CHRONIC PAIN: A STUDY OF LOW BACK PAIN PATIENTS FROM SOUTHERN WEST VIRGINIA AND EASTERN KENTUCKY

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ABSTRACT

The Minnesota Multiphasic Personality Inventory-2 (MMPI-2) was administered to 60 males ranging from 22 to 65 years of age. Subjects were seeking treatment at Mountain Comprehensive Care Center, an outpatient mental health center, for depression/anxiety with a secondary diagnosis of chronic pain stemming from low back pain related to an injury. This study considered T-scores of a K-corrected profile using Scales F (Faking), 1 (Hypochondriasis), 2 (Depression), and 3 (Hysteria). Statistical interpretation of data was obtained through use of the General Linear Model at the $p < .05$ level of significance to determine variance among the groups. Subjects were assigned to three of six groups based on the criteria of age (less than 35 years vs. 35 years or older); duration of pain (less than one year's duration vs. one year or more duration); and medical evidence available (with clinical evidence to support an orthopedic diagnosis vs. those with no clinical evidence available). The results of this study showed that there was no significant difference between groups on the age variable and the only significant differences on the medical evidence variable were for Scales 2 (D) and 3 (Hy). On the duration of pain variable, significant differences among groups for all scales were noted. Also, chronic low back pain patients from this geographic area presented with extreme elevations on Scale F and high elevations on Scales 1 (Hs), 2 (D), and 3 (Hy), with a higher elevation on Scale 2 (D).

Chronic Pain: A Study of Low Back Pain Patients From Southern West Virginia and Eastern Kentucky

One of the most distressing clinical problems in the medical field today is chronic low back pain. It extracts huge costs in personal anguish, loss of productivity, and financial loss and is the principal diagnosis in 10% of all chronic health conditions. In patients of working age, the leading cause of limitations in their activity level is painful musculoskeletal conditions (Andersson, Pope, & Frymoyer, 1984).

Most individuals with back pain are expected to recover within two months of seeking medical treatment and only a small percentage will suffer for more than six months with any given episode. Pain is defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (The International Association for the Study of Pain, 1986). This definition emphasizes that pain is a subjective psychological experience associated with a somatic sensation and is not necessarily a result of a physiological stimulus (Keller & Butcher, 1991).

Pain has been classified as either acute pain, which is defined as duration of less than six months, or chronic pain, which implies extended duration, usually more than six months. While this classification system is helpful in differentiating between truly time-limited pain, such as, postoperative or other post-traumatic pain conditions and longer standing conditions, the dividing line between acute and chronic pain is less clear when applying these terms to chronic conditions with periodic episodes of increased intensity of pain.

Due to the duration of chronic pain, the individual may have months or years of opportunities to learn to experience and express pain. Within six months after the injury, an individual's pain behaviors may occur as a reaction to environmental reinforcers, rather than in response to a sensory stimulus. Direct reinforcement of pain behaviors can occur

when they are followed by positive consequences, such as, attention from family members, medication, and financial compensation.

Also, pain behaviors can be indirectly reinforced when their occurrence leads to avoidance or reduction of unpleasant events, such as, reducing conflict in the home, avoiding unwanted sexual contact, or by avoiding unpleasant chores or work. Indirect reinforcement may be particularly powerful for those patients who feel inadequate to perform the social or vocational roles expected of healthy adults.

Finally, pain behaviors may be maintained if the client does not receive sufficient reinforcement of "well behaviors" (activities that are incompatible with the sick role and are necessary for the person to function successfully in educational, vocational, and social roles), such as, families encouraging the injured one to do less, or those who would receive a loss of income by returning to a lower paying job instead of remaining on disability payments, or those with inadequate work skills (Keller et al., 1991).

Due to the huge costs involved in treating and maintaining chronic low back pain patients, it is important to provide adequate assessment to help address problems inherent in determining pain etiology, factors that maintain pain behaviors, and successful treatment approaches in chronic pain. Also, it would be helpful to be able to describe the characteristics of the typical pain patient and the differences among pain patients, in order that appropriate treatment approaches could be identified for those individuals. Adequate assessment of the factors contributing to an individual's pain problem could potentially cut medical costs by accurately predicting who might benefit from a particular treatment approach, allowing selection of those patients most likely to show improvement.

Although a variety of measures and observational methods have been used in evaluating chronic low back pain patients, the most widely cited objective assessment instrument used with the chronic pain population is the Minnesota Multiphasic Personality

Inventory (MMPI). Items on this instrument are grouped into scales which were developed to discriminate between groups of patients with various psychiatric diagnoses and a group of "normal" adults.

In addition to the physiological factors that may be contributing to the pain complaints, there are psychological factors that may be contributing to the complaints. Depression and anxiety syndromes are the most frequently diagnosed psychological disorders among chronic pain patients. Unfortunately, emphasis is frequently placed on physical abnormalities while the influence of psychological factors that have a significant role in the development of chronic pain is either minimized or ignored (King, 2000).

Only with the development of the DSM-IV (Diagnostic and Statistical Manual, fourth edition), was an attempt made to address the many pain states, where both psychological and general medical conditions play a major etiological role, in addition, to those where psychological factors alone appear to be preeminent (American Psychiatric Association, 1994). In one study of chronic pain patients in an outpatient psychiatric pain clinic, it was reported that 79% of the patients fit the diagnosis of pain disorder associated with both psychological factors and a general medical condition and nine percent (9%) fit the diagnosis of pain disorder associated with psychological disorders (Anooshian, 1999).

Attempts have been made to develop techniques for distinguishing between pain due to physical or psychological factors. For many years, it was believed that the Minnesota Multiphasic Personality Inventory (MMPI) could be employed for this purpose. It was thought that chronic low back pain patients whose pain did not have an organic etiology were more likely to demonstrate a certain configuration on the MMPI. These individuals, who presented with elevations on the Hypochondriasis (Hs) and Hysteria (Hy) scales, were thought to be excessively concerned with their health and a lower Depression (D) scale reflected that the patient may be indifferent to health concerns. Later studies reported that these elevations were representative of the individual's adjustment to chronic

pain issues and was evident regardless of age, sex, or organic pathology. The difference between profile groups was that higher elevations were more likely associated with greater self-reported limitations (Naliboff, Cohen, & Yellen, 1982).

Chronic low back pain affects all aspects of a patient's life--an individual's marriage, career, family, and finances, etc. While working in an outpatient community mental health center with a large number of chronic low back pain patients, it was apparent that the majority of these individuals were seeking outpatient mental health treatment for depression/anxiety associated with chronic low back pain. In reviewing the literature documenting research in this area, the MMPI and MMPI-2 have been the most widely accepted assessment instruments to address the physiological and psychological aspects of chronic pain.

The MMPI contains validity scales and clinical scales. The validity scales include the L-scale, which was designed to detect test-taking attitudes; the F-scale, which was designed to detect individuals whose approach to test-taking tasks was different from that intended by the test authors; and the K-scale, which was designed to identify clinical defensiveness. Originally, the clinical scales of the MMPI included the scales for Hypochondriasis (Hs), Depression (D), Hysteria (Hy), Psychopathic Deviate (Pd), Paranoia (Pa), Psychastenia (Pt), Schizophrenia (Sc), and Hypomania (Ma). Later, two other clinical scales were constructed, the Masculinity-Femininity (Mf) scale and the Social Introversion (Si) scale (Graham, 1993).

The MMPI was revised and was published as the MMPI-2. Both instruments have been used widely in medical settings where evaluations of chronic pain patients were conducted (Keefe, Brown, Scott, & Ziestat, 1982; Love & Peck, 1987). These studies were aimed at determining the relationship of certain variables to MMPI scores of chronic pain patients. They explored the relationship to the following variables: age and gender (Fow, Sittig, Dorris, Brusinger, & Anthony, 1992); "negative life impact" variables

(Nickel, 1993); somatic symptoms (Wade, Dougherty, Hart, & Cook, 1992); and subjects having two or more pain complaints (Strassburg, Reimherr, Ward, Russell, & Cole, 1981).

The remainder of the section that follows critically reviews contemporary literature regarding the use of the MMPI-2 in assessment of chronic pain patients. Early studies in this area of chronic pain generally focused on the K corrected T-scores for the first three scales of the MMPI-2. Those three scales are Scale 1, Hypochondriasis (Hs); Scale 2, Depression (D); and Scale 3, Hysteria (Hy). Almost without exception, MMPI studies of chronic pain patients have revealed elevations on those three scales (Strassburg et al., 1981; Cohen, 1987; Ahles, Yunus, Gaulier, Riley, and Masi, 1986; and Wade et al., 1992).

MMPI-2 Pain Profiles

The majority of information indicated that there exists at least four chronic pain profiles (Sternback, 1974). The first profile type was the "Hypochondriasis" type described as presenting a primary elevation on Scale 1 (Hs) and secondary elevations on Scales 3 (Hy) and 2 (D) forming a "neurotic triad". These individuals usually had a clear organic basis for their pain and were preoccupied with somatic complaints. The second profile type was described as having an elevation on Scale 2 (D) and usually reported depressive symptoms in response to the effects of pain in their lives. The third profile was the "conversion V" profile with elevations on Scales 1 (Hs) and 3 (Hy) with a lower 2 (D) scale and these individuals included somatic preoccupation with denial of psychological or interpersonal problems. The fourth profile type presented with expected elevations on the 1 (Hs), 2 (D), and 3 (Hy) scales, in addition to an elevated 4 (Pd) scale. These individuals were described as "con artists" who used their symptoms to manipulate others and abused various substances. Sternbach (1974) failed to clearly describe the pain patient population and to present support for the associations that he assigned to these profile types. Other studies have failed to validate Sternbach's findings because each author tends to describe his own unique classification system.

In the "conversion V" configuration, Scales 1 (Hs) and 3 (Hy) were elevated over Scale 2 (D) forming a "V" on the profile sheet. Usually elevations were reflected by a T- score greater than 70 on Scales 1 (Hs) and 3 (Hy) with relatively no elevation on Scale 2 (D). Several authors have suggested that pain patients typically showed this configuration when they were under stress, which contributed to an increase in reported pain levels. Also, they displayed many of the psychological characteristics typically associated with conversion reaction or conversion hysteria, which was the tendency to seek or prefer somatic explanations or symptoms to the exclusion of psychological ones (Franz, Paul, Bautz, Choroba, & Hildebrant, 1986; Love et al., 1987).

The "neurotic triad" profile showed elevations on these same three scales, 1 (Hy), 2 (D), and 3 (Hy), but the elevations reflected a T-score below 70, which was characteristic of neurotic symptomology and psychological disturbances. Interpretation of this profile reflected more depression than conversion hysteria, which indicated passive dependency, low self-esteem, and avoidance of performance demands. (Sternback, Wolf, Murphy, & Akeson, 1973).

Distinction between the "conversion V" and "neurotic triad" profiles was somewhat unclear, according to Cohen (1987). When administered the MMPI and the MMPI-2, chronic pain patients responded in a similar fashion to the revised version of the MMPI. Analysis of the data was conducted by use of the group mean profiles, configural, and cluster analysis and as substantiated by other studies, the group mean profiles were characterized by higher elevations on Scales 1 (Hs), 2 (D), and 3 (Hy). Elevations on these scales may have been interpreted differently by some authors since the size of the elevations in the "neurotic triad" and "conversion V" profiles weren't clearly defined, according to Keller et al., (1991).

Recent studies with chronic pain patients forced to seek court action in order to receive disability and compensation benefits in comparison to a group of chronic pain

patients supported the "conversion V" profile. Results supported the use of the MMPI-2 to help detect malingering, inconsistencies, and distorted responses since secondary gains associated with pain and disability behaviors and a lack of objective medical evidence to support orthopedic impairment was often found in this population. These individuals did not differ in age, education, or length of injury, nor were there any gender effects or interactions evident. Those involved in litigation were clearly more likely to present with the "conversion V" profile with a much lower Scale 2 (D) than found in other groups. (Dush & Simons, Platt, Nation, & Ayres, 1994; Prokop, 1986).

Since Keller's et al., (1991) complaint that different authors were identifying the "conversion V" profile based on different criteria, specific guidelines have been set to reflect a 10 point valley between Scale 2 (D) and Scales 1 (Hs) and 3 (Hy). Of the four groups found in this study which compared MMPI pain subgroups with patterns of normal personality structure, three of the groups presented with elevations on these scales above a T-score of 70. The MMPI Scale 2 (D), specifically, reflects depression, anxiety, and anger associated with chronic pain. At issue, was whether the elevations on Scales 1 (Hs) and 3 (Hy) were reflective of the large number of scale items that addressed somatic symptoms related to pain experiences (Wade et al., 1992). The findings supported the idea that personality disturbance noted by an elevation on Scale 2 (D) in the chronic pain population may have been more reflective of emotional/behavioral adjustment to chronic pain while elevations on Scales 1 (Hs) and 3 (Hy) may have represented the endorsement of somatic items associated with their illness rather than underlying neurotic character style.

MMPI studies of chronic pain patients have revealed marked elevations on three scales: Scale 1 (Hs), Scale 2 (D), and Scale 3 (Hy), which reflected the "neurotic triad". Only these scales reflected the elevations consistent with chronic pain populations (Strassberg et al.,1981). In most studies, other scales have been elevated, but none as

consistently as these three scales. Research has detected that lower scores on these scales better predict treatment outcome for chronic pain patients for up to one year after treatment (McCreary, Turner, & Dawson, 1979; Vendrig, Derksen, & de Mey, 1999). Also, studies supported the use of the MMPI as part of the assessment package for patients being treated for chronic pain. The MMPI, also, seemed to be able to discriminate between those pain patients with one complaint vs. those with several pain complaints and head and/or back pain patients vs. other types of pain patients (Strassberg et. al., 1981); and discriminated acute from chronic pain patients (Sternbach et al., 1973).

Further support for the use of the MMPI-2 as an assessment tool for chronic pain patients was reflected when MMPI-2 data from two different treatment programs was factor-analyzed; the T-scores for the validity and clinical scales were used in this analysis. Chronic pain patients tended to endorse items reflecting somatic symptoms, depression, memory problems, and concentration problems. The objective was to identify distinct, relatively independent, characteristics of the chronic pain population as assessed by the MMPI-2. The results indicated that direct correlations existed between high scores on Scale 1 (Hs) for those with somatic concerns and high scores on Scale 3 (Hy) for those who tended to show increased physical symptoms under stress, complaints of despondency, and a lack of psychological insight (Deardorff, Chino, & Scott, 1993).

While replicating other studies using male and female chronic back pain groups with patients from a university back pain clinic, Bradley, Prokop, Gentry, Van der Heide, & Prieto, (1981) found elevations on Scales 1 (Hs), 2 (D), and 3 (Hy), and 8 (Sc) for males; the sub clinical "neurotic-triad" profile for men, the elevated "neurotic triad" for women, and an elevated profile with peaks on Scales 1 (Hs), 2 (D), 3 (Hy), 4 (Pd), and 8 (Sc) for women. They also found a novel male cluster marked by elevations on Scales 2 (D), 4 (Pd), 7 (Pt), and 8 (Sc), a normal-limits cluster for men and for women, and a subclinical depression profile for women. In addition, they found a positive relationship

between elevation of profile and self-report of pain intensity and disruption of daily activities.

Another study replicated these groups and found that MMPI profiles were divided into three groups 1) normal profile (no T-scores > 70); 2) typical pain profile (3 or fewer T-scores > 70); and 3) psychological disturbance profile (4 or more T-scores > 70). They found that the profiles of patients in group 2 (typical pain profile) could have been characteristic of patients with "neurotic" traits or the elevations could have been the result of patients living with chronic pain, especially, since the elevations tended to disappear with successful pain relief (Ahles et al., 1986). More recently it has been suggested that elevated scores on Scales 1 (Hs), 2 (D), and 3 (Hy) may have been artificially inflated because of the large number of items evaluating somatic symptoms either related to the pain or secondary to living with chronic pain (Smythe, 1984: Sternbach, et. al., 1973).

Also, other factors that may affect the patient's performance on the MMPI and indication for treatment have been identified. They are negative attitudes or beliefs about doctors and psychological treatment (Butcher, Dahlstrom, Graham, Telegen, & Kaemmer, 1989); whether scale elevation may be independent of the likelihood of completing treatment (Clark, 1996); and the greater the "negative life-impact" variables, the more elevated the MMPI-2 profiles found (Nickel, 1993) .

Cluster analysis comparing MMPI profile types was conducted for three illness populations: chronic low back pain, mixed headache, and cardiac disease patients. Male chronic pain patients in the chronic low back pain and mixed headache groups differed significantly from cardiac patients, but presented very similar profile types. It appeared that the MMPI may be a measure of response to illness rather than reflecting predisposing personality types. Profile types identified for these groups were 1) a high distress/ psychopathological profile with elevations on nearly all of the MMPI clinical scales; 2) a profile with elevations on the "neurotic triad", in a "V" pattern; 3) a second "neurotic

triad" profile without the "V" pattern; and 4) a normal profile with no clinical elevations. The chronic low back pain group had greater representation in the highly distressed profile type and the "neurotic triad" profile type. Disrupted lifestyles as seen in this group, coupled with nearly constant suffering from chronic pain may have contributed to group differences (Robinson, Greene, & Geisser,1993). It has been suggested that increased physical dysfunction and greater pain complaints were associated with the more pathological MMPI profiles (Rosen, Grubman, Bevins, & Frymoyer, 1987).

While examining the psychological characteristics of a sample of Chinese acute and chronic pain patients using the MMPI, moderate to high elevations (up to three standard deviations above the mean) on the "neurotic triad" scales 1 (Hs), 2 (D), and 3 (Hy) and on the 7 (Pt) and 8 (Sc) scales were found for the two groups of low back pain patients with Scale 2 (D) being the most elevated. Their findings consistent with other studies indicated that the elevated scales identifying the "neurotic triad" was evident, but the "conversion V" was not. Their findings inconsistent with other studies indicated that the clinical scales of acute and chronic pain patients differed significantly only on Scale 3 (Hy), as evidenced by the T score ($-2.44 < .05$), and that males showed a somewhat more disturbed profile than females (Lee Cheung, Man, & Hsu, 1992).

As evident from reviewing the research, there were specific chronic low back pain profiles present with the use of the MMPI-2. They varied according to specific variables found in each group, such as; age, gender, ethnicity, education, marital status, duration of pain, medical evidence of orthopedic impairment available, whether the individual was in litigation, severity of pain, etc. Other factors considered were pain patients who had been given diagnosis of a psychiatric disorder, as most of the pain patients studied presented with some degree of depression. Severity of depression seemed to be directly correlated to severity of pain and it has been suggested that as pain decreased, depression decreased (Taylor, 1987).

Age Variable

On the age variable, several studies have identified group differences, which they contributed to age differences of group members. Studies of various patient and "normal" groups have reported age-related increases in MMPI scores. Scale 1 (Hs) scores appeared to increase with age among psychiatric patients and Scales 1 (Hs) and 2 (D) for medical patients. For all age groups, mean T-scores were elevated significantly on Scales 1 (Hs), 2 (D), and 3 (Hy) in a study conducted by Fow et al., (1994). The results of this study suggested that chronic pain constituted a unique type of stressor as it evolved with age. Also, they found that increased scores and decreased scores for Scales 1 (Hs) and 3 (Hy) in all age groups were reflected by increased elevations and decreased elevations, respectively, for Scale 2 (D) and Scale 6 (Pt) for males, but not for females.

In order to determine the impact of age on MMPI scales scores, a study conducted with healthy subjects resulted in failure to demonstrate age-related score increases on Scales 1 (Hs), 2 (D), and 3 (Hy); but age-related score increases on Scale 2 (D) for males only was noted (Koeppl, Bolla-Wilson, & Bleecker, 1989). It appeared that older psychiatric, medical, and healthy subjects, when compared with younger subjects in the same categories, tended to score higher on Scales 1 (Hs), 2 (D), and 3 (Hy) of the MMPI (Fow et. al., 1994; Rosen et al., 1987).

There have been concerns expressed that the MMPI-2 may not be appropriate for assessing persons of lower socioeconomic status or those who differed in other ways (e.g. age, ethnicity) from the typical person in the MMPI-2 normative sample. Data was accumulating that suggested that the small differences between age groups were due to group differences and age-related changes in physical health rather than to age-related differences in psychopathology. Thus, it seemed that age-specific norms were not indicated for the MMPI and that somewhat higher scores obtained by older adults on Scales 1(Hs) and 2 (D) and lower scores obtained by older adults on Scales 4 (Pd), 6 (Pt),

and 9 (Ma) probably reflected meaningful differences in the background and life circumstances of these older persons (Butcher & Graham, 1994).

Duration of pain variable

The definition of chronic pain implied extended duration, usually more than six months, and was pain that lasted longer than would be expected. All aspects of patients' lives were affected by pain of extended duration. According to Meyer & Deitsch (1996), clients with actual chronic pain often showed very little elevation on the MMPI-2 scales immediately after the injury. However, if they were tested several months after the injury occurred, elevations on Scales 1 (Hs) and 3 (Hy) were more likely. Also, an elevated "conversion V" profile along with an elevated Scale 4 (Pd) predicted poor recovery from pain or from surgery in general. Increased duration of pain tended to negatively impact treatment of psychiatric patients in chronic pain management programs (Clark, 1994; Fow, et. al., 1994).

Male chronic pain patients evaluated over a three year period at a VA hospital by Armentrout, Moore, Parker, Hewett, & Feltz (1982) were given the MMPI and a pain questionnaire. The VA hospital sample was different in age, education, chronicity of problem, site of pain, and compensation status. Their cluster analysis found three male groups: a "normal" profile; a "neurotic triad" profile; and a pathologic profile with elevations on Scales F, 1 (Hs), 2 (D), 3 (Hy), 4 (Pd), 6 (Pa), and 8 (Sc). They found duration and severity of pain to be positively related to the degree of scale elevations in the MMPI profile for chronic pain patients. Also, they reported a similar trend for the disruptive influence that pain has had on the lives of their subjects. Gatchel (1996) found that as pain became more chronic, psychosocial variables played an increasing dominant role in the maintenance of pain behavior and suffering.

In an attempt to determine the extent that fear of movement/reinjury in chronic low back pain patients was related to the pain patient's behavior, it was suggested that the

association between duration of pain and the fear of movement/reinjury played an important role in the process of becoming a chronic pain patient. Also, of interest was the finding that patients receiving disability compensation reported more fear of movement/reinjury than those not receiving benefits. It would appear that this fear was responsible for the higher levels of disability, which were evident in this chronic pain population (Vlaeyen, Kole-Snijders, Boeren, and van Eck (1995) .

In evaluating patients who were entering an anesthesiologic and a psychiatric treatment program, Strassberg, et. al., (1981) found that elevations on Scales 1 (Hs), 2 (D), and 3 (Hy) seemed to consistently characterize the chronic pain patients. Significant differences between pain patients with less than six (6) months of pain compared with those in pain for longer than six (6) months were found. Also, it has been determined that pretreatment scores on these scales can successfully predict treatment outcome for back pain patients for as long as one year after treatment with lower scores on these scales being associated with better treatment outcome (McCreary et al., 1979).

In a study conducted with chronic pain patients with duration of pain ranging from less than two (2) years to more than 11 years, findings indicated that chronicity or severity of pain (as measured by history of surgery and by length of the patient's difficulties) were not associated with more elevated profiles as had been found in previous studies. All of their subjects had pain of sufficient duration to have achieved "chronic" profiles and had experienced major life disruptions for at least several months before entering the program. These types of clients were not expected to present for treatment at outpatient clinics as they had already been through the gamut of conservative treatment for pain (Keller et al., 1991).

Medical Evidence Variable

Another factor to consider in assessing chronic pain patients was whether evidence of organic etiology to support the orthopedic diagnoses existed. Chronic low back pain

patients, who presented with orthopedic symptoms from the lumbar region, with or without physical findings to support the orthopedic diagnosis, were not significantly different in their responses to the MMPI. Unfavorable prognosis was associated with significantly higher scores on the Scales 1 (Hs) and 3 (Hy) and also on the K scale. Scales 2 (D), 5 (Mf), and 7 (Pt) were of borderline significance. The other scales, as well as, sex of the patient and general intelligence level, were of no importance for prognosis. Age was highly related to a negative prognosis, but there was no significant relationship between age and the MMPI results. In an attempt to appraise the significance of psychological factors in long-term prognosis for those receiving disability benefits, Scales 1 (Hs) and 3 (Hy) were found to be better predictors than profile patterns of overall long term functioning (Akerlind, Hornquist, & Bjurulf, 1992).

Patients with chronic back pain for whom a distinct organic origin of their illness was detected, did not differ significantly from a normal population without back pain with regard to personality variables. It was important to determine whether chronic low back pain patients without organic origin of their pain developed their special personality profiles as a result of prolonged pain or whether these personality traits had existed prior to the development of symptoms. If this was in fact the case, it would have been possible to identify those individuals who ran greater risks than others of developing chronic back pain (Sivik, 1991).

Chronic pain patients presented with one profile type termed "Hypochondriasis", which was defined as having a primary elevation on Scale 1 (Hs) and secondary elevations on Scales 3 (Hy) and 2 (D), forming a "neurotic triad". These patients were described as very preoccupied with a variety of somatic symptoms, many of them unrelated to pain. This profile was most commonly found in patients with a clear organic basis for their pain (Sternback, 1974). Other studies have suggested that patients with sufficient organic pathology to account for their pain may display elevated scores on certain MMPI scales

because of the effects of pain and chronic illness rather than reflecting psychopathology (Etscheidt, Steger, & Braverman, 1995).

In one study, intervertebral disc bulges visible on MRI were as common in patients without back pain as in those with back pain (Jenson, Brant-Zawadzki, Obuchowski, Modic, Malkasian, & Ross, 1994). From these results, one could have concluded that a physical abnormality did not necessarily mean that the individual would experience pain. It was difficult to determine whether distress, poor coping, or personality traits identified in chronic pain patients were causing pain, were a reaction to pain, or were irrelevant to a pain problem (Sullivan, 2000).

It has been suggested that psychogenic pain was probably due to multiple causes and that no single cause, whether personality traits, secondary gains, or cognitive processes, was sufficient explanation. The findings did show that patients who recovered had a better income and reported more satisfaction with their medical treatment than those who remained disabled and continued complaints of chronic pain (Louks, Freeman, & Calsyn, 1978).

According to local psychologists practicing independently and in agency settings, individuals from Southern West Virginia and Eastern Kentucky with chronic low back pain issues would present with a somewhat different profile on the MMPI-2 than in pain populations from other parts of the country. They suggested that expected elevations on Scales 1 (Hs), 2 (D), and 3 (Hy) would be consistent in local populations with Scale 2 being higher (T>70) for most patients. They indicated that they see a high number of related psychological problems with chronic pain patients from this area.

Due to the lack of available research with the chronic pain populations in Southern West Virginia and Eastern Kentucky, this study was conducted to gain information

about this local population. This study performed analysis of those individuals seeking treatment at an outpatient mental health facility with the primary focus of the problem being low back pain. The following comparisons were made using a between groups design: subjects below age 35 vs. subjects age 35 and older; subjects seeking treatment with pain of less than one year's duration vs. subjects seeking treatment with pain of one year or more duration; and subjects with documented clinical evidence of back injury vs. subjects with no documented clinical evidence of back injury.

During the course of this study, the following hypotheses were addressed:

H_1) Subjects with no documented clinical evidence of orthopedic impairment would present with marked elevations (>80) on Scale 1 (Hs).

H_2) Subjects who have been injured for less than one year would present with marked elevations (> 70) of depression as noted by elevations on Scale 2 (D).

H_3) Subjects under the age of 35 would present with marked elevations (>70) of depression on Scale 2 (D).

H_4) Subjects with no documented clinical evidence of orthopedic impairment would present with marked elevations (> 80) on Scale 3 (Hy).

Method

Subjects

Sixty (60) subjects were drawn from a pool of chronic pain patients seeking treatment at Mountain Comprehensive Care Center, a local mental health center. Subjects were males and ranged from 22 to 65 years of age. Subjects were seeking treatment for depression and/or anxiety disorders with a secondary diagnosis of chronic pain. In addition, six (6) MMPI-2 profiles were retrieved from archival records of chronic low back pain patients previously tested at the mental health center.

Apparatus

The instrument used in the study was the Minnesota Multiphasic Personality Inventory-2 (MMPI-2). The MMPI-2 was a 567 item set of binary choice (true, false) statements relating to various aspects of mood, behavior, self-concept and personal preferences. It was a revised version of the original MMPI, a self-report personality inventory. It's use was restricted to qualified professionals, who have adequate training in the administration of the test. Users should be familiar with the test manual and interpretative procedures.

The MMPI was first published in 1943 and was originally developed to assist psychologists and psychiatrists in assigning appropriate psychodiagnostic labels for routine diagnostic assessment. Although a variety of measures and observational methods have been used in evaluating patients, the most widely cited objective assessment instrument used with chronic pain patients is the MMPI. Over ten thousand studies with the MMPI have been conducted.

"The original standardization of the MMPI included obtaining a large sample that would be representative of the population of the United States. Unfortunately, the sample consisted of 724 persons who were visiting friends or relatives at the University of Minnesota Hospitals. The sample was one of convenience, and little effort had been made to ensure that it was representative of the U.S. population. Standardization subjects came primarily from the geographic area around Minneapolis, Minnesota. All were white, and the typical person was about 35 years of age, married, residing in a small town or rural area, working in a skilled or semiskilled trade, and having about eight years of formal education. (Graham, 1993, p. 5)."

The need for a revision of the MMPI had been discussed for a number of years and several studies examining the relevance of the original MMPI norms for contemporary use have been reported. However, the official test norms have remained the same as when the

MMPI was first published. In 1982, the University of Minnesota Press, which held the copyright to the MMPI, initiated a project to revise the MMPI and establish new nationally representative norms for the instrument. The revision team was charged with the task of modifying the existing item pool, adding new items, and collecting new normative data on the instrument.

The MMPI-2 was normed in a restandardization project conducted with 822 couples by The University of Minnesota Press. The results of the restandardization project suggested that this instrument had both convergent and discriminate validity for the clinical scales. The scores and configuration of scores on the MMPI-2 were congruent with those obtained on the MMPI. Initial research indicated that there were reliable extratest correlates for the MMPI-2 clinical scales and code types and that these correlates were consistent with previously reported correlates for the original MMPI.

Many of the original items were rewritten to eliminate reference to a specific sex, to replace obsolete language and expression, or to eliminate cultural bias. Some of the original MMPI items were deleted in the revision because of objectionable or useless content. Some new items were included to assess characteristics such as drug abuse, suicide potential, Type-A behavioral patterns, marital adjustment, work attitudes, and treatment amenability.

The MMPI-2 booklet included all of the items necessary for scoring the standard validity and clinical scales, some new validity scales, some important supplementary scales, and a new set of content scales. The standard validity and clinical scales can be scored from the first 370 items in the booklet. The MMPI-2 items were likely to be more acceptable to and appropriate for assessing the diversity of persons now given the test. They also provided the basis for scoring some important new scales. The standard validity and clinical scales remained essentially the same in the MMPI-2 as they were in the original MMPI. Most of the standard validity and clinical scales had no items deleted, but

the largest number of items deleted from any scale was four (Scales F and 5 (Mf). Some items in the MMPI were slightly rewritten to modernize or to clarify the language.

The MMPI-2 manual reported test-retest reliability coefficients for the basic MMPI-2 validity and clinical scales. According to Graham (1993), internal consistency coefficients for the MMPI-2 validity and clinical scales were similar to typical values previously reported for the original MMPI scales. Scales 1 (Hs), 7 (Pt), 8 (Sc), and 0 (Si) appeared to be the most internally consistent scales, whereas scales 5 (Mf), 6 (Pa), and 9 (Ma) appeared to be the least internally consistent scales. A meta-analysis of MMPI studies was conducted and determined an average internal-consistency coefficient of .87 across a number of samples.

Procedures

Subjects with low back pain were assigned to three groups based on their age, duration of their pain, and whether clinical evidence to support an orthopedic diagnosis in the lumbar region was available to the author. Subjects with no documented medical evidence of an orthopedic condition were assigned to the group with no medical evidence available. Subjects were administered an MMPI-2 on an individual basis after they signed a consent form (See Appendix A) and verbally agreed to participate in this experiment. Subjects with a valid MMPI-2 in their case record were asked to sign a consent form. They, also, were requested to complete a demographic sheet containing the following information: age, race, marital status, educational level, type of injury, area of pain, duration of injury, DSM-IV diagnosis, previous back surgery, and type of medication being taken. (See Appendix A).

Administration of each MMPI-2 took 1 1/2 to 2 1/2 hours. Each MMPI-2 was hand scored and a K-corrected profile developed for each subject. No further analysis of the individual MMPI-2 data was conducted. When the MMPI-2 profile was obtained from existing patient records, the demographic sheet was completed by the author and

available orthopedic records were reviewed to determine if clinical evidence of an orthopedic diagnosis was available. Only individuals tested with the MMPI-2 were included in the study. Subjects with known or suspected severe chronic psychiatric disorders as the main treatment issues were not included in the study. Subjects whose performance was clearly below average or worse as regards to verbal understanding were excluded from the study. F scale scores (T >70) possibly indicating an invalid profile, did not result in the profile being rejected, as it was anticipated that elevations on the F scale would be somewhat typical in this chronic pain population.

This experimental research study adopted a between groups design in comparison of chronic pain patients assigned to groups based on age, duration of pain, and clinical evidence of orthopedic diagnosis. Six subgroups were addressed in the study: Group 1 A included subjects whose age range was less than 35 years of age and was compared to Group 1 B which included subjects whose age range was 35 years or older; Group 2A included subjects with pain of less than one year's duration and was compared to Group 2B, which included subjects with pain of one year or more duration; Group 3A included subjects with documented clinical evidence of back injury and was compared to Group 3B, which included individuals with no documented clinical evidence of orthopedic diagnosis.

The MMPI-2 scales (F, 1 (Hs), 2 (D) , and 3 (Hy) were the dependent variables and age, duration of pain, and clinical documentation were the independent variables. Mean profiles and standard deviations for T-score conversions were analyzed by Scales F, 1 (Hs), 2 (D), and 3 (Hy), for each group and a comparative analysis was performed.

Results

As anticipated the results of this study found significant elevations on Scales F, 1 (Hs), 2 (D), and 3 (Hy) for all groups. On the F Scale, 60% of all the scores were elevated above 70; on Scale 1 (Hs), 88.33% of all the scores were elevated above 70; on Scale 2 (D), 86.67% of all the scores were elevated above 70; and on Scale 3 (Hy), 75% of all the scores were elevated above 70.

Means and standard deviations for T-score conversions for all groups were shown in Table I. Normal mean profiles for the scales were F Scale (44.1) Standard Deviation (SD) (6.7); Scale 1 (55.9) SD (7.6); Scale 2 (48.6) SD (5.0); and Scale 3 (55.8) SD (5.6) as reported by Keller et al., 1991.

Scores on individual scales ranged from as low as 38 to as high as 120, which was the full range of T scores possible on the MMPI-2. The standard deviations for most of the scales were higher than those in the entire normative sample, suggesting that this sample was even more heterogeneous than a large group of people randomly solicited from around the country.

Statistical interpretations of data obtained was analyzed by conducting an analysis of variance at the .05 level of significance using a general linear model due to unbalanced data. F values were calculated for each variable and evaluated in comparison to the critical value of $F(1, 59) = 4.02$, $p < .05$.

On the age variable there was no evidence to indicate that age has an affect on the individual's scores on the MMPI scales in this study. All F values were below the critical

Table I

Table for Group Means and Standard Deviations (SD)

MMPI-2 Scales	Group A/B	Age Group 1		Duration Group 2		Medical Evidence Group 3	
		Means	SD	Means	SD	Means	SD
F Scale	A	78.81	23.03	70.83	22.56	82.88	22.18
	B	81.52	25.69	87.44	24.35	76.65	29.67
Scale 1	A	85.75	13.67	79.88	18.48	86.90	11.90
	B	84.68	15.13	88.36	10.37	81.10	18.75
Scale 2	A	86.06	10.90	79.96	19.44	91.03	13.81
	B	88.57	17.91	93.19	11.24	81.65	19.24
Scale 3	A	82.44	17.10	75.04	20.28	86.78	14.50
	B	82.84	17.17	87.86	12.24	74.65	19.07

value of F (1, 59) = 4.02, $p < .05$, which indicated that the means were nearly equal for each scale and there were no significant differences among groups. For Scale F the age variable was not significant, F (1, 59) = 0.14, $p < .05$; for Scale 1 (Hs) the age variable was not significant, F (1, 59) = 0.06, $p < .05$; for Scale 2 (D) the age variable was not significant, F (1, 59) = 0.27, $p < .05$; and for Scale 3 (Hy) the age variable was not significant, F (1, 59) = 0.01, $p < .05$.

On the duration of pain variable there was significant evidence to suggest that differences among the groups were as a result of duration of pain rather than due to chance on all scales. All F values were greater than the critical value of F (1, 59) = 4.02, $p < .05$. For Scale F the duration of pain variable was significant, F (1, 59) = 7.10, $p < .05$; for Scale 1 the duration of pain variable was significant, F (1, 59) = 5.17, $p < .05$; for Scale 2 the duration of pain variable was significant, F (1, 59) = 11.15, $p < .05$; and for Scale 3 the duration of pain variable was significant, F (1, 59) = 9.34, $p < .05$.

On the medical evidence variable there was significant evidence to suggest that differences among the groups were as a result of the medical evidence variable rather than due to chance on Scale 3 (Hy). The F value of Scale 2 was slightly greater than the critical value of F (1, 59) = 4.02, $p < .05$ indicating that there was evidence to suggest that there were slight differences among groups. For Scale F the medical evidence variable was not significant, F (1, 59) = 0.83, $p < .05$; for Scale 1 the medical evidence variable was not significant, F (1, 59) = 2.13, $p < .05$; for Scale 2 the medical evidence variable was slightly significant, F (1, 59) = 4.70, $p < .05$; and for Scale 3 the medical evidence variable was significant F (1, 59) = 7.53, $p < .05$.

In summary, it appeared that there were significant differences between groups on the duration of pain variable. Also, there were significant differences between groups on Scale 3 (Hy) for the medical evidence groups. There were no significant differences between groups on the age variable.

In reviewing the results of this study, it was informative to consider the frequency of T scores on each of the four Scales as divided into three groups: the mild group, which consisted of scores 69 and below; the moderate group, which consisted of scores 70 to 79; and the severe group, which consisted of scores 80 and above. For most of the scales, T scores below 70 reflected a normal pattern of responding, T scores of 70-79 reflected a somewhat higher than normal response and indicated that these individuals were manifesting clinical disorders, and T scores 80 and above indicated severe psychopathology or an exaggerated response that may reflect malingering or a "cry for help".

On Scale F, 22 subjects (36.67%) scored in the mild range, 13 subjects (20.67%) scored in the moderate range, and 25 subjects (42.66%) scored in the severe range as presented in Figure 3. On Scale 1, six (6) subjects (10%) scored in the mild range, 11 subjects (18.33%) scored in the moderate range, and 43 subjects (71.67%) scored in the severe range as presented in Figure 4. On Scale 2, 7 subjects (11.67%) scored in the mild range, five (5) subjects (8.33%) scored in the moderate range, and 48 subjects (80%) scored in the severe range as presented in Figure 5. On Scale 3, nine (9) subjects (15%) scored in the mild range, 13 subjects scored in the moderate range (21.67%), and 38 subjects (63.33%) scored in the severe range as presented in Figure 6.

Discussion

There were no significant differences between groups on Scale 1 (Hs) in the medical evidence groups. Regardless of group assignment, 71.7% of all subjects had a T-score above 80 on Scale 1 (Hs). These results suggested that medical evidence, or the lack thereof, did not impact the pain patients' scores on these MMPI scales.

Results found in this study supported the hypothesis that subjects with less than one year's duration of pain presented with marked elevations on Scale 2 (D). The mean score for this group was 79.96, but the mean score for the group with pain of more than one year's duration was 93.19 indicating that overall, this group scored higher on Scale 2 (D) than the less than one year's duration group. For this study, it appeared that subjects, who were seeking treatment for pain of more than one year's duration in an outpatient mental health setting presented themselves as more depressed than subjects with less than one year's duration of pain. One explanation was that these individual's were more likely to consider themselves as unable to help themselves and/or having little or no hope for the future.

Subjects under age 35 had a group mean score of 86.06 as compared to the 35 and older group's mean score of 88.57 on Scale 2 (D). Indications were that the majority of chronic pain patients presented with elevated scores on Scale 2 (D) regardless of age. On Scale 2 (D), 86.67% of all subjects presented with a T score above 70. There was no significant difference between groups on the age variable.

Subjects with no documented clinical evidence of orthopedic impairment presented with a group mean of 74.65 on Scale 3 (Hy) as compared to the group with documented

medical evidence with a group mean of 86.78. It appeared that the group with documented medical evidence tended to score higher on Scale 3 (Hy) than the other group. Marked elevations on Scale 3 (Hy) were suggestive of individuals, who reacted to stress and avoided responsibility by developing physical symptoms, which did not fit the pattern of any known organic disorder. These individuals may have been symptom free most of the time, but when confronted with stress they reacted immediately with physical symptoms (Graham, 1993).

In consideration of the profile types discussed in this report, the "conversion V" (elevations on Scales 1 {Hs} and 3 {Hy} at least 10 points above Scale 2 {D}), the "neurotic triad" (elevations on Scales 1 {Hs}, 2 {D}, and 3 {Hy}) with a higher elevation on Scale 2 (D), and the elevated depression scale (highest elevation on Scale 2 {D}), this study supported the existence of these profile types. In evaluating the data, there were five (5) subjects with the "conversion V" profile; 13 subjects with the "neurotic triad", but only two (2) of these subjects presented scores under the T-score of 70 as reported in the literature; and 17 subjects presented with significant elevations on Scale 2 (D) above Scales 1 (Hs) and 3 (Hy). As indicated by the findings in this study, it appeared that there were several different chronic pain profile types that presented in any given pain population.

F Scale Elevations

The F Scale was a validity scale, which, when elevated ($F \geq 90$) indicated response styles which were related to test item content, such as, malingering, exaggeration of problems and symptoms as a plea for help, a "fake-bad" response-set to

the test, or may have been unrelated to test-item content, such as, random responding, all true or all false responding, response confusion due to organic impairment or psychosis. If profile invalidity was ruled out, the F Scale served as an indicator of the extent of psychopathology with higher scores reflecting more severe psychopathology (Graham, 1993).

Elevations on the F standard validity scale were found in several studies and should have been given consideration as part of the pain profile. For example, one study was conducted comparing MMPI basic validity and clinical scale patterns for White, African, and Latino-American pain patients. They found the same high elevations for these groups on Scales 1 (Hs), 2 (D), and 3 (Hy) with the exception of Black males for whom a very substantial proportion of high points were on Scale 8 (Sc). It was common among all subgroups, and even more especially among Black males to find 1 (Hs), 2 (D), and 3 (Hy) to be the highest three elevated scales in the chronic pain profiles. For white patients, increasing elevations on the F Scale was associated with greater pain intensity and less ability to cope, while Blacks had very little association of these variables, and Latinos apparently reported a notable relation only of greater pain intensity with higher F scores. The findings with both genders included apparent differences on the validity scales, but these findings also apparently were strongly influenced, not only by ethnic group membership, but by level of education and, for males on the F Scale, duration of pain (Nelson, Novy, Averill & Berry, 1996).

The F Scale may reflect intentional exaggerated responses to certain items on the MMPI. Certain pain behaviors have been identified and are evident in most chronic pain

patients to some degree. There has been some suggestion that those behaviors would be a more impartial means to evaluate pain patients as the behaviors were considered observable and measurable and more objective than patients' self reports which may be purposely distorted. Systematic assessment of pain behaviors should contribute to the understanding of the pain experience and might have been useful in identifying social learning factors in the development and maintenance of chronic pain patients (Turk & Rudy, 1987).

High F scores (T > 70) were consistent among all groups for all variables in this study conducted in inpatient setting. Subjects may have been wary of responding appropriately to test items in an attempt to present themselves in a negative light. It was important to consider that subjects tested in an inpatient setting tended to score considerably higher on the F Scale ('faking-bad" response set) than others tested in outpatient settings. This type of response was considered to be a rare phenomenon, but Wetzler and Marlowe (1990) found it to be common in an inpatient psychiatric setting. Also, they indicated that this response may have been a reflection of high stress in the individual's lives.

Also, high F scores may have been an indication that the subjects favored endorsement of more bizarre or psychotic symptoms or characteristics; may have been useful for detecting malingering or emotional disability; may have been an indication that they were in litigation, or involved in other court evaluations with similar response patterns. Also, the evidence indicated that exaggeration of the F standard validity scale may have been reflected in this group. This group was described as preferring to use

physical symptoms as explanation for their situation, using denial by insisting that no psychological or emotional problems exist. This attitude could have accounted for selectively exaggerated profiles where most or all of the scales were somatically loaded (Dush, et al., 1994).

If we assumed that the exaggerated MMPI-2 profile merely reflected a person, who was out to fabricate for personal gain and didn't take into consideration pain patients, who endorsed anger, resentment, perceived betrayal by employers and/or coworkers, and perceived mistrust based on their experiences in the context of personal injury litigation, then we may have been treating these individuals unfairly. Based on their reports of difficulties encountered in dealing with physicians, employers, attorneys, and judges, these experiences may well have produced unusual exaggerated response patterns in pain patients (Dush et al., 1994; Grillo, Brown, Hilsabeck, Price, & Lees-Haley, 1994).

Depression Variable

Unfortunately, there was no treatment available that could consistently and permanently alleviate pain for all people. When pain became chronic, the effect on an individual could be extremely debilitating and could produce problems, which may have included depression, isolation, disruption in intimate relationships, a sense of helplessness, and medication addiction (Philips, 1987). As chronic pain persisted, various pain behaviors became increasingly independent of one another while the relationship between pain experience and pain behavior tightened progressively. The chronic pain sufferer may have been characterized as one who lost the capacity to distinguish his pain problems from other emotional and behavioral difficulties.

In considering the relationship between pain and depression, a statistical relationship was found between the presence of chronic pain and depression. Also, depression was more common among chronic pain patients than in healthy control patients without pain. Studies supported the relationship between the severity of depression and the intensity of perceived pain. It was unclear whether depression was present prior to the development of chronic pain or followed the development of pain, but there was more evidence for the depression following the pain. In understanding this relationship, there was the additional problem of determining whether common symptoms of depression including sleep impairment, changes in appetite, anhedonia, and fatigue were due to the mood state, the pain, or an underlying physical illness if one was identified (Fishbain, Cutler, Rosomoff, & Rosomoff, 1997; King, 2000).

It was not surprising that a large number of chronic pain patients were depressed, since their lives had been altered due to decreased activity, lowered self-esteem, a sense of despondency and hopelessness, and a decreased sense of control over pain. The physical condition that initiated a patient's original pain report played less and less of a role in disability over time (Gatchel, 1996).

Depression was the most common coexisting disorder found in chronic pain patients with reported prevalence approaching 100%. (Verma & Gallagher, 2000; Kleinke, 1991). Depression was apparently one psychological factor that was inextricably connected to chronic pain and was positively correlated with the severity and chronicity of chronic pain (McCreary et al., 1983). Individuals with a pain condition had higher levels of anxiety, depression, and non-pain somatic complaints. In the clinical setting, individuals

sought help for pain, which caused worry, emotional distress, and interference with social and occupational functioning. Those with multiple pain complaints were much more likely to qualify for a diagnosis of Major Depression than those with less than two pain complaints, according to Sullivan, (2000).

Also, secondary problems associated with pain complaints may have been exacerbated and served to maintain the pain problem. Inactivity led to increased focus on and preoccupation with the body and pain, and the individual's obsession with their physical condition helped to increase the likelihood of misinterpreting pain symptoms and the patient's perception of disability (Gatchel, 1996). Believing that one had little ability to control pain was related to depression (Turner & Clancy, 1986). The impact of social support on depression with chronic pain patients indicated that those who felt they had no support system were more likely to become depressed (Trief, Carnike, & Drudge (1995).

Pain alone does not appear to be sufficient condition for the development of depression. Kerns & Haythornthwaite (1987) found important similarities between the experience of depression among individuals with and without significant pain problems. Also, they found that there was a small but meaningful relationship between depression of chronic pain patients and their success in rehabilitation. Although not statistically significant, there was a tendency for the depressed subjects to show greater improvement on measures of depression than the mildly depressed and non-depressed subjects (Munley, Baines, & Bloem, 1993).

This study provided chronic pain profiles for males residing in Southern West Virginia or Eastern Kentucky similar to those found in other populations, except for the

extreme elevations found on the F Scale. The majority of the subjects were disabled coal miners or others employed in the coal mining industry, such as, truck drivers or railroad workers. It was the author's contention that the type of injuries received in these forms of employment were more severe and disabling injuries than those found in other occupations. Due to the serious nature of these injuries, recovery was often a long term process and frequently elusive to this population.

Also, wages earned in the coal mining related positions were considerably higher than most other professions in this geographical area. This discrepancy among salaries earned appeared to be the deciding factor in the individual's decision not to enter a vocational rehabilitation program or other type of education program to be re-trained for another profession. These were professions, in which wages were considerably less than what the individual would normally receive in the coal mining industry.

Standard deviations (SD) were consistently higher for these groups, than those in the entire normative sample, suggesting that this chronic pain sample was even more heterogeneous than the random group selected from across the country. Several variables, some that were not given clinical consideration in this study, may have helped contribute to these differences. The age range for these groups varied from 22 to 65 years of age. A few of the subjects were employed, but most of the subjects either received disability benefits or were seeking disability benefits. The majority of the subjects were Caucasian, except for one subject of Hispanic origin and one subject of African-American origin. Also, there were reported differences in pain intensity and number of pain complaints for subjects.

Results of this study would need to be replicated with other subjects with similar characteristics from this geographic area, as this profile does not support previous findings from other studies for pain patients. Also, this was a relatively small sample size (n = 60) and the results would have been more conclusive if repeated with a larger sample. This study could have been improved with the addition of a control group to determine how the "normal" population from this geographic area would have scored on these same variables. Also, other confounding variables that should have been controlled for were subjects who were Vietnam Veterans, subjects involved in litigation, subjects with multiple pain complaints, including pain subjects that are not part of the coal mining industry. It would have improved the quality of the information obtained, if differences between these identified groups were given consideration.

This was an intriguing area of study and the results of this study would continue to support the use of the MMPI-2 as a tool in assessment with the chronic pain population. One suggestion would be that future researchers consider using a more structured pain report questionnaire, such as, the McGill Pain Index, for subjects than the one used in this study. Also, consideration may need to be given to the differences between subjects with one pain complaint in comparison to those with multiple complaints. Future research with this population should focus on physical, behavioral, and emotional characteristics of pain patients and consider barriers to treatment. This will be of assistance in predicting treatment outcome for the chronic pain population.

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Appendix A

Consent Form
Demographic Information Sheet
Permission Letter

Appendix A

MARSHALL UNIVERSITY GRADUATE COLLEGE
CONSENT FORM

I, _____, agree to participate in psychological testing being conducted by students from the Marshall University Graduate College. I understand that the results of this testing process will be shared with Nicky M. Cooke and the College's Faculty Supervisors. This testing process is in partial fulfillment of the requirements for a Master of Arts Degree in Psychology at the Marshall University Graduate College in South Charleston, WV. The purpose of this process is to conduct research with low back pain patients and draw conclusions regarding the test results obtained in this study. Identifying information and individual results will be kept strictly confidential and will be used solely for educational purposes by the college.

_____ _____
Signature Date Signed

_____ _____
Witness Date Signed

Demographic Information Sheet

AGE_____

SEX_____

RACE_____

MARITAL STATUS

SINGLE_____

MARRIED_____

DIVORCED_____

SEPARATED_____

COHABITATING_____

EDUCATION LEVEL (List highest grade completed)

_____

(Degree Obtained - Y or N)

HIGH SCHOOL_____

VOCATIONAL SCHOOL_____

TWO YEAR COLLEGE_____

FOUR YEAR COLLEGE_____

GRADUATE COLLEGE_____

DATE OF INJURY

_____

TYPE OF INJURY

_____

SURGERY

Date_____

Type of procedure_____

PAIN LEVEL

(Circle number indicating current pain level)

LEAST		MODERATE		SEVERE
1	2	3	4	5

IDENTIFY AREAS OF PAIN

_____

_____

BENEFITS (Check all that apply)

	(Pending)	(Receiving)
WORKER'S COMPENSATION	_____	_____
SOCIAL SECURITY BENEFITS	_____	_____
OTHER BENEFITS	_____	_____

DSM-IV DIAGNOSIS

AXIS I _____

_____

MEDICATIONS _____

_____

_____

_____

Mountain Comprehensive Care Center

140 Hospital Drive
South Williamson, Kentucky 41503

MAILING ADDRESS:
P. O. Box 699
Williamson, WV 25661

Telephone: (606) 237-9871 or (606) 237-9893

Chronic Pain

KARP

August 25, 1997

Dr. Stephen O'Keefe
Marshall University Graduate College
100 Angus Peyton Drive
South Charleston, WV

RE: Nickandrea M. Cooke
Conduct of Thesis Study

Dear Dr. O'Keefe:

Nickandrea M. Cooke is an employee at Mountain Comprehensive Care Center in our South Williamson Outpatient Clinic. It is my understanding that she plans to conduct a study considering chronic pain of male outpatients in a mental health setting as her thesis topic for completion of requirements for the Masters of Arts in Psychology degree.

She has been given permission to conduct this study with clients, who are being treated at our mental health facility, provided that they are willing to volunteer and sign a written consent to the testing. I am familiar with the MMPI-2, the test that she plans to administer and feel that they should not interfere with the client's treatment. Therefore, the conduct, behavior and study are approved within the setting of this agency.

We are willing to assist Ms. Cooke in any way possible. If you need additional information or have any questions, please contact me at (606) 886-8572.

Sincerely,

Steve Schenck, M.A.
Executive Director

SS/bm

Appendix B

Tables

Table II

F Values for MMPI-2 Scales (F, 1, 2, 3)

	F Scales	Scale 1 (Hs)	Scale 2 (D)	Scale 3 (Hy)
Age	0.14	0.06	0.27	0.01
Pain	7.10*	5.17*	11.15*	9.34*
Medical Evidence	0.83	2.13	4.70*	7.53*

*Exceeds the critical value of F (1, 59) = 4.02, $p < .05$.

Table III

Raw Data Converted to T-Corrected Scores for Group 1A (Under 35 years of age)

Subject #	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#1	14	79	30	90	38	89	47	114
#2	15	82	27	84	36	85	35	84
#3	8	61	27	84	35	83	34	81
#4	44	120	33	97	43	98	35	84
#5	5	51	23	75	26	66	20	47
#6	7	58	32	94	36	85	36	86
#7	16	85	37	105	40	93	41	99
#8	12	73	30	90	41	95	36	86
#9	10	67	24	77	38	89	30	71
#10	8	61	26	81	42	97	35	84
#11	31	120	29	88	29	72	34	81
#12	26	116	31	92	37	87	39	94

(table continues)

Table III cont'd.

Subject #	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#13	23	107	30	90	42	97	38	91
#14	2	42	11	45	26	66	19	45
#15	12	73	32	94	43	98	40	96
#16	15	82	23	75	40	93	36	86
#17	28	120	32	94	40	93	33	79
#18	12	73	27	84	42	97	35	84
#19	26	116	30	90	29	72	38	91
#20	14	79	32	94	23	75	36	86

Table IV

Raw Data Converted to T-Corrected Scores for Group 1B (35 years of age and over)

Subject #	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#1	8	61	27	84	39	91	32	72
#2	8	61	27	84	41	95	31	74
#3	16	85	23	75	44	100	36	86
#4	4	48	31	92	29	72	35	84
#5	13	76	25	79	45	102	37	89
#6	2	42	14	54	17	47	20	47
#7	10	67	36	103	51	114	46	111
#8	13	76	21	70	34	81	28	66
#9	12	73	39	110	46	104	46	111
#10	10	67	36	103	51	114	46	111
#11	4	48	12	48	13	38	18	43
#12	4	48	26	81	35	83	36	86

(table continues)

Table IV (cont'd.)

Subject #	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#13	5	51	23	75	25	64	36	86
#14	12	73	28	86	44	100	38	91
#15	4	48	14	54	13	38	24	57
#16	17	89	32	94	43	98	39	94
#17	11	70	31	92	40	93	32	76
#18	18	92	29	79	47	106	48	116
#19	24	110	33	97	37	105	34	81
#20	24	110	23	75	44	100	31	74
#21	19	95	33	97	40	93	41	99
#22	24	110	35	101	43	98	41	99
#23	33	120	33	97	44	100	39	94
#24	25	113	36	103	43	98	39	94

(table continues)

Table IV (cont'd.)

Subject #	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#25	33	120	33	97	44	100	39	94
#26	22	104	30	90	40	93	32	76
#27	18	92	29	88	38	89	39	94
#28	28	120	34	99	37	87	33	79
#29	9	64	23	75	34	81	27	64
#30	26	116	17	62	38	89	32	76
#31	9	64	33	97	45	102	42	101
#32	8	61	28	86	36	85	32	76
#33	13	76	29	88	41	95	36	86
#34	5	51	26	81	28	70	30	71
#35	11	70	10	42	20	54	19	45
#36	12	73	31	92	45	102	37	89
#37	4	48	25	79	41	95	24	57

(table continues)

Table IV (cont'd.)

Subject #	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#38	24	110	26	81	34	81	32	76
#39	33	120	35	101	44	100	41	99
#40	8	61	27	84	37	87	30	71

Table V

Raw Data Converted to T-Corrected Scores for Group 2A (Duration of pain less than one year)

Subject	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#1	2	42	14	54	17	47	20	47
#2	4	48	12	48	13	38	18	43
#3	5	51	23	75	25	64	36	86
#4	4	48	14	54	13	38	24	57
#5	11	70	31	92	40	93	32	76
#6	24	110	35	101	43	98	41	99
#7	18	92	29	88	38	89	39	94
#8	28	120	34	99	37	87	33	79
#9	9	64	23	75	34	81	27	64
#10	11	70	10	42	20	54	19	45
#11	12	73	31	92	45	102	37	89
#12	4	48	25	79	41	95	24	57

(table continues)

Table V (cont'd.)

Subject	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#13	8	61	27	84	37	87	30	71
#14	8	61	27	84	39	91	32	72
#15	14	79	30	90	38	89	47	114
#16	16	85	37	105	40	93	41	99
#17	7	58	32	94	36	85	36	86
#18	5	51	23	75	26	66	20	47
#19	2	42	11	45	26	66	19	45
#20	12	73	32	94	43	98	40	96
#21	15	82	23	75	40	93	36	86
#22	28	120	32	94	40	93	33	79
#23	12	73	27	84	42	97	35	84
#24	14	79	32	94	23	75	36	86

Table VI

Raw Data Converted to T-Corrected Scores for Group 2B (Duration of pain for more than one year)

Subject #	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#1	8	61	27	84	41	95	31	74
#2	16	85	23	75	44	100	36	86
#3	4	48	31	92	29	72	35	84
#4	13	76	25	79	45	102	37	89
#5	4	67	36	103	51	114	46	111
#6	13	76	21	70	34	81	28	66
#7	12	73	39	110	46	104	46	111
#8	10	67	36	103	51	114	46	111
#9	4	48	26	81	35	83	36	86
#10	12	73	28	86	44	100	38	91
#11	17	89	32	94	43	98	39	94
#12	18	92	29	79	47	106	48	116

(table continues)

Table VI (cont'd.)

Subject #	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#13	24	110	33	97	37	105	34	81
#14	24	110	23	75	44	100	31	74
#15	19	95	33	97	40	93	41	99
#16	33	120	33	97	44	100	39	94
#17	25	113	36	103	43	98	39	94
#18	33	120	33	97	44	100	39	94
#19	22	104	30	90	40	93	32	76
#20	26	116	17	62	38	89	32	76
#21	9	64	33	97	45	102	42	101
#22	8	61	28	86	36	85	32	76
#23	13	76	29	88	41	95	36	86
#24	5	51	26	81	28	70	30	71

(table continues)

Table VI (cont'd.)

Subject #	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#25	24	110	26	81	26	81	32	76
#26	33	120	35	101	44	100	41	99
#27	23	107	30	90	42	97	38	91
#28	26	116	31	92	37	87	39	94
#29	31	120	29	88	29	72	34	81
#30	8	61	26	81	42	97	35	84
#31	10	67	24	77	38	89	30	71
#32	12	73	30	90	41	95	36	86
#33	44	120	33	97	43	98	35	84
#34	8	61	27	84	35	83	34	81
#35	15	82	27	84	36	85	35	84
#36	26	116	30	90	29	72	38	91

Table VII

Raw Data Converted to T-Corrected Scores for Group 3A (With medical evidence of orthopedic conditions)

Subject #	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#1	4	48	12	48	13	38	18	43
#2	24	110	35	101	43	98	41	99
#3	18	92	29	88	38	89	39	94
#4	14	79	30	90	38	89	47	114
#5	12	73	32	94	43	98	40	96
#6	28	120	32	94	40	93	33	79
#7	15	82	27	84	36	85	35	84
#8	8	61	27	84	35	83	34	81
#9	12	73	30	90	41	95	36	86
#10	10	67	24	77	38	89	30	71
#11	8	61	26	81	42	97	35	84
#12	31	120	29	88	29	72	34	81

(table continues)

Table VII (cont'd.)

Subject #	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#13	26	116	31	92	37	87	39	94
#14	23	107	30	90	42	97	38	91
#15	5	51	26	81	28	70	30	71
#16	13	76	29	88	41	95	36	86
#17	8	61	28	86	36	85	32	76
#18	26	116	17	62	38	89	32	76
#19	25	113	36	103	43	98	39	94
#20	19	95	33	97	40	93	41	99
#21	24	110	23	75	44	100	31	74
#22	18	92	29	79	47	106	48	116
#23	12	73	28	86	44	100	38	91
#24	10	67	36	103	51	114	46	111
#25	12	73	39	110	46	104	46	111

(table continues)

Table VII (cont'd.)

Subject #	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#26	13	76	21	70	34	81	28	66
#27	4	67	36	103	51	114	46	111
#28	13	76	25	79	45	102	37	89
#29	4	48	31	92	29	72	35	84
#30	16	85	23	75	44	100	36	86
#31	8	61	27	84	41	95	31	74
#32	12	73	31	92	45	102	37	89
#33	8	61	27	84	37	87	30	71
#34	12	73	27	84	42	97	35	84
#35	44	120	33	97	43	98	35	84
#36	24	110	26	81	34	81	32	76
#37	22	104	30	90	40	93	32	76
#38	17	89	32	94	43	98	39	94

Table VIII

Raw Data Converted to T-Corrected Scores for Group 3B (With no medical evidence of orthopedic condition)

Subject	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#1	2	42	14	54	17	47	20	47
#2	11	70	31	92	40	93	32	76
#3	28	120	34	99	37	87	33	79
#4	9	64	23	75	34	81	27	64
#5	11	70	10	42	20	54	19	45
#6	8	61	27	84	39	91	32	72
#7	16	85	37	105	40	93	41	99
#8	5	51	23	75	26	66	20	47
#9	2	42	11	45	26	66	19	45
#10	15	82	23	75	40	93	36	86
#11	9	64	33	97	45	102	42	101
#12	33	120	33	97	44	100	39	94

(table continues)

Table VIII

Subject #	F Scale		Scale 1(Hs)		Scale 2(D)		Scale 3(Hy)	
Scores	Raw	T	Raw	T	Raw	T	Raw	T
#13	33	120	35	101	44	100	41	99
#14	24	110	33	97	37	105	34	81
#15	4	48	26	81	35	83	36	86
#16	5	51	23	75	25	64	36	86
#17	4	48	14	54	13	38	24	57
#18	33	120	33	97	44	100	39	94
#19	14	79	32	94	23	75	36	86
#20	26	116	30	90	29	72	38	91
#21	4	48	25	79	41	95	24	57
#22	7	58	32	94	36	85	36	86

Appendix C

Figures

Figure 1. Bar Graph indicating the percentage of subjects in each of two groups on three different variables. On the age variable, Group 1A (n = 16) and Group 1B (n = 44), on the duration of pain variable, Group 2A (n = 24) and Group 2B (n = 36); and on the existence of medical evidence variable Group 3A (n = 40) and Group 3B (n = 20).

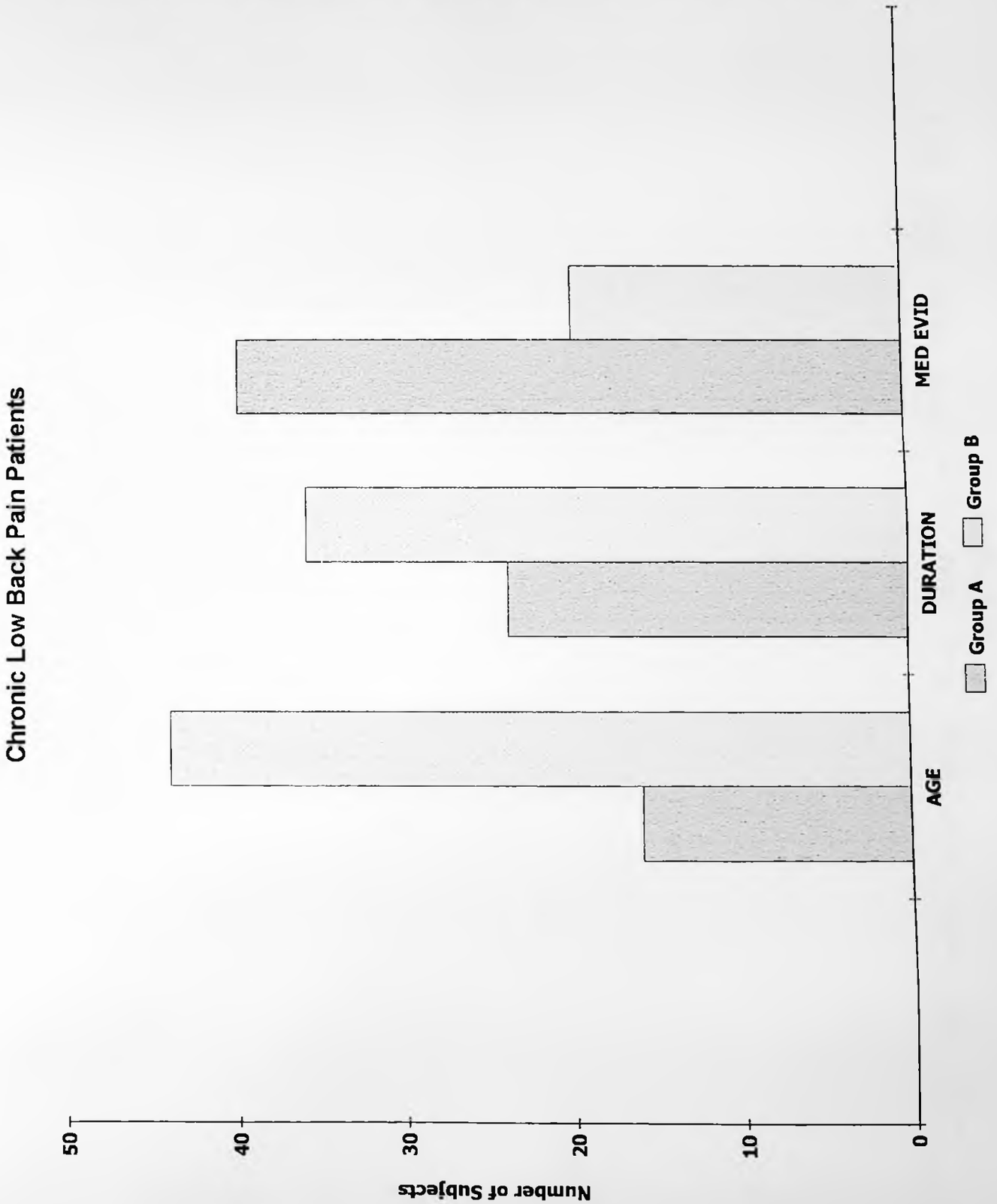

Chronic Low Back Pain Patients
Number of Subjects
0
10
20
30
40
50
AGE
DURATION
MED EVID
Group A
Group B

Figure 2. Frequency Distribution for ages of all subjects participating in the study.

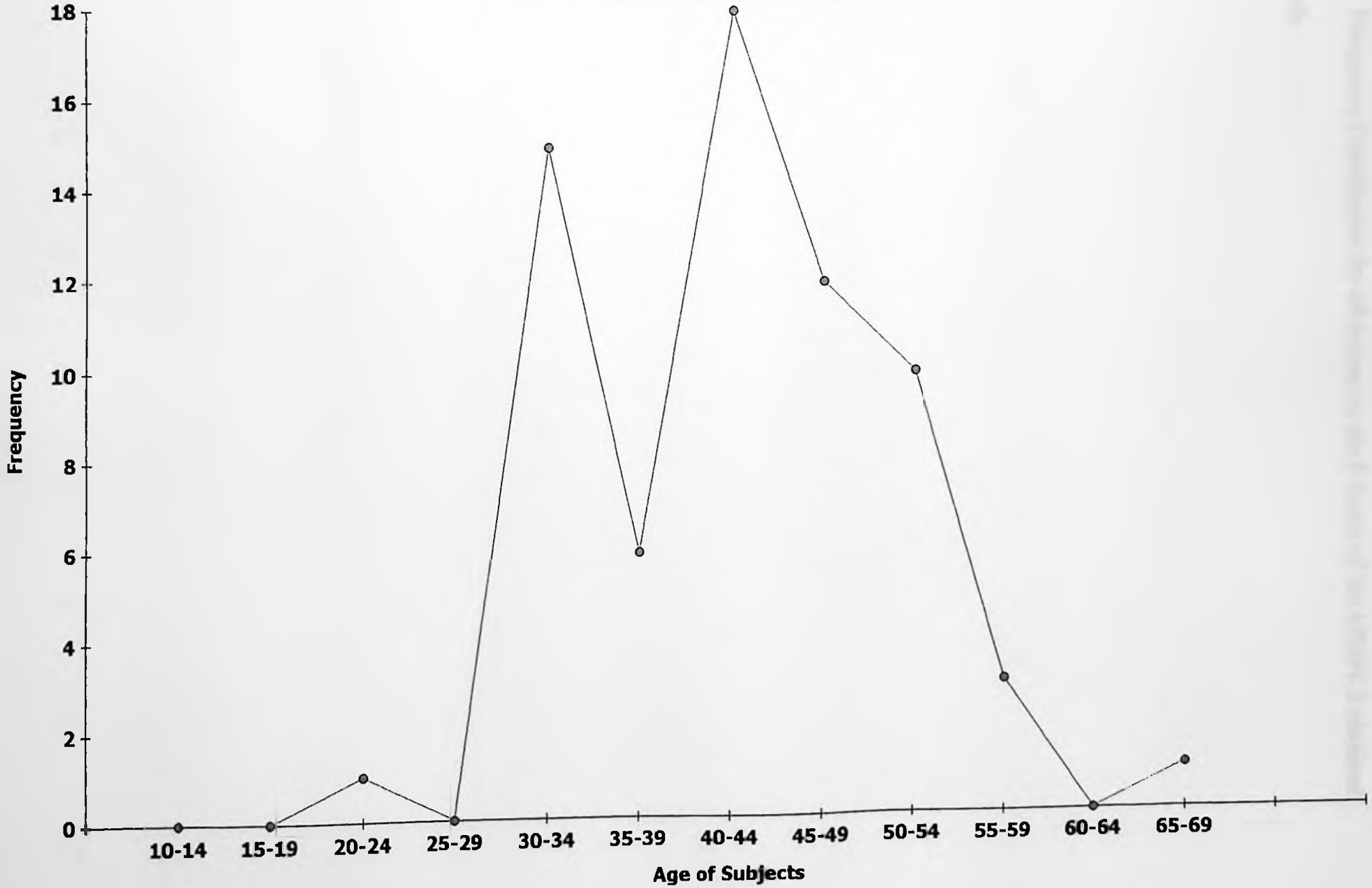

Frequency Distribution for Ages
Frequency
18
16
14
12
10
8
6
4
2
0
10-14
15-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
Age of Subjects

Figure 3. Frequency Distribution for all scores on the F Scale of the MMPI-2 obtained in this study.

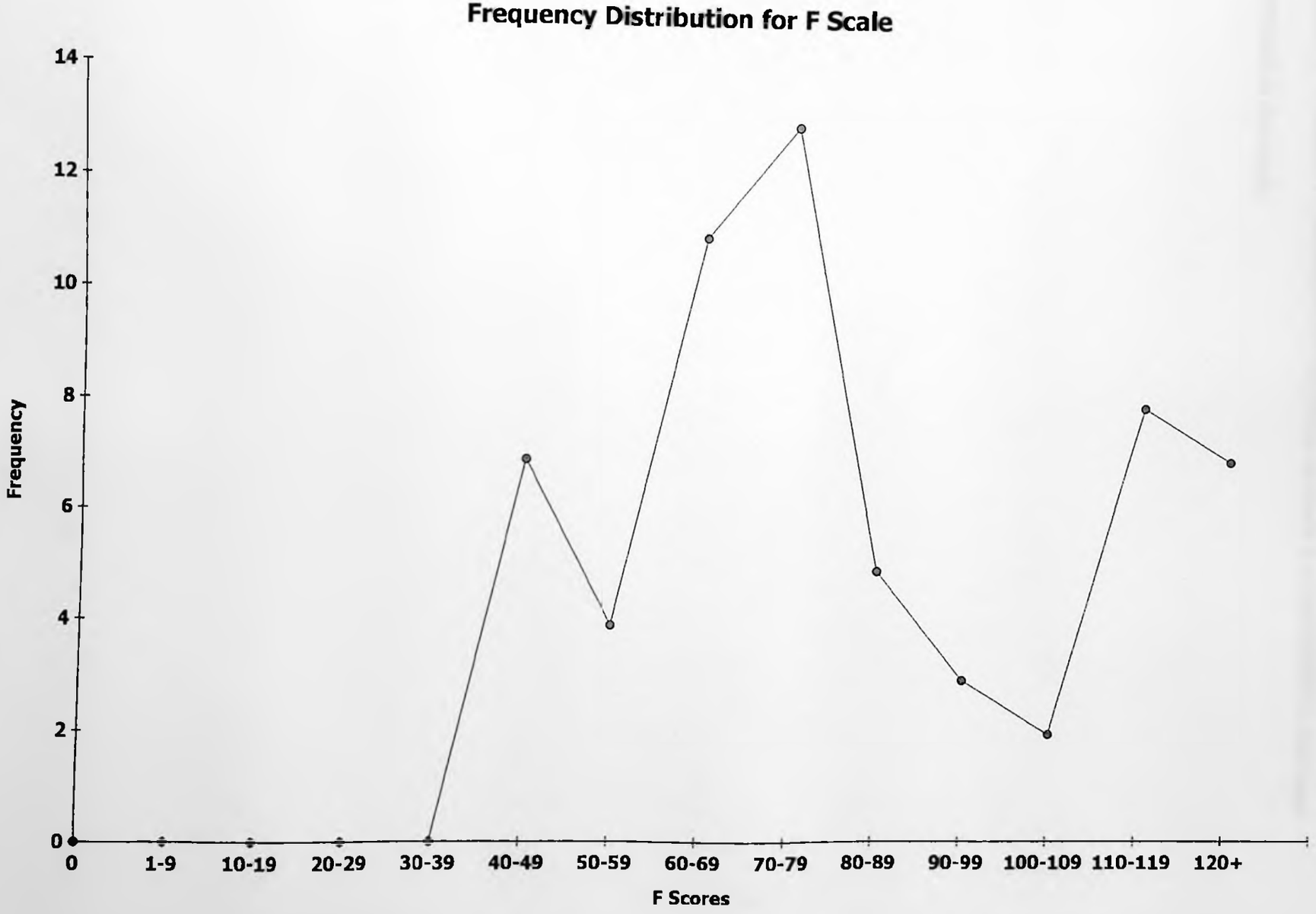

Frequency Distribution for F Scale
Frequency
14
12
10
8
6
4
2
0
0
1-9
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
90-99
100-109
110-119
120+
F Scores

Figure 4. Frequency Distribution for all scores on Scale 1 of the MMPI-2 that were obtained in this study.

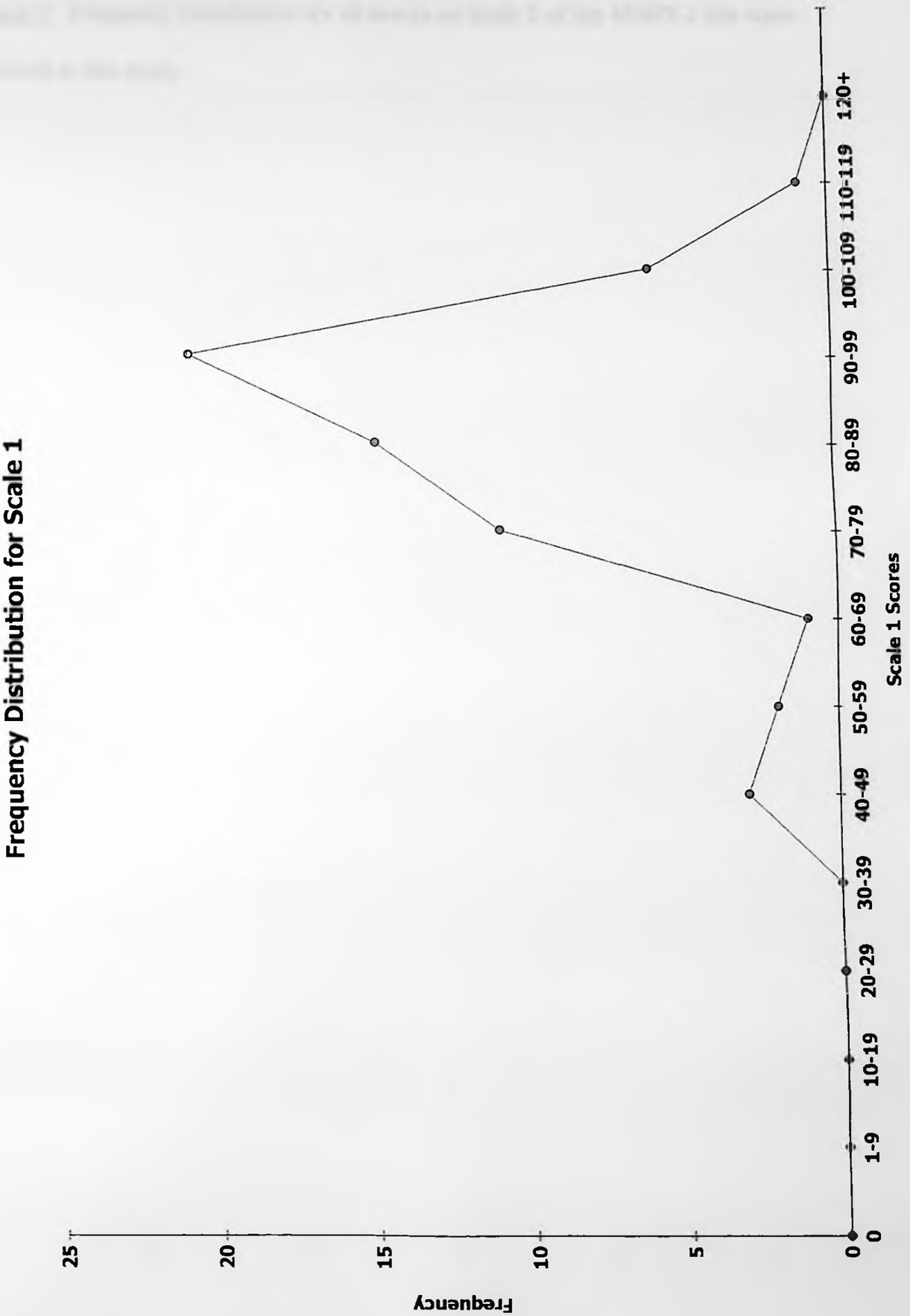

Frequency Distribution for Scale 1
Frequency
0
5
10
15
20
25
1-9
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
90-99
100-109
110-119
120+
Scale 1 Scores

Figure 5. Frequency Distribution for all scores on Scale 2 of the MMPI-2 that were obtained in this study.

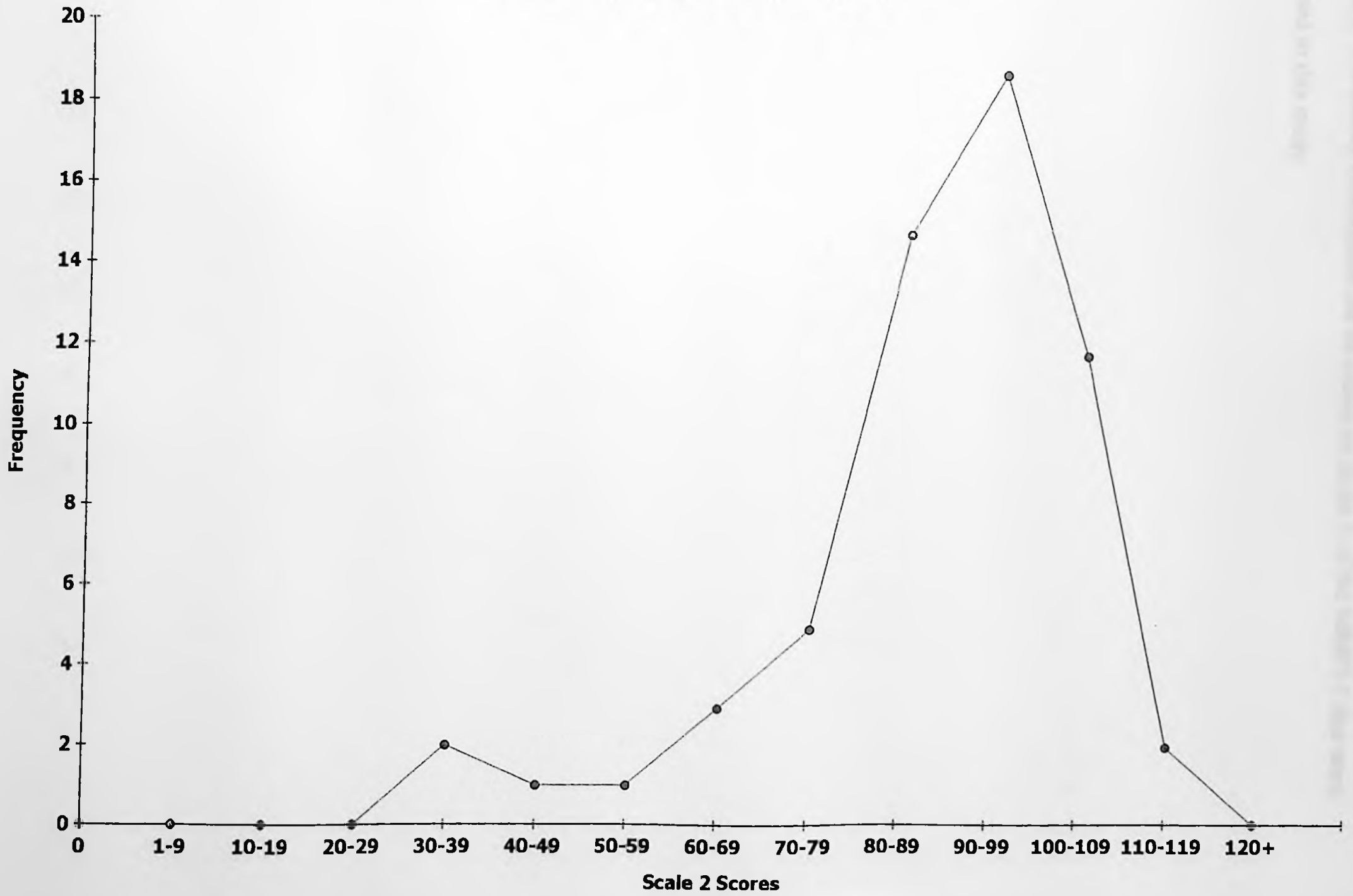
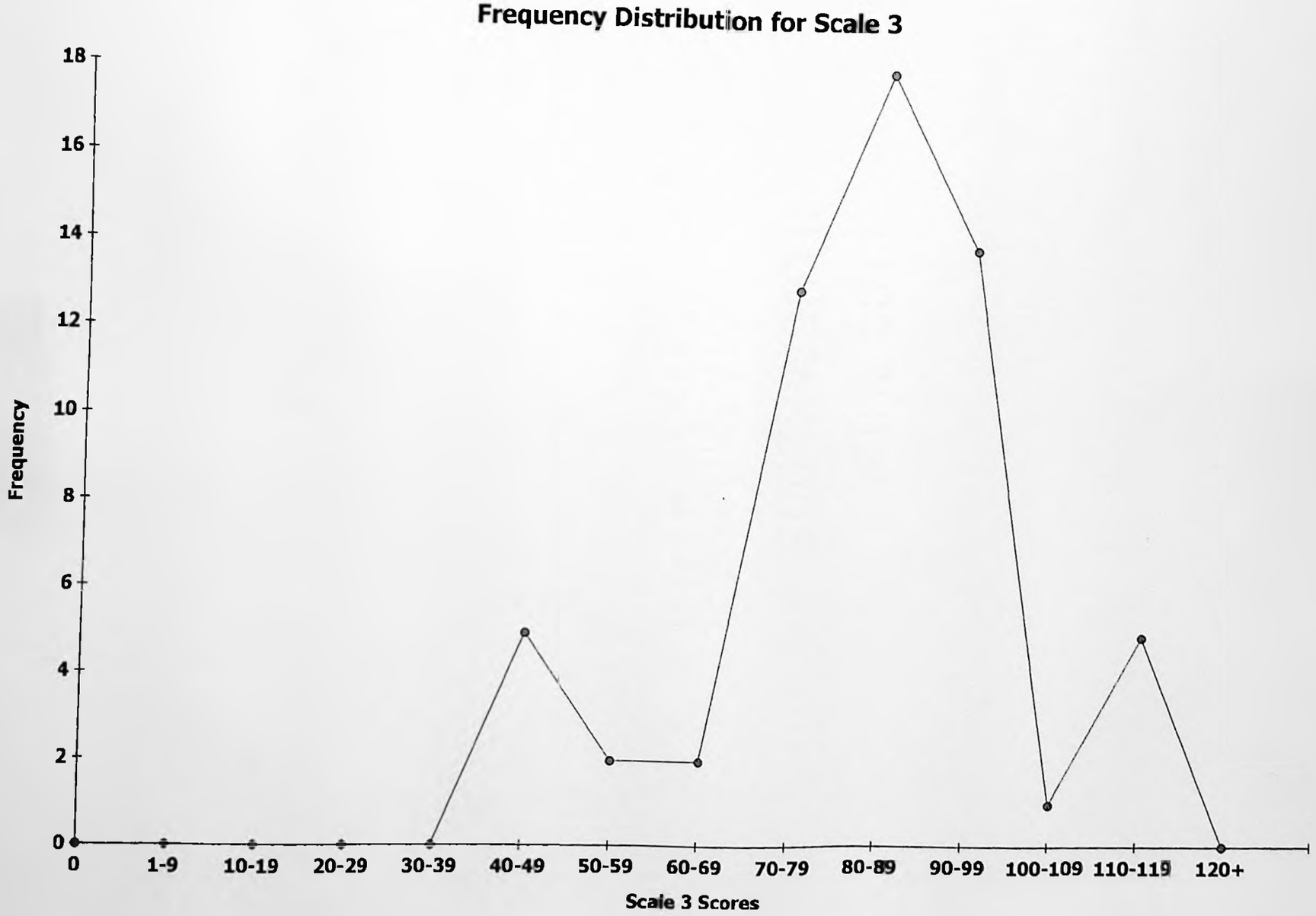

Frequency Distribution for Scale 2
Frequency
20
18
16
14
12
10
8
6
4
2
0
0
1-9
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
90-99
100-109
110-119
120+
Scale 2 Scores

Figure 6. Frequency Distribution for all scores on Scale 3 of the MMPI-2 that were obtained in this study.


Frequency Distribution for Scale 3
Frequency
18
16
14
12
10
8
6
4
2
0
0
1-9
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
90-99
100-109
110-119
120+
Scale 3 Scores