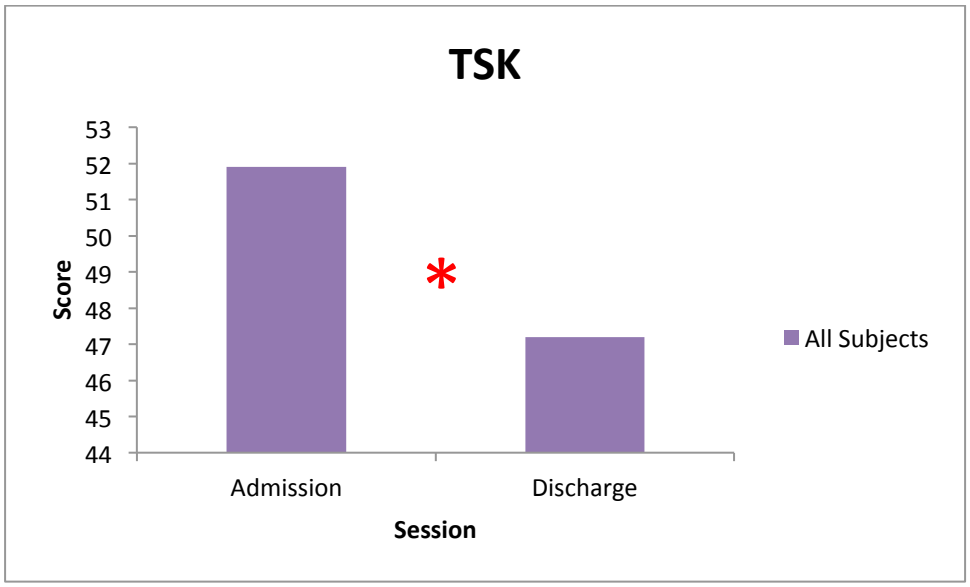



*Figure 6.* CPAQ_AE scores at admission and discharge for all subjects.

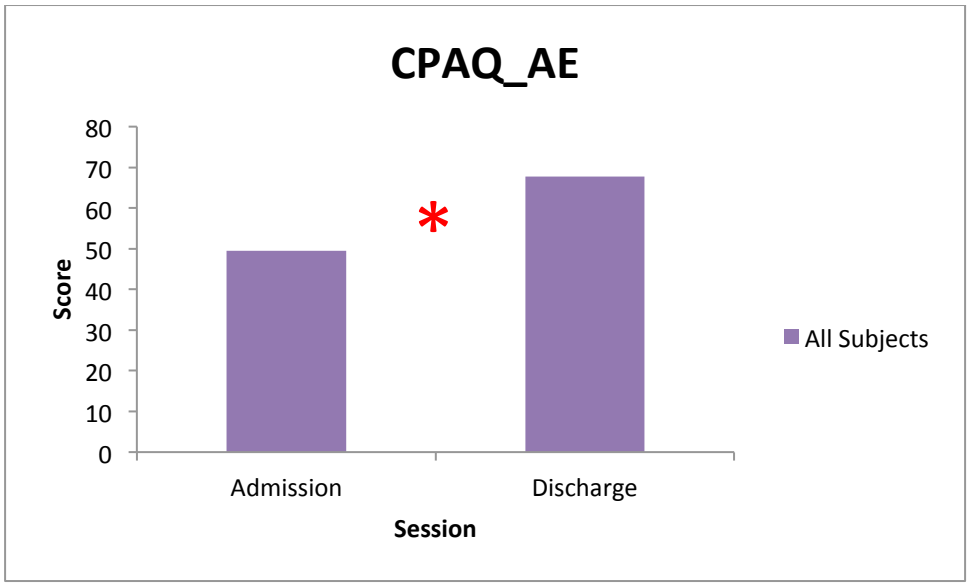



*Figure 7.* CPAQ_PW scores at admission and discharge for all subjects.

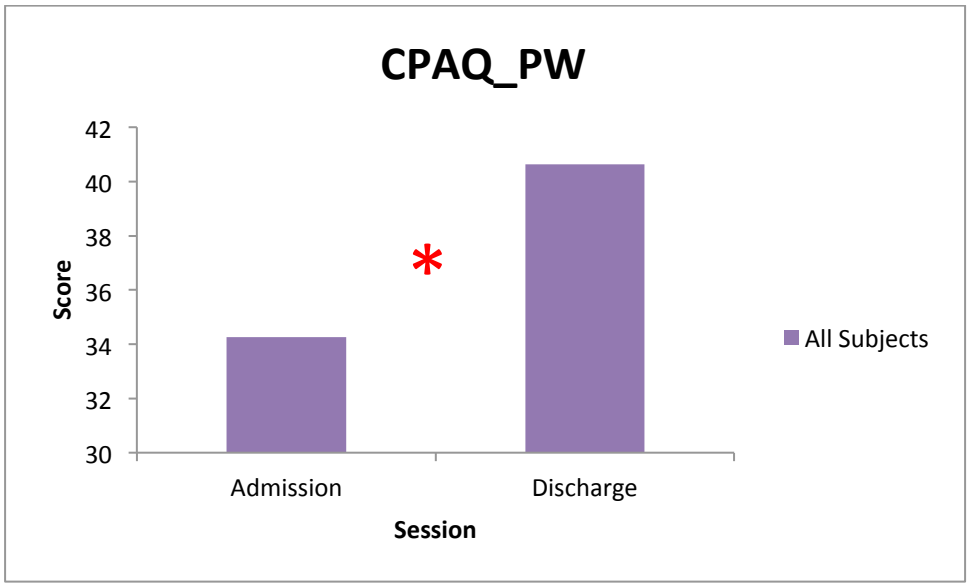



*Figure 8.* CPAQ_T scores at admission and discharge for all subjects.

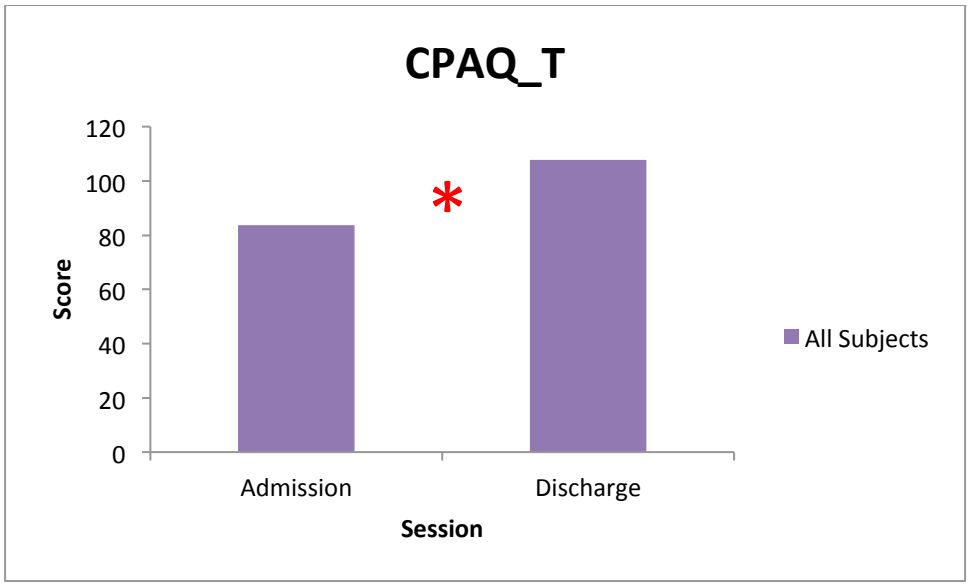



*Figure 9.* PSCOQ_PCON scores at admission and discharge for all subjects.

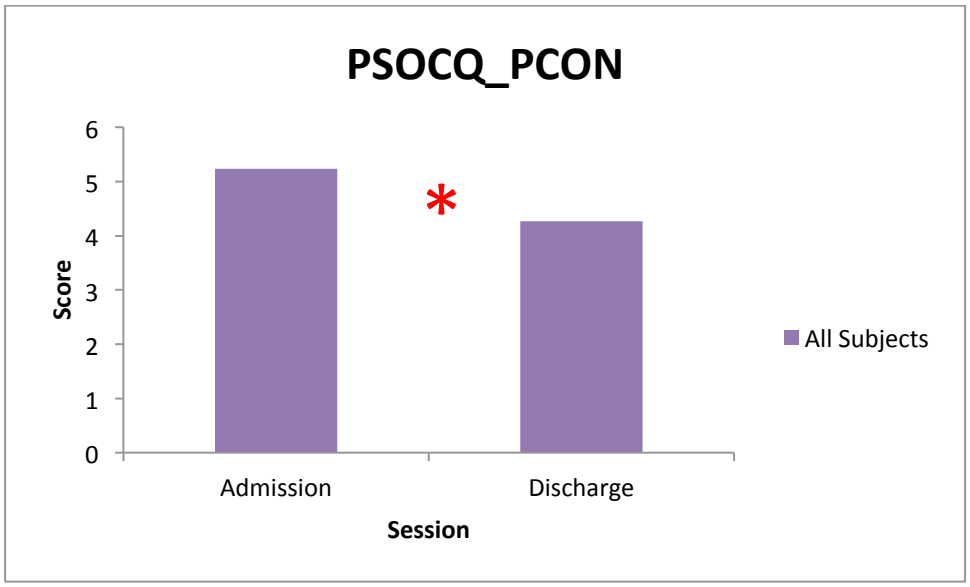



*Figure 10.* PSOCQ_ACT scores at admission and discharge for all subjects.

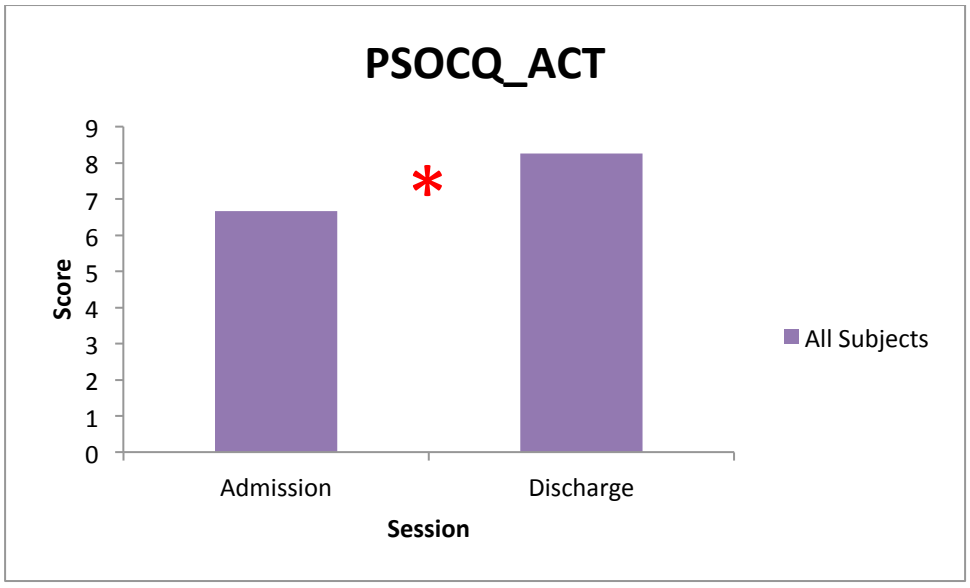



*Figure 11.* PSOCQ_M scores at admission and discharge for all subjects.

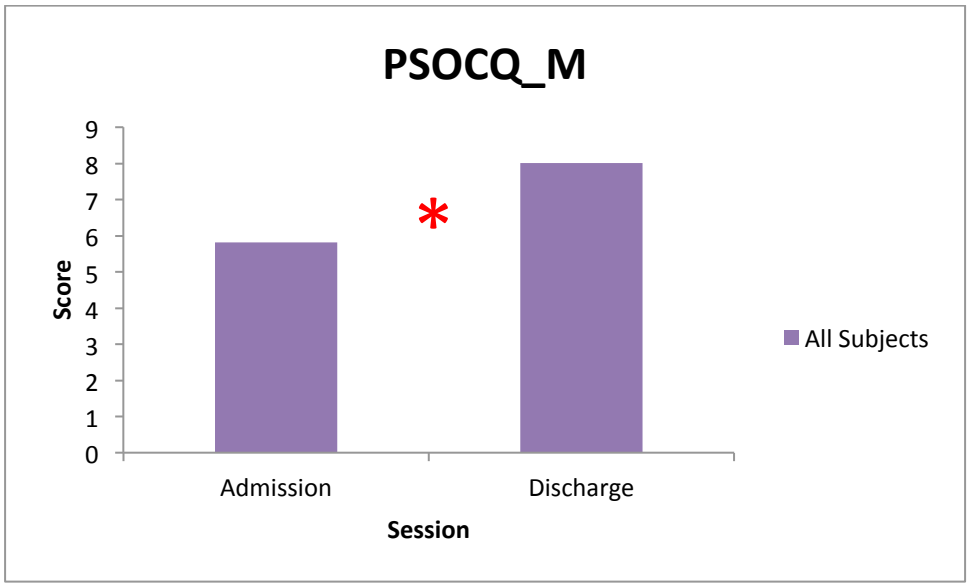



*Figure 12.* CPCI_GAR scores at admission and discharge for all subjects.

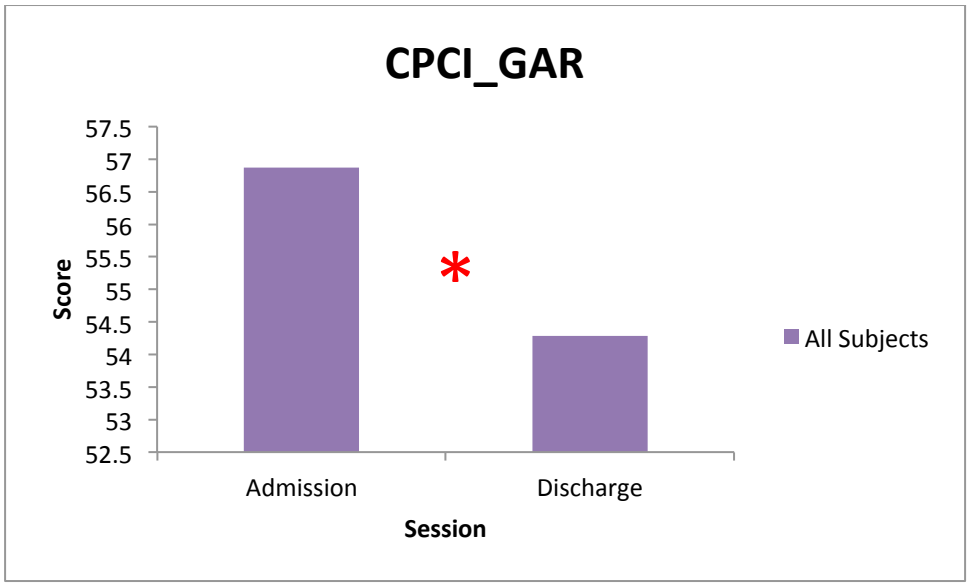



*Figure 13.* CPCI_TP scores at admission and discharge for veterans and non-veterans.

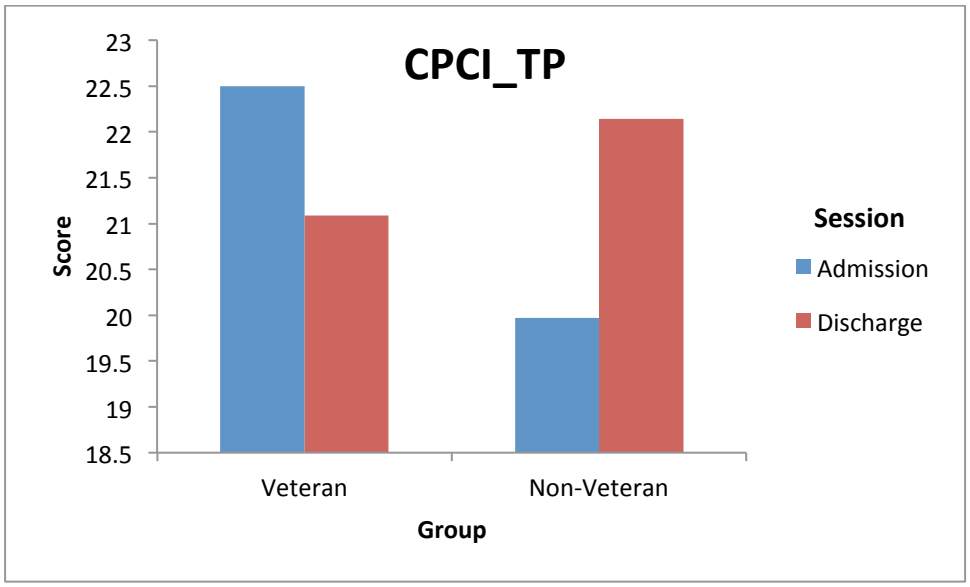



*Figure 14.* CPCI_ES scores at admission and discharge for all subjects.

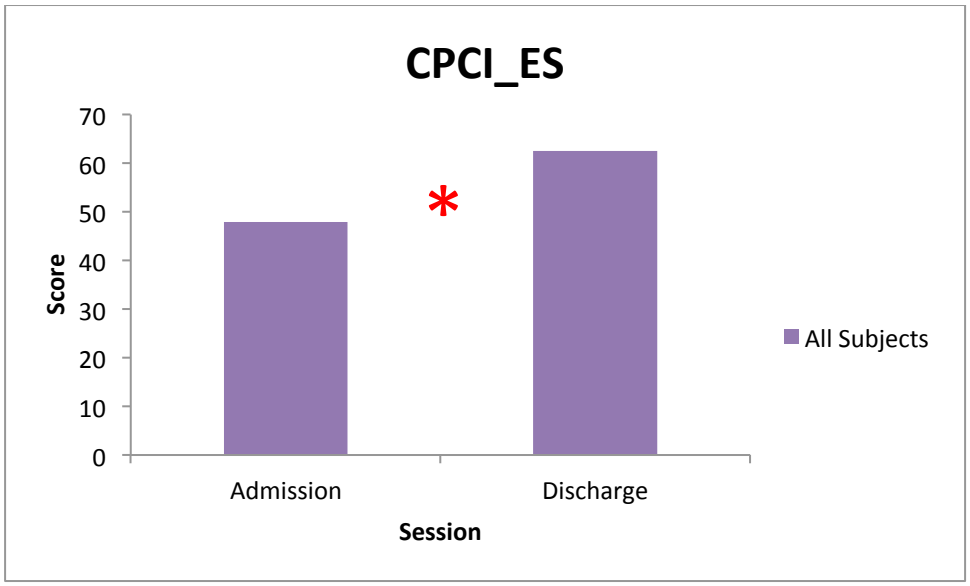



*Figure 15.* CPCI_REL scores at admission and discharge in all subjects.

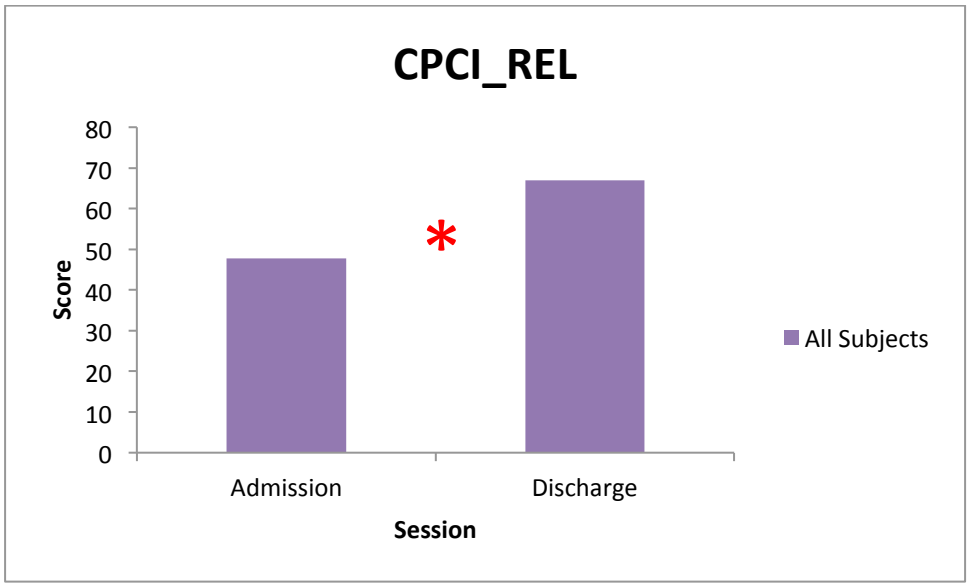



*Figure 16.* CPCI_COP scores at admission and discharge in all subjects

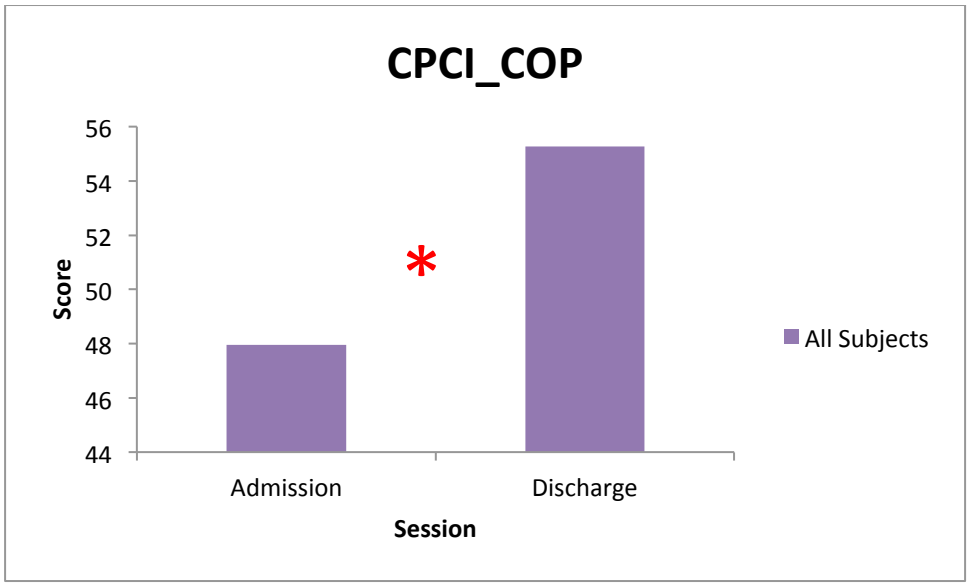



*Figure 17.* CPCI Pacing scores at admission and discharge in all subjects.

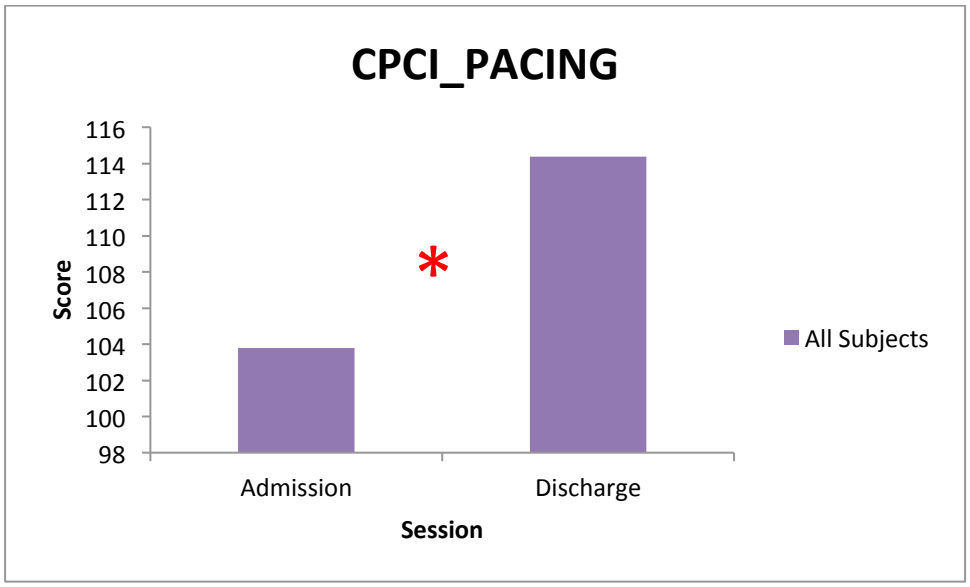
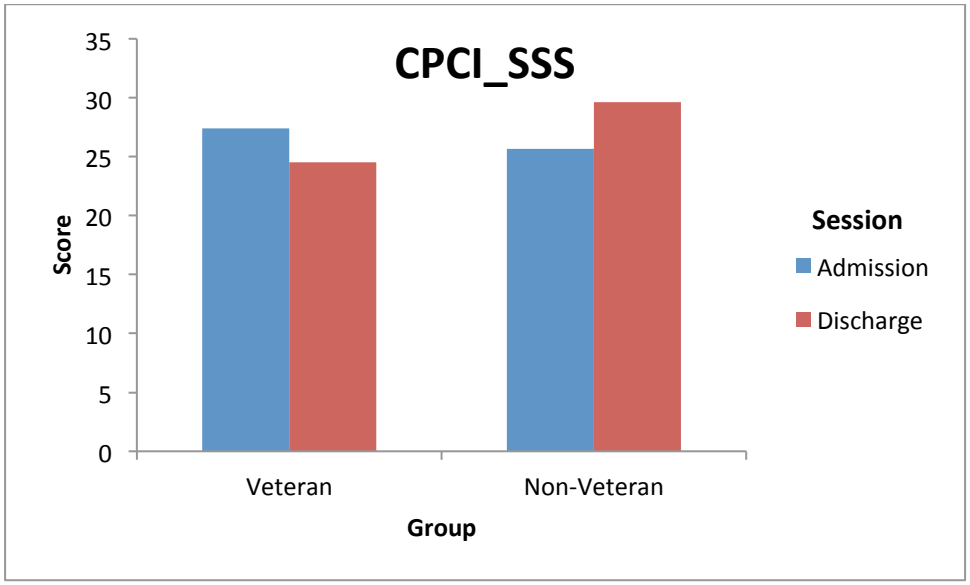



*Figure 18.* CPCI SSS scores at admission and discharge in veterans and non-veterans.



# Appendix G

MMPI-2 Scale Differences in Veterans and Non-veterans

*Figure 19.* Differences in MMPI-2 (L) scores in veterans and non-veterans.

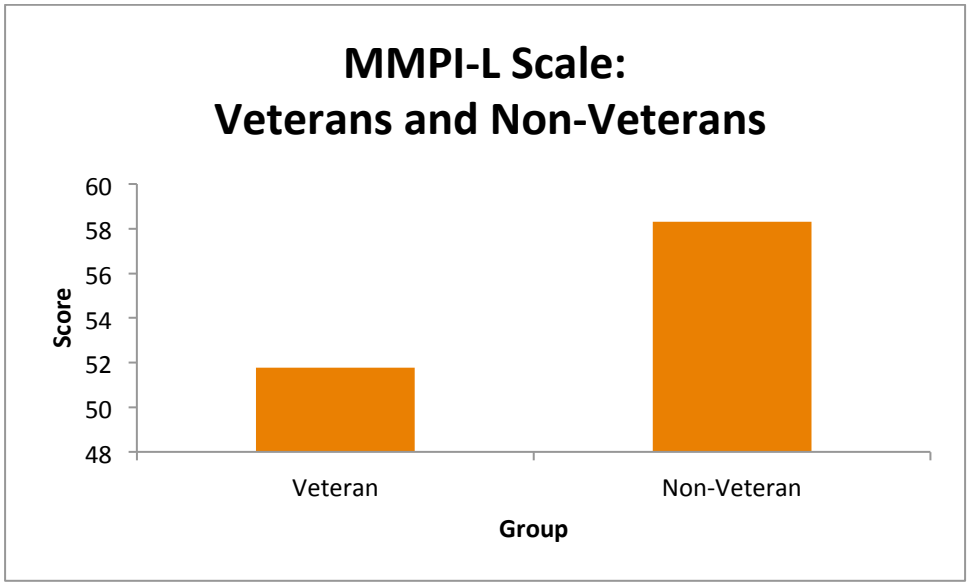
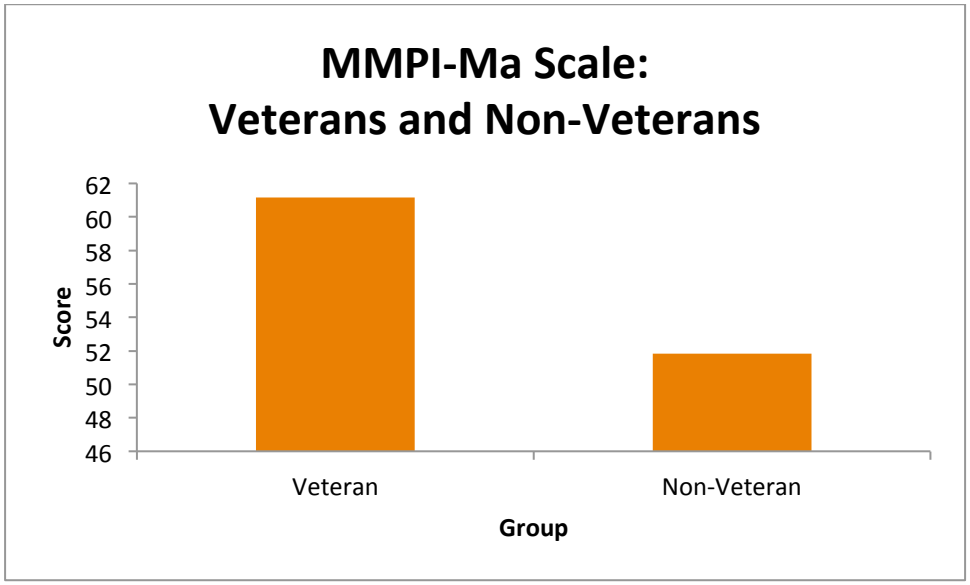



*Figure 20.* Differences in MMPI-2 (Ma) scores in veterans and non-veterans.



# Appendix H

All MMPI-2 scores for veterans and non-veterans

*Figure 21.* MMPI-2 scores for veterans.

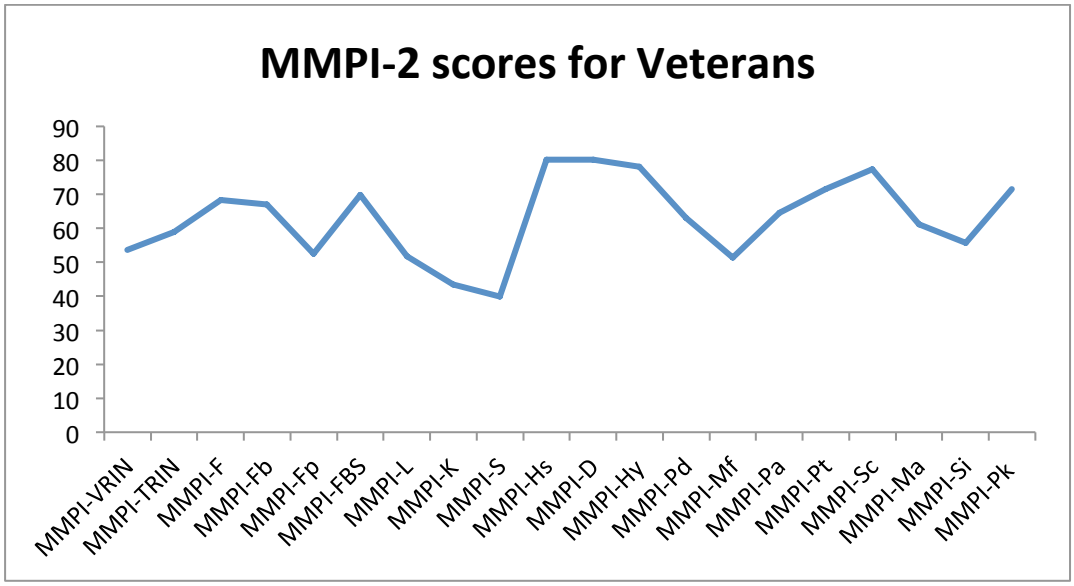



*Figure 22.* MMPI-2 scores for non-veterans.

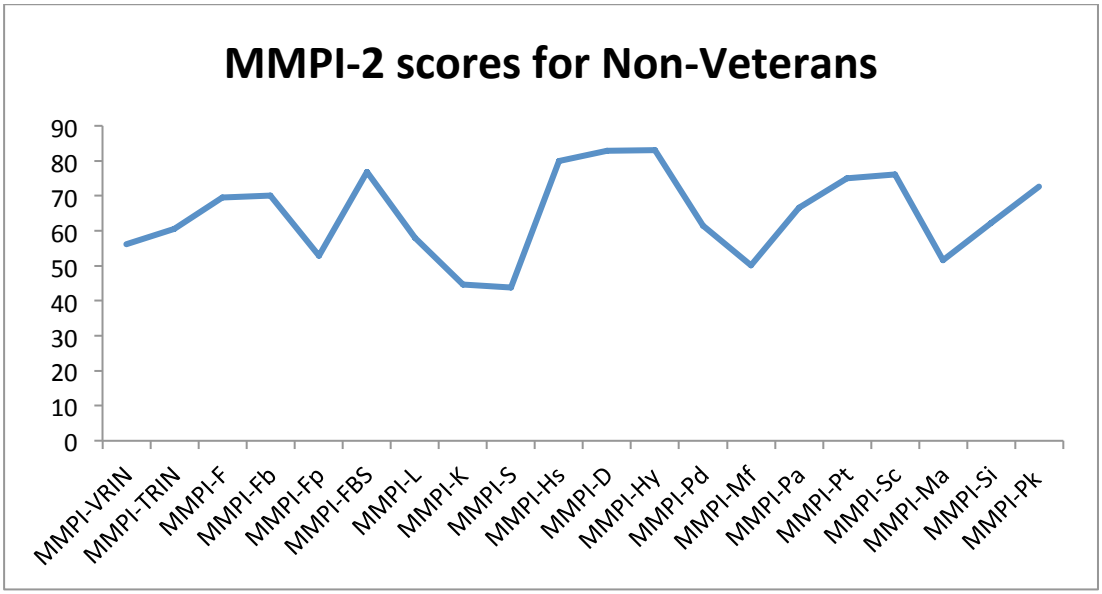
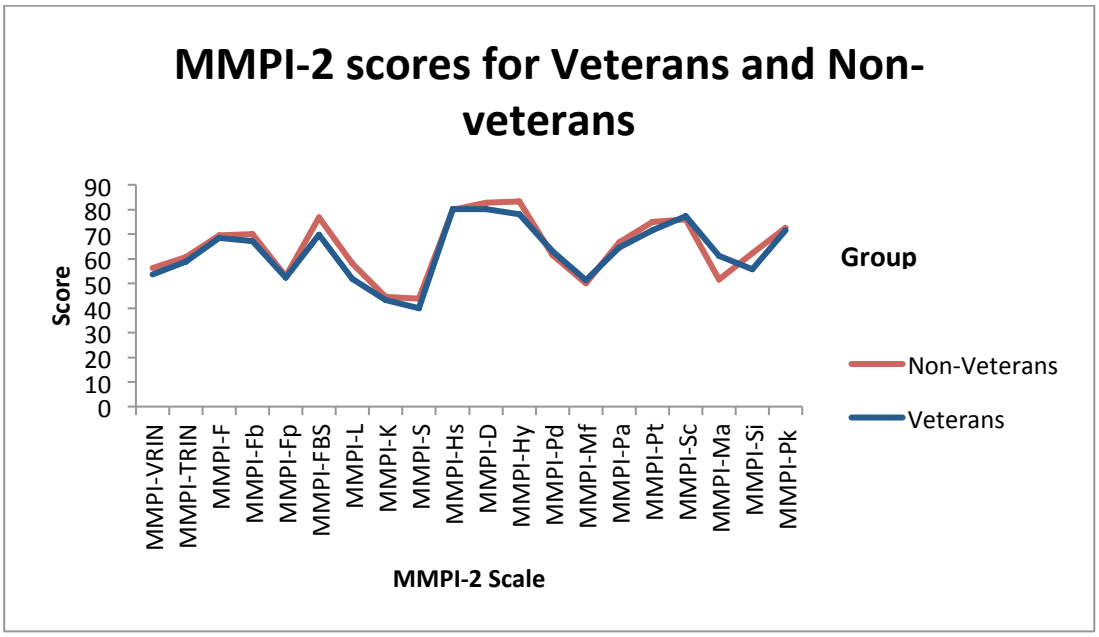



*Figure 23.* MMPI-2 scores for veterans and non-veterans.


MMPI-2 scores for Veterans and Non-veterans
Score
90
80
70
60
50
40
30
20
10
0
MMPI-VRIN
MMPI-TRIN
MMPI-F
MMPI-Fb
MMPI-Fp
MMPI-FBS
MMPI-L
MMPI-K
MMPI-S
MMPI-Hs
MMPI-D
MMPI-Hy
MMPI-Pd
MMPI-Mf
MMPI-Pa
MMPI-Pt
MMPI-Sc
MMPI-Ma
MMPI-Si
MMPI-Pk
MMPI-2 Scale
Group
Non-Veterans
Veterans