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MMPI–2 Personality Psychopathology Five (*PSY–5*) and Prediction of Treatment Outcome for Patients With Chronic Back Pain

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This study investigated the utility of the MMPI–2-based Personality Psychopathology Five (*PSY–5*) scales (Harkness, McNulty, & Ben-Porath, 1995) in the outcome prediction of behaviorally oriented chronic-pain treatment. The *PSY–5* is a dimensional descriptive system for personality and its disorders. The sample consisted of 120 consecutive chronic-back-pain patients who followed a 4-week multimodal treatment program aimed at achieving a normal pattern of functioning, including return to regular work. The psychometric properties of the *PSY–5* scales (Aggressiveness, Psychoticism, Constraint, Negative Emotionality/Neuroticism, and Positive Emotionality/Extraversion) were highly similar to the data reported by Harkness et al. (1995) and also corresponded to the characteristics of chronic-pain patients. The results of the hierarchical regression analyses provided support for the utility of the *PSY–5* Positive Emotionality/Extraversion scale for the prediction of emotionally oriented outcome. We conclude that the *PSY–5* model of personality psychopathology provides a solid basis for the more systematic study of the complex relation between personality characteristics and multidimensional treatment.

In this age of short-term treatment and managed care, psychological assessment has become quite important. Explicit, integrated, and empirically based models of treatment selection have also become critical (Norcross & Beutler, 1997). Treatment is more likely to succeed when a clinician has clear insight into the problems

and peculiarities of a patient at a very early stage in the treatment process. Such insight enables not only the formulation of efficient treatment strategies but also the effective building of rapport with the patient. In addition, the patient's personality may be an important facilitator of or barrier to change and should, therefore, be recognized during assessment as well. Personality assessment may thus be important for the behavior-oriented treatment of chronic pain. In fact, behavioral change and, to a lesser degree, emotional change are always necessary in such cases to achieve functional improvement or pain relief and are often facilitated by a personal bond with the treatment staff. There are also studies that weaken support for the benefits of personality assessment; for example, Vittengl, Clark, Owen-Salter, and Gatchel (1999) found that a clinical interview rather than self-report for personality pathology is more effective in predicting chronic-pain patients' response to treatment.

In the early chronic-pain research, personality factors have typically been studied in terms of etiology. Well known in this regard is Engel's (1959) formulation of the "pain-prone personality." Engel suggested that a propensity to pain proneness and suffering is more common in individuals with early and pathological experiences with suffering, guilt, and anger. In current empirically oriented chronic-pain research, personality is studied cross-sectionally and in terms of how certain traits relate to pain variables and other psychological measures. For example, patients who score high on neuroticism report higher levels of emotional distress than patients who score low on this trait (BenDebba, Torgerson, & Long, 1997).

Personality factors have also been studied in the prediction of treatment outcome among patients with chronic pain. Considerable empirical work on this front has been conducted using the Minnesota Multiphasic Personality Inventory (MMPI) or the MMPI-2 (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989). In several studies, patients with more disturbed MMPI profiles have been shown to have less positive treatment outcomes after participation in multidisciplinary chronic-pain programs than less disturbed patients (Vendrig, in press). On the basis of such research, we can conclude that personality is indeed relevant to the prediction of treatment outcome, but exactly which personality factors are most relevant, and just how they relate to treatment outcome, remains unknown. To date, the basic scales of the MMPI-2 have been empirically derived and are not based on any theory of personality. Thus, no attempts have been made as yet to systematically study the role of personality in the outcome of multidisciplinary chronic-pain treatment.

The MMPI-2 Personality Psychopathology Five (*PSY-5*; Harkness, McNulty, & Ben-Porath, 1995) scales may be a solution to the aforementioned problem. Harkness and McNulty (1994) developed the *PSY-5* constructs by analyzing the fundamental topics and theories of personality disorders, normal personality trait terms, and the five-factor model of personality based on normal samples (e.g., Costa & McCrae, 1990). The *PSY-5* constructs are summarized in Table 1. The

TABLE 1
Description of PSY-5 Constructs—Scales

<i>Scale</i>	<i>Description</i>
1. Aggressiveness	<i>PSY-5</i> Aggressiveness entails dispositional differences in agonal behavior and offensive aggression in particular. Grandiosity versus egalitarianism and the desire for power and influence are also features of <i>PSY-5</i> Aggressiveness.
2. Psychoticism	<i>PSY-5</i> Psychoticism entails “thinking away from reality” or a predilection for primary rather than secondary process, that is, the degree of reality contact.
3. Constraint	<i>PSY-5</i> Constraint includes features of control versus impulsiveness, harm avoidance (physical risk aversion), and traditionalism. Rule following versus rule breaking and criminality are other prominent features of this construct.
4. Negative Emotionality/Neuroticism	<i>PSY-5</i> Negative Emotionality/Neuroticism is a broad affective disposition to experience negative emotions, especially anxiety and nervousness.
5. Positive Emotionality/Extraversion	<i>PSY-5</i> Positive Emotionality/Extraversion is a broad disposition to experience positive affects, seek and enjoy social experiences, and have the energy to pursue life’s goals and tasks.

Note. *PSY-5* = Personality Psychopathology Five.

PSY-5 constructs of Aggressiveness, Constraint, Negative Emotionality/Neuroticism, and Positive Emotionality/Extraversion closely resemble the four factors in the general model of personality offered by Watson, Clark, and Harkness (1994) and four of the Alternative Five (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). *PSY-5* Psychoticism is related to Tellegen’s (1982) primary factor of Absorption. The psychometric properties of the MMPI-2 *PSY-5* scales appear to be good. The alphas range from .65 to .88; these strong and consistent findings resemble those for Tellegen’s (1982) Multidimensional Personality Questionnaire (Harkness et al., 1995).

The purpose of this study was to study the ability of the MMPI-2 *PSY-5* scales to predict behaviorally oriented chronic-pain treatment outcome. We had no specific hypotheses concerning which *PSY-5* scales would predict what types of outcome measures. Moreover, to our knowledge the MMPI-2 *PSY-5* scales have not as yet been studied in the prediction of treatment outcome, in response to chronic-pain treatment or any other type of treatment. Thus, this study can be regarded as largely exploratory. Multiple outcome measures were used to determine treatment success; these included measures of depression,

pain, functional disability, physical capacity, satisfaction with the treatment, and return to work.

METHOD

Participants

The participants consisted of 120 consecutive referrals (78 men, 42 women) to the Netherlands Back Advice Center (*Rug AdviesCentra Nederland*), which is a network of multidisciplinary assessment and intervention centers for people who suffer from chronic spinal disorders. The participants had no structural pathology of the spine and had pain symptoms of at least 3 months duration. Moderate degenerative changes of the intervertebral disc were not regarded as structural pathology. The mean age of the participants was 41.3 years ($SD = 9.0$). The mean duration of the symptoms was 47.6 months ($SD = 37.6$), with an average absence from work due to back pain of 14.0 months ($SD = 8.2$). The participants' educational backgrounds were distributed as follows: 96 (80%) had at least an elementary, high school, or higher (nonuniversity) education; 24 participants (20%) had a university education.

Overview of Treatment Program

The treatment program was an outpatient multimodal treatment program with the aim of restoring a normal pattern of daily functioning, including a complete return to work. Treatment was given daily, and the program had a duration of 4 weeks. Decrease of pain or improvement of pain coping were not the direct aims of the program. The program is based on the functional restoration approach (Mayer et al., 1987) and includes many of the principles outlined by Fordyce (1976). The patients participated in groups of about 6.

The professionals involved in the treatment were a clinical psychologist, a physical therapist, an occupational therapist, and an orthopedic surgeon or neurologist. The professionals worked as a solid team and consulted on a daily basis. All of the clinicians provided group sessions, which included back school, discussion of deep-rooted beliefs about symptoms and disabilities, and education on stress management. The physical training occurred according to operant learning principles (graded activity) and was aimed at the elimination of inadequate pain behaviors and the restoration of muscle strength endurance as well as aerobic fitness. Activities such as swimming and squash were also part of the program. The occupational therapist assisted the patient in the process of returning to work. The clinical psychologist provided 12 group sessions in which an eclectic approach was adopted to identify and modify maladaptive behaviors, enhance adequate coping skills, and improve emotional awareness.

Instruments

Predictor Measure

MMPI-2. The Flemish/Dutch version of the MMPI-2 (Derksen, de Mey, Sloore, & Hellenbosch, 1996) was used. The MMPI-2 is a 567-item self-report measure of psychopathology and personality. The validity of the MMPI-2 has been established in many studies (for a review, see Graham, 1993). The continuity between the MMPI and the MMPI-2 was demonstrated by Graham, Timbrook, Ben-Porath, and Butcher (1991). The Flemish/Dutch version of the MMPI-2 has its own normative database, which consists of 1,244 people representative of the Dutch society. The Dutch norms of the MMPI-2 correspond well with the U.S. norms (de Mey & Derksen, 1995; Sloore, Derksen, de Mey, & Hellenbosch, 1996).

Outcome Measures

Pain intensity. We used the Visual Analogue Scale (VAS; Duncan, Bushnell, & Lavigne, 1989) to assess the intensity of the pain experienced by a patient along a 10-cm line. The VAS score can vary from 0 (*no pain*) to 100 (*the worst pain ever experienced*). The patient is asked to estimate the average amount of pain for the last week, including the current day.

Self-reported disability. The Quebec Back Pain Disability Scale (QBPDS; Kopec et al., 1995) is a validated self-report measure of disability that is due to back pain symptoms. In this study, we used the Dutch translation of the QBPDS (Schoppink, van Tulder, Koes, Beurkens, & de Bie, 1996). The QBPDS was constructed using a conceptual approach to disability assessment and the empirical methods of item development, analysis, and selection. The test-retest reliability and Cronbach's alpha for the Dutch adaptation of the QBPDS are .90 and .95, respectively (Schoppink et al., 1996).

Fear of movement. We assessed fear of movement with the Isostation B200 (Isotechnologies, Inc., Hillsborough, NC). The Isostation B200 is a triaxial dynamometer that measures isometric and dynamic trunk muscle performance (angular position, angular velocity, and torque). The reliability of the Isostation has been demonstrated in many studies (e.g., Newton & Waddell, 1993). However, the validity of the Isostation in terms of "objective" trunk muscle fitness has been challenged, and the Isostation has therefore been recommended as a machine that assesses the actual behavior-effort of the patient (Newton & Waddell, 1993). Studies have shown the Isostation performance of back pain patients—in particular, their

extension—to be affected by pain behavior (Cooke, Menard, Beach, Locke, & Hirsch, 1992; Menard, Cooke, Locke, Beach, & Butler, 1994). We therefore selected maximal isometric extension (MISE) to provide a measure of fear of movement. We corrected the MISE scores for sex.

Satisfaction with treatment. The Client Satisfaction Questionnaire (CSQ; Nguyen, Attkinsson, & Stegner, 1983) is an 8-item measure of an individual's satisfaction with treatment. The CSQ is frequently used in psychotherapy outcome research to provide an index of treatment success from the point of view of the patient. In chronic-pain research, this aspect of treatment outcome has been largely neglected. We therefore adapted the questions from the CSQ to our program. Cronbach's alpha was .86 in this study.

Self-rated emotional change. At a 6-month follow-up, we asked participants to rate the emotional change they underwent between preprogram and follow-up on a 5-point Likert scale that ranged from 1 (*no emotional change*) to 5 (*considerable emotional change*).

Other outcome criteria. At the 6-month follow-up we documented whether the patient had achieved the goals of normal daily functioning. *Normal functioning* meant complete return to work (i.e., pre-illness level of work demand), no single use (that also means no incidental use) of analgesics or any other drug during the past 6 months to reduce pain symptoms, and no medical or paramedical treatment for back pain symptoms during the past 6 months. The actual return to work was able to be pretty reliably documented, because the occupational therapist was involved in the patient's work reintegration process. However, the other two criteria (no pain medication and no medical or paramedical treatment) were based only on self-report, and therefore the potential of some underreporting cannot be ignored.

Procedure

About 2 weeks after the multidisciplinary assessment, each patient and his or her partner were informed about the assessment results by the orthopedic surgeon and clinical psychologist. If no structural pathology of the spine were present, and both the occupational therapist and the patient expressed a desire for the patient to participate in the treatment program, the occupational therapist organized this and consulted with the patient's employer about reintegrating the patient into work. As part of the preprogram multidisciplinary assessment, each patient completed the

MMPI-2 using the computer administration scoring system (Theuns et al., 1994). The possibility of skipping items was not allowed, which resulted in a cannot-say score of 0 whenever applicable. The following criteria were applied to determine the validity of the MMPI-2 profiles: *T* score below 80 on the Variable Response Inconsistency scale (VRIN), *T* score below 80 on the True Response Inconsistency scale, raw *F* score below 27, and a raw *F_B* score below 23 (Graham, Watts, & Timbrook, 1991). We excluded two participants because their VRIN scale scores were over 80. The outcome measures were assessed during multidisciplinary assessment as well as at the 6-month follow-up. The other outcome measures (return to work, no use of analgesics, and no medical consumption) were obtained at the 6-month follow-up meeting.

RESULTS

The mean MMPI-2 profile found for the basic scales is similar to that reported for most chronic-pain populations. Scale 1 (Hypochondriasis; $M = 66.1$, $SD = 11.3$) and Scale 3 (Hysteria; $M = 63.7$, $SD = 13.3$) produced the highest mean scores, whereas Scale 2 (Depression; $M = 57.4$, $SD = 11.4$) and Scale 7 (Psychasthenia; $M = 56.8$, $SD = 9.2$) produced the next highest scores (e.g., Keller & Butcher, 1991). The mean score for Scale 1 was somewhat lower than the mean typically reported in the literature. This is most likely due to the outpatient setting and the heterogeneous nature of our sample with regard to the severity of the complaints.

Descriptive Statistics for the MMPI-2 PSY-5 Scales

We first examined the psychometric properties of the PSY-5 scales and then compared them with the psychometric data reported by Harkness et al. (1995) for five different samples: two psychiatric samples, a chemical dependency sample, a college sample, and the MMPI-2 normative sample. In our sample, the results were quite similar for men and women; we therefore conducted the remaining analyses on a single sample. Harkness et al. also found no significant differences across sexes for the PSY-5 scales. Table 2 shows the means, ranges, standard deviations, and alphas for each of the PSY-5 scales.

As can be seen, the means for the PSY-5 scales of Aggressiveness, Psychoticism, and Constraint highly resemble those for the MMPI-2 normative sample. It is interesting that the mean for the PSY-5 Negative Emotionality/Neuroticism scale in Table 2 is lower than the mean for the MMPI-2 normative sample (10.46). The relatively low mean for the PSY-5 Negative Emotionality/Neuroticism scale in our sample is most likely due to test defensiveness (the mean *T* scores on Scales *L* and *K* for our sample were 52.90 and 54.61, respectively). Other researchers have also

TABLE 2
Descriptive Statistics for *PSY-5* Scales

<i>Scale</i>	<i>Item</i>	<i>MMPI-2</i>			<i>This Sample</i> ^b		
		<i>Normative Sample</i> ^a			<i>M</i>	<i>SD</i>	α
		<i>M</i>	<i>SD</i>	α	<i>M</i>	<i>SD</i>	α
Aggressiveness	18	7.41	2.97	.68	7.05	2.74	.65
Psychoticism	25	3.48	2.75	.70	3.60	3.93	.56
Constraint	29	17.08	4.19	.71	17.85	3.52	.64
Negative Emotionality/Neuroticism	33	10.46	5.67	.84	8.63	4.57	.78
Positive Emotionality/Extraversion	34	23.14	4.31	.71	20.71	3.93	.63

Note. *PSY-5* = Personality Psychopathology Five; *MMPI-2* = Minnesota Multiphasic Personality Inventory-2.

^a*n* = 2,567. ^b*n* = 118.

TABLE 3
Intercorrelations for *PSY-5* Scales and Correlations With the Welsch *A* and *R* Scales

	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>A</i>	<i>R</i>
1. Aggressiveness	—	.32	-.21	.19	.21	.09	-.42
2. Psychoticism		—	.24	.41	.00	.47	-.26
3. Constraint			—	.07	-.07	-.20	.21
4. Negative Emotionality/Neuroticism				—	.16	.74	-.33
5. Positive Emotionality/Extraversion					—	-.36	-.42

Note. *PSY-5* = Personality Psychopathology Five; *A* = Anxiety; *R* = Repression.

found relatively high mean *T* scores on Scales *L* and *K* for chronic-pain patients (e.g., Clark, 1996). The mean score on Positive Emotionality/Extraversion (20.71) is lower than the mean for the *MMPI-2* normative sample (23.14) but corresponds to the (lower) means found for other clinical samples.

The pattern of the alphas shown in Table 2 is akin to the patterns of the alphas reported by Harkness et al. (1995). The low alpha for Psychoticism (.65) may be a result of the relatively low mean score found for this scale. Harkness et al. also found that samples with relatively low mean scores on Psychoticism have lower alphas.

Table 3 shows the intercorrelations for the *PSY-5* scales and the correlations of the *PSY-5* scales with Welsch's (1956) factor scales. Welsch Anxiety (*A*) and Repression (*R*) are the two largest factors from the *MMPI-2*. The *A* scale is a general maladjustment factor. High scores on the *A* scale are associated with greater psychopathology. The *R* scale is the second largest factor of the *MMPI-2*. High *R*-scale scorers are internalizing individuals who have adopted careful and cautious lifestyles (Graham, 1993). The pattern of the intercorrelations and the corre-

lations with *A* and *R* are highly similar to the results of Harkness et al. (1995). In short, the psychometric properties of the *PSY-5* scales are quite similar to those for the data reported by Harkness et al.; the existing differences, moreover, reflect the characteristics of chronic-pain patients.

Description of Outcome Results

The means and standard deviations for the outcome measures assessed at pre-program and at follow-up are shown in Table 4. As can be seen, substantial improvements were obtained on all of the outcome measures. Although the program was not specifically aimed at pain reduction, we observed an average of about 50% pain relief. The most substantial improvement was observed with regard to fear of movement. The mean improvement in fear of movement was more than 1 *SD* of the mean preprogram score. The mean total score for the CSQ was 30.45 (*SD* = 3.83), whereas the mean item score for the CSQ was 3.81 (*SD* = 0.48). Because the CSQ items are measured along a 5-point Likert scale (1 = *very unsatisfied*, 5 = *very satisfied*), this means that the program was evaluated fairly positively. The mean score along the 5-point rating scale for emotional change was 3.56 (*SD* = 1.25). With regard to the other outcome measures, 87% of the participants achieved a complete (100%) return to work at the 6-month follow-up, 93% reported no medical or paramedical treatment for back pain between program termination and 6-month follow-up, and 82% of the participants had not used any medication to manage pain since termination of the treatment program. In sum, substantial improvement was obtained in all domains.

Prediction of Treatment Outcome

We examined the adequacy of the *PSY-5* scales as predictors of treatment outcome in a series of hierarchical regression analyses. In each series age, duration of the pain and education were first entered as a control block of variables; that is, age,

TABLE 4
Outcome Measures at Preprogram and Follow-Up

<i>Outcome Measure</i>	<i>Preprogram</i>		<i>Follow-Up</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Pain intensity (VAS)	46.3	21.0	25.7	25.8
Disability (QBPDS)	32.5	13.5	4.4	13.5
Fear of movement (MISE)	92.2	44.8	158.3	46.7

Note. VAS = Visual Analogue Scale; QBPDS = Quebec Back Pain Disability Scale; MISE = maximal isometric strength extension.

pain duration and education have been clearly shown to relate to the severity of chronic-pain symptoms (e.g., Aronoff & Evans, 1982). We computed difference scores for the outcome measures assessed at pretreatment and follow-up (i.e., VAS, QBPDS, MISE). We used difference scores rather than follow-up scores because personality (i.e., the *PSY-5* scales) is hypothesized to influence treatment gains. Theoretically, moreover, there was no particular reason to suspect a direct relation between the *PSY-5* scales and the outcome variables. In these analyses, the pretreatment scores were also entered in the first block as control variables. In each series, the *PSY-5* scale was then entered in the second block. This analysis was repeated for each outcome variable. The results of the regression analyses are presented in Table 5.

As can be seen in Table 5, Positive Emotionality/Extraversion was a significant predictor of treatment satisfaction (CSQ) and self-rated emotional change; that is, high scores on Positive Emotionality/Extraversion were associated with enhanced outcome for these two measures. However, Positive Emotionality/Extraversion was not a significant predictor of pain intensity (VAS), self-reported disability (QBPDS), or fear of movement (MISE). Thus, Positive Emotionality/Extraversion appears to be most relevant to the prediction of outcome variables in the emotional domain and less relevant to outcome variables pertaining to pain or functioning. Another significant finding was observed for the *PSY-5* scale of Constraint. Constraint predicted less improvement with regard to fear of movement (MISE). Aggressiveness, Psychoticism, and Negative Emotionality/Neuroticism were not predictive of any outcome measure.

Prediction of Categorical Outcome

We also examined the ability of the *PSY-5* scales to predict successful outcome in terms of the categorical measures (return to work, no use of medication to control back pain, no health care utilization for back pain). We excluded the categorical outcome variable of health care utilization from further analysis because of a particularly skewed distribution of the scores (93% successful vs. 7% unsuccessful). We then conducted two multivariate analyses of covariance (MANCOVAs). Age, education, and pain duration were included as control variables. The MANCOVAs failed to reveal an overall between-subjects effect of either return to work or medication use. However, for the outcome variable of medication use, univariate analysis of covariance revealed a significant effect of Aggressiveness, $F(1, 114) = 9.025, p = .003$, and a marginally significant effect of Negative Emotionality/Neuroticism, $F(1, 114) = 3.672, p = .058$; that is, ongoing use of medication to control back pain after treatment is more likely to happen in patients who obtain higher scores on Aggressiveness or Negative Emotionality/Neuroticism.

TABLE 5
 Hierarchical Regression Analyses With PSY-5 Scales as Predictors of Treatment Outcome

Scale and Outcome Variable	R^a	Adjusted R^2	ΔR^2	ΔF	p
Aggressiveness					
Satisfaction (CSQ)	.1359	.0024	.0185	0.8839	.4166
Emotional change (self-rating)	.2843	.0502	.0143	1.402	.2395
Pain intensity (VAS)	.5892	.3132	.0044	0.5166	.4745
Self-reported disability (QBPDS)	.6982	.4659	.0021	0.3801	.5390
Fear of movement (MISE)	.5357	.2450	.0007	0.0897	.7653
Psychoticism					
Satisfaction (CSQ)	.1361	.0131	.0001	0.0069	.9341
Emotional change (self-rating)	.2665	.0400	.0045	0.4330	.5122
Pain intensity (VAS)	.5893	.3134	.0045	0.5333	.4674
Self-reported disability (QBPDS)	.7009	.4699	.0059	1.101	.2968
Fear of movement (MISE)	.5368	.2463	.0020	0.2327	.6308
Constraint					
Satisfaction (CSQ)	.1360	.0131	.0001	0.0030	.9562
Emotional change (self-rating)	.2640	.0387	.0031	0.3038	.5829
Pain intensity (VAS)	.5856	.3088	.0001	0.0198	.8884
Self-reported disability (QBPDS)	.6991	.4673	.0034	0.6266	.4306
Fear of movement (MISE)	.5505	.2616	.0513	6.188	.0148
Negative Emotionality/Neuroticism					
Satisfaction (CSQ)	.1820	.0020	.0147	1.412	.2378
Emotional change (self-rating)	.2594	.0362	.0008	0.0749	.7850
Pain intensity (VAS)	.5936	.3187	.0096	1.137	.2895
Self-reported disability (QBPDS)	.7006	.4695	.0055	1.024	.3142
Fear of movement (MISE)	.5353	.2446	.0004	0.0455	.8316
Positive Emotionality/Extraversion					
Satisfaction (CSQ)	.2592	.0371	.0488	4.860	.0300
Emotional change (self-rating)	.4037	.1351	.0964	10.37	.0018
Pain intensity (VAS)	.5936	.3187	.0096	1.137	.2895
Self-reported disability (QBPDS)	.6988	.4667	.0029	0.5303	.4683
Fear of movement (MISE)	.5366	.2461	.0018	0.2108	.6473

Note. PSY-5 = Personality Psychopathology Five; CSQ = Client Satisfaction Questionnaire; VAS = Visual Analogue Scale; QBPDS = Quebec Back Pain Disability Scale; MISE = Maximal Isometric Strength Extension.

^aAge, education, and pain duration were entered first as control variables. Preprogram measures of VAS, QBPDS, and MISE were also entered first as control variables.

DISCUSSION

The purpose of this study was to investigate the effects of personality on the treatment gains of patients who participated in a 4-week multidisciplinary chronic-pain treatment program. Although personality factors have been studied in connection with the prediction of chronic-pain treatment outcome, most of the studies have investigated only certain aspects of personality and not a theoretically coherent model

of personality. The *PSY-5* constructs, developed by Harkness and McNulty (1994) and operationalized as the MMPI-2 *PSY-5* scales (Harkness et al., 1995), were particularly well suited to the purposes of this study because they are grounded in a model of personality (i.e., the five-factor model of personality) and are designed to provide a dimensional description of personality disorders. This is thus the first study to investigate the utility of the MMPI-2-based *PSY-5* scales in the prediction of treatment outcome.

The results of our study provide support for the utility of certain *PSY-5* scales in connection with chronic back pain patients. In particular, the *PSY-5* scale of Positive Emotionality/Extraversion proved to be a significant predictor of treatment outcome. Positive Emotionality/Extraversion predicted enhanced outcome with regard to the emotionally oriented measures in particular. High pretreatment scores on Positive Emotionality/Extraversion were also associated with enhanced satisfaction with the treatment and enhanced self-perceived emotional changes. The correlations with physically oriented measures were not, however, significant.

We now speculate on the manner in which Positive Emotionality/Extraversion may be related to enhanced outcome concerning the emotionally oriented measures. Positive Emotionality (Tellegen & Waller, 1996) and Extraversion (Eysenck & Eysenck, 1985) represent a predisposition to experience positive affect, seek and enjoy social experiences, and have the energy to pursue life's goals and tasks (Harkness et al., 1995). Thus, patients with high scores on Positive Emotionality/Extraversion are likely to perceive contacts with other people, including with the treatment staff and other patients, as satisfying. They will also have more positive attitudes toward the treatment process, expect more of the treatment process, and invest more energy in the treatment. As a consequence, these patients can also be expected to show greater emotional changes and emotion-related improvement. Unfortunately, the range of emotional measures included in this study was limited. Thus, more research using other outcome measures is needed to facilitate generalization of these findings. Not only are self-report measures welcome, but therapist or partner-based observations and ratings, which will give the results a broader empirical basis, are also needed.

Positive Emotionality/Extraversion did not significantly predict changes on the physically oriented measures (VAS, QBPDS, MISE). Thus, positive emotions and extraversion are apparently not necessary for physical improvement in response to behaviorally oriented treatment for chronic pain. Also, the likelihood of resuming one's regular work was not predicted by Positive Emotionality/Extraversion or any other *PSY-5* scale. Other factors, such as job satisfaction, social support at work, and support or reinforcement from a partner, are probably much more important for the prediction of return to work than personality factors (Fordyce, 1995). Thus, most patients are able to resume their work and achieve better physical functioning, al-

though those with high scores on Positive Emotionality/Extraversion may benefit more comprehensively (i.e., make more additional emotional changes) when provided with behaviorally oriented chronic-pain treatment in the form of at least our 4-week program.

Two other *PSY-5* scales appeared to be significant predictors of outcome: Constraint predicted less improved fear of movement (MISE), and Aggressiveness predicted ongoing posttreatment use of medication to control back pain.

We now attempt some more in-depth explanation of the observed associations. Constraint taps, among other characteristics, risk aversion and control (Harkness et al., 1995). In this light, the observed connection between Constraint and less improved fear of movement becomes obvious; that is, because of their unwillingness to take risks, people with high scores on Constraint will carefully conduct their trunk exercises and thus have more difficulties overcoming their fear of movement. It is important to note that fear of movement (MISE) is not a self-report measure but a test of actual behavior and thus provides support for the external validity of Constraint. With regard to the relation between Aggressiveness and ongoing medication use, the following explanation is available. In our program, patients are simply not allowed to take medication for the control of pain during the program and are strongly advised to be sober when taking pain medication after the program. A central characteristic of Aggression is agonal behavior—doing the opposite of what one is asked to (Harkness et al., 1995). People with high scores on Aggressiveness indeed appear more likely to ignore this medication instruction. It should be emphasized, however, that not much can be concluded from these two single isolated observations and that more research is needed to generalize our findings to other outcome variables and clinical settings.

Some limitations on this study should now be mentioned. First, the MMPI-2-based *PSY-5* scales were developed using rational item selection. Such items ask directly and obviously about particular traits. However, such items are also sensitive to the test-taking attitudes of the respondents. Given a tendency among chronic-pain patients to deny negative attitudes or personal weaknesses (e.g., Pilowsky, 1997; Vendrig, de Mey, Derksen, & van Akkerveeken, 1998), the scores may not reflect the true traits of the respondents. It is therefore quite possible that the relevant outcome measures may actually be predicted even more directly than indicated by the results of this study and particularly by the *PSY-5* scale of Negative Emotionality/Neuroticism. Second, the *PSY-5* scales of Negative Emotionality/Neuroticism and Psychoticism did not show up as significant predictors of treatment outcome in this study. With other clinical populations, or when regressed onto other outcome measures, however, these two scales may nevertheless prove useful. In conclusion, the results of this preliminary research on the MMPI-2-based *PSY-5* scales appear to be promis-

ing. The *PSY-5* model of personality psychopathology appears to provide a solid base for the systematic study of the complex relation between personality characteristics and the outcomes of multidimensional treatment for chronic back pain.

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