

# Personality Traits Related To Chronic Pain Location

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**Background.** Previous research has yielded inconsistent findings on the relationship between personality characteristics and chronic pain. The present study examines measures of alexithymia, somatosensory amplification, attachment, counterdependency, and emotional distress in 140 consecutive general medical outpatients seen in psychiatric consultation. **Methods.** Forty-five subjects having no chronic pain (NP) were compared to 49 subjects with chronic pain restricted to their back and/or extremities (BE) and with 46 subjects having pain involving other regions of the body (OP). **Results.** Findings demonstrated marked counterdependency traits in the BE group relative to the other two groups. By contrast, traits of alexithymia and somatosensory amplification, insecure attachment, and a high level of emotional distress characterized the OP group. A multiple logistic regression model combining counterdependency and secure attachment was 86% accurate in predicting BE ( $c=0.86$ ). **Conclusions.** The study's findings suggest that personality traits vary according to chronic pain location, although the nature of the relationship still needs to be determined.

## INTRODUCTION

Personality has been defined as an “enduring pattern of perceiving, relating to, and thinking about the environment and oneself” (1, p. 630). There has been little consensus on the importance of personality on the development and maintenance of chronic nonmalignant pain. A series of studies in the 1970s focused on the application of the Minnesota Multiphasic Personality Inventory (MMPI). Correlations were discovered between chronic pain and a certain MMPI profile, the so-called Conversion V (2). But correlations with treatment outcome have been mixed and there is evidence that the profile may represent a nonspecific reaction to having a severe illness (3,4).

More recently, other personality traits, including alexithymia, somatosensory amplification, attachment, and counterdependency have been examined in chronic pain populations. Persons with alexithymia have difficulty identifying and describing feelings, impoverishment of fantasy life, and excessive preoccupation with physical symptoms and external events (5). Although there is evidence that alexithymia is prevalent in chronic pain populations (6,7), there is also evidence

that alexithymic traits may be more related to emotional distress than to chronic pain per se (8).

Somatosensory amplification refers to a tendency in some persons to scrutinize their bodies for somatosensory input and then amplify and misinterpret the sensation as representing a pathological process (9). The concept of somatosensory amplification has been applied to the chronic pain population to explain how maladaptive cognitions may lead to heightened pain perception and disability (10). As with alexithymia, somatosensory amplification is also influenced greatly by the degree of emotional distress (11).

Attachment theory derives from infant research examining the nature of the infant-mother bond and how that affects the ability to form secure attachments with others as an adult (12). Bartholomew and Horowitz (13) have created a 4-Category Model of attachment style in adults based on whether individuals have a positive or negative view of themselves and other people (see Figure 1). Preliminary studies of attachment style in chronic pain populations have indicated that insecure attachment is associated with greater pain, emotional distress, and disability (14,15).

		MODEL OF SELF	
		Positive	Negative (Dependent)
MODEL OF OTHER	Positive	<b>SECURE</b>	<b>PREOCCUPIED</b>
	Negative (Avoidant)	<b>DISMISSING</b>	<b>FEARFUL</b>

**Figure 1** 4-Category model of adult attachment.

The concept of counterdependency, as developed by Gregory and Berry (16), describes a cluster of personality traits characterized by denial of emotional distress and interpersonal problems, strong work ethic, care-giving role identity, and self-reliance. In a sample of patients referred to an outpatient psychiatry consultation program, counterdependency traits were strongly associated with the presence of chronic pain. Remarkably, counterdependency was found to be independent of psychiatric comorbidity and measures of emotional distress.

In a follow-up study employing a similar patient sample, Gregory et al. (17) reported counterdependency differed according to chronic pain location. Patients having chronic pain restricted to their back and/or extremities scored higher on a measure of counterdependency compared to those with chronic pain that involved their abdomen, chest, head, and/or pelvis. The latter group reported a higher level of emotional distress.

The present study examines the interactions among the above personality traits, chronic pain location, and emotional distress. Based on the earlier study, the authors hypothesize that subjects with pain restricted to their back and/or extremities will demonstrate counterdependency traits. Given that subjects having pain in other locations tend to have greater emotional distress, the authors hypothesize that this group will demonstrate traits of alexithymia, somatosensory amplification, and insecure attachment.

## METHODS

### Subjects

The location of the study was the general medicine clinic of SUNY Upstate Medical University. One hundred and fifty consecutive clinic patients who had been referred for outpatient psychiatric consultation comprised the study population. Ten patients were excluded from the study on the basis of having a primary psychotic disorder (n=3), cognitive impairment

(n=2), or inability to complete questionnaires (n=5). Sources of referral included the general medicine residents and attendings providing care within the clinic. Approximately two thirds (n=95) of the referrals suffered from chronic nonmalignant pain, which is defined as daily pain for at least 6 months. Mean duration of pain was  $6.1 \pm 5.4$  years. Location of pain included extremities (n=74), back (n=63), head (n=28), chest (n=10), abdomen (n=16), and pelvis (n=7). Extremity pain was most commonly due to radiation of chronic lower back pain into the lower extremities (n=52). In general, the chronic pain patients were characterized by multiple pain diagnoses and attributions, often with poorly defined etiologies.

### Measures

DSM-IV diagnoses and social, developmental, and occupational histories were obtained in semi-structured clinical interviews by board-certified psychiatrists (RG and JM) employing a form devised by the authors. This form prompts the psychiatrist to obtain important parts of the patient's history, such as childhood sexual or physical abuse, thereby ensuring that all relevant information was gathered. For example, the form states "history of childhood sexual abuse: yes/no" and the examining psychiatrist circles either yes or no.

Patients referred for consultation are also routinely administered a series of self-rated questionnaires before each interview, including anxiety and depression subscales of the Brief Symptom Inventory (BSI), the Twenty-Item Toronto Alexithymia Scale (TAS-20), the Somatosensory Amplification Scale (SSAS), the Counterdependency Scale (CDS), and the Relationship Scales Questionnaire (RSQ).

The anxiety and depression subscales of the BSI were employed as measures of emotional distress. The BSI is a symptom checklist derived from the Hopkins Symptom Checklist and has been shown to have good validity and reliability (18).

The Toronto Alexithymia Scale and its two modified versions, the TAS-R and TAS-20, are currently the most commonly used and best researched measures of alexithymia (19,20).

The SSAS was initially designed and validated to measure somatosensory amplification in hypochondriasis (21). It has since been widely applied to other patient populations.

The RSQ is a 30-item questionnaire designed to measure attachment styles within the four-category model of adult attachment (22). Patients rate how well each of the 30 statements characterizes their reactions in close relationships. The RSQ demonstrates convergent validity with other measures of attachment and discriminant validity across the four categories of attachment style.

The CDS is a questionnaire developed by Gregory and Berry (16) based on the clinical observation that a large number of chronic pain patients appeared to minimize emotional distress; described idealized, shallow relationships with

stereotypical roles; and led overly productive lives until the development of their pain syndrome. The CDS was designed to capture these traits and was demonstrated to have construct validity, internal consistency, and test-retest reliability.

### *Statistical Analysis*

Upon approval from our Institutional Review Board, the authors reviewed the medical records of the 150 patients. Data regarding demographics, medical and psychiatric diagnoses, psychosocial history, and questionnaires were entered into a computer software program for analysis. Subjects were divided into 3 groups for comparison, that is, subjects with no chronic pain (NP); subjects with chronic pain that is restricted to the back and/or extremities (BE); and subjects with chronic pain that involves other locations (OP). Note that the OP group included some patients with back and/or extremity pain who also had pain in the head, chest, abdomen, or pelvis ( $n=25$ ). Their inclusion in the OP group was based on findings from a previous study indicating that the psychological profile of patients with multi-site pain (including back and extremities) most closely matched other patients in the OP group, rather than the BE group (17).

We first compared the three pain groups with respect to demographics and co-morbidities using analysis of variance (ANOVA). Where applicable, chi-square procedures were used to assess categorical characteristics. One-way ANOVA was also used to determine whether a uni-variate association existed between the three pain groups and each psychological outcome measure. In order to account for the bias inherent in multiple statistical outcome comparisons, a conservative  $p$ -value of 0.01 was chosen to assess the statistical significance of differences in psychological measures between pain groups.

Multi-way ANOVA and ANCOVA procedures were utilized to determine whether the uni-variate associations remained after adjusting for significant ( $p<0.10$ ) demographic variables. With the exception of BSI-anxiety and depression, the psychological measures did not substantially deviate from normality. In addition to exploratory data analysis (e.g., stem and leaf plots), normality was assessed using a formal statistical hypothesis test. Even though BSI-anxiety and depression did not "pass" normality tests, the results of the non-parametric Kruskal-Wallis test were very similar to the ANOVA results hence verifying the fact that ANOVA is robust against departures from normality.

Propensity scores have been observed to reduce the potential bias inherent in observational studies where non-random group assignment often occurs (23). For this reason, standard multi-way ANOVA was not used when determining whether or not pain location independently predicted each psychological outcome. The propensity score for each patient is equal to the probability of pain location (no pain vs. back/ext. vs. other pain) and was calculated using a multi-nomial logistic regression model that included main effects for each demographic

variable and significant interactions between the appropriate main effects. Thus, five demographic variables were condensed into a single scalar variable, named the propensity score, designated as the co-variate in an ANCOVA model. Pain was defined as the grouping factor in this model.

Two sets of  $p$ -values are provided for assessing the associations between each psychological measure and pain. An initial  $p$ -value is presented for the purpose of determining whether or not each psychological measure on its own provides significant information differentiating pain. The second  $p$ -value is a result of the two-step propensity score method that reduces bias due to confounding.

In addition to determining whether an independent association existed between pain and each psychological measure, we developed a statistical model to predict whether a given patient had BE or no pain based solely on the psychological measures. We also developed a model to predict other or no pain, which was different from the model used to predict BE pain. Binary logistic regression was utilized to develop these models and to produce probabilities of BE and OP. The discriminatory strength of each of the two models for classifying patients with regards to BE and OP was assessed using the C-statistic, which is defined as the area under the receiver-operating characteristic curve (24). Model calibration was assessed using the Hosmer-Lemeshow goodness-of-fit statistic.

### **RESULTS**

Most of the study subjects were Caucasian with a high school education. Groups did not differ significantly from one another in terms of age ( $p=0.263$ ), education ( $p=0.335$ ), or marital status ( $p=0.127$ ). However, subjects in the OP group were more likely to be female ( $p=0.004$ ) and tended more towards an African-American ethnicity ( $p=0.044$ ) than the other two groups.

Psychiatric comorbidity was high, as would be expected among patients referred for psychiatric consultation. Depressive diagnoses were most common (52% of subjects), followed by substance use disorders (31%). The OP group was somewhat more likely to be diagnosed with a mood disorder ( $p=0.038$ ). However, there were no statistically significant differences between groups in rates of anxiety disorders ( $p=0.402$ ), personality disorders ( $p=0.354$ ), and substance use disorders ( $p=0.947$ ).

There was a marked difference between groups in rates of reported history of childhood sexual and/or physical abuse. Forty six percent of subjects in the OP group reported a history of sexual abuse, compared to 24% in the NP group and 6% in the BE group ( $p<0.001$ ). Subjects in the OP group also reported a higher rate of childhood physical abuse ( $p=0.010$ ).

Table 1 demonstrates marked differences among the groups on measures of personality and emotional distress. Subjects in the BE group were very counterdependent compared to the other two groups. However, their scores on measures of

**Table 1** Comparison of the 3 Patient Groups on Measures of Anxiety (BSI-A), Depression (BSI-D), Counterdependency (CDS), Somatosensory Amplification (SAS), and Alexithymia (TAS-20)

Psychological Measure	Pain Location			P-value <sup>1</sup>	Adjusted P-value <sup>2</sup>
	No Pain (N=45)	Back/Ext. Only (N=49)	Other Sites (N=46)		
BSI-A	1.2 ± 1.1	1.2 ± 1.2	1.9 ± 1.1	0.007	0.032
BSI-D	1.1 ± 1.1	1.1 ± 1.2	2.0 ± 1.2	<0.001	0.002
CDS	2.2 ± 0.8	3.1 ± 0.5	2.4 ± 0.6	<0.001	<0.001
SAS	1.6 ± 0.7	1.5 ± 0.7	2.0 ± 0.7	<0.001	0.005
TAS-20	48.4 ± 13.9	47.6 ± 14.6	58.8 ± 13.1	<0.001	0.003

Psychological measures are represented by the observed mean plus or minus the standard deviation. A p-value ≤ 0.01 suggests that at least two of the pain groups differ with respect to the mean of the psychological measure. P-value<sup>1</sup> = type I error rate attained from the uni-variate ANOVA. P-value<sup>2</sup> = error rate using the propensity score as sole co-variate in the ANCOVA model.

alexithymia, somatosensory amplification, and emotional distress were virtually identical to subjects with no chronic pain. The association between back and/or extremity pain and counterdependency continued to be significant (p<0.001) when confounding variables (i.e., age) were adjusted for in multivariate analysis. By contrast, subjects in the OP group demonstrated high levels of alexithymia, somatosensory amplification, and emotional distress relative to the other two groups.

The attachment styles of the 3 groups are compared in Table 2. Subjects in the BE group trended towards a relatively secure attachment style characterized by low dependence (high RSQ Self score). By contrast, subjects in the OP group were likely to have an insecure attachment style characterized by high avoidance (low RSQ Other score) and marked fearfulness. In multivariate analysis, these differences were largely accounted for by differences in mood disorder and history of childhood abuse.

In multivariate logistic regression models, a secure attachment style and high counterdependency traits were the two psychological factors that best predicted chronic pain restricted to the back and/or extremities. The model has high discriminatory strength (c=0.862) suggesting that the model

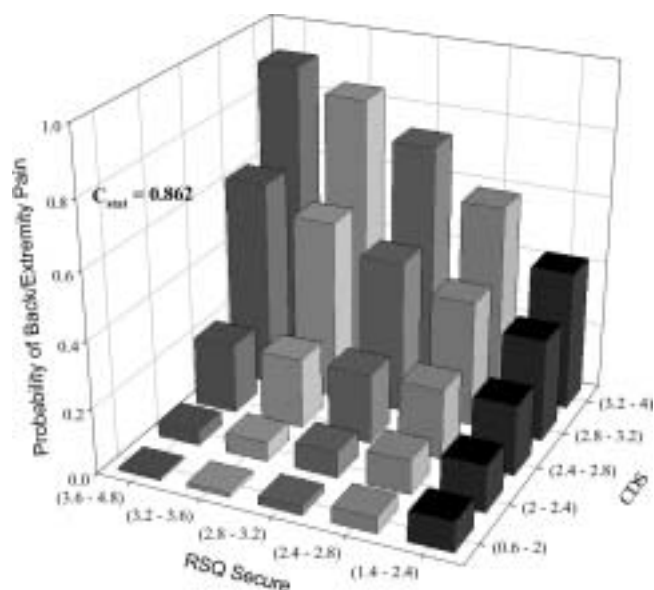
can distinguish between BE and NP/OP merely by utilizing CDS and RSQ-secure scores. As shown in Figure 2, the model predicts an 82% probability of chronic back and/or extremity pain for subjects at the highest quintile on each of the two measures. On the other hand, subjects scoring at the lowest quintiles of these measures have less than a 10% chance of having localized back and/or extremity pain. The model provides good overall fit, as indicated by a nonsignificant Hosmer-Lemeshow statistic (p=0.330)

By contrast, fearful attachment style and depression severity (as measured by the BSI) were the two psychological factors that best predicted other chronic pain locations. Whereas depression severity followed a linear pattern (p=0.017) of association with chronic pain location, RSQ-F scores followed a quadratic pattern (p=0.002). As with the statistical model for BEP, utilizing RSQ-F and depression severity provides substantial discriminatory strength (c=0.78). Subjects scoring at the highest quartile on both measures were 80% likely to have chronic pain in their chest, abdomen, pelvis, or head. Our OP model also showed that the predicted probabilities matched well against the observed probabilities (p=0.253).

**Table 2** Comparison of the 3 Patient Groups on Measures of Attachment Style (RSQ)

Attachment Style Psychological Measure	Pain Location			P-value <sup>1</sup>	Adjusted P-value <sup>2</sup>
	No Pain (N=45)	Back/Ext. Only (N=49)	Other Sites (N=46)		
Secure	2.9 ± 0.7	3.2 ± 0.7	2.9 ± 0.7	0.076	0.108
Preoccupied	2.8 ± 0.8	2.6 ± 0.7	2.7 ± 0.8	0.303	0.438
Dismissive	3.2 ± 0.7	3.3 ± 0.6	3.6 ± 0.7	0.030	0.075
Fearful	2.7 ± .9	2.6 ± 0.9	3.5 ± 1.1	<0.001	<0.001
Self	0.5 ± 1.8	1.3 ± 1.6	0.3 ± 1.8	0.012	0.033
Other	-0.3 ± 1.8	-0.1 ± 1.7	-1.5 ± 2.0	0.001	0.014

Attachment measures are represented by the mean plus or minus the standard deviation. A p-value ≤ 0.01 suggests that at least two of the pain groups differ with respect to the mean of the attachment style. P-value<sup>1</sup> = type I error rate attained from the uni-variate ANOVA. P-value<sup>2</sup> = error rate using the propensity score as sole co-variate in the ANCOVA model.



**Figure 2** Multiple Logistic Regression Interaction Model for Back or Extremity Pain.

## DISCUSSION

The authors' hypotheses were supported by the data. The BE group was differentiated from the other groups by high counterdependency traits. On the other hand, the OP group was characterized by alexithymia, somatosensory amplification, insecure attachment, and emotional distress.

The association between chronic back and/or extremity pain and counterdependency remains a consistent finding across studies (16,17). It is particularly striking that the presence of two personality traits (counterdependency and secure attachment) allowed accurate prediction as to whether or not a given subject experienced back and/or extremity pain, regardless of demographics, medical history, or psychiatric comorbidity.

However, the nature of the relationship between counterdependency and chronic back and/or extremity pain is unknown and requires further investigation. For instance, do differences in medication regimes between groups mediate some of the differences in observed personality measures? Are counterdependent persons more likely to select more labor-intensive occupations and so become prone to injury and pain? Because of their self-reliance, do they tend to ignore pain when it occurs and continue to work until permanent injury results? Or is the explanation that emotional distress becomes repressed and displaced into physical pain? An important future study will be to evaluate whether premorbid counterdependency and attachment traits can predict the development of chronic back and/or extremity pain in persons at high risk.

It is important to note that the study has some limitations. One is that the psychiatric diagnoses were obtained as part of a clinical interview and a different examiner may have obtained different diagnoses. Another limitation of our study is that all of the subjects were referred for psychiatric consultation, thereby pre-selecting a population having high rates of psychopathology. It is therefore possible that our results do not generalize to other chronic pain samples. However, given that the correlation between counterdependency and chronic back and/or extremity pain in this study was independent of psychiatric comorbidity and measures of emotional distress, we anticipate that the results can be generalized. Nevertheless, research is needed to replicate the findings in other samples.

The marked differences observed between the BE and OP groups on measures of personality and emotional distress suggest that there are specific subgroups within the chronic pain population that require further definition and differentiation from one another. Further research is indicated to investigate how these subgroups differ in the biopsychosocial etiology, treatment, course, or prognosis of their chronic pain syndromes. Overall, the study highlights the importance of an individualized approach to chronic pain management that takes into account each patient's unique personality and emotional response.

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## REFERENCES

1. American Psychiatric Association: *Diagnostic and Statistical Manual of Mental Disorders*, 4th Edition. Washington, D.C., American Psychiatric Association, 1994
2. Phillips EL: Some psychological characteristics associated with orthopaedic complaints. *Curr Pract Orthop Surg* 1964; 2:165-176
3. Trief PM, Yuan HA: The use of the MMPI in a chronic back pain rehabilitation program. *J Clin Psychol* 1983; 39:46-53
4. Sternbach RA, Timmermans G: Personality changes associated with reduction in pain. *Pain* 1975; 1:177-181
5. Sifneos PE: The prevalence of alexithymia characteristics in psychosomatic patients. *Psychother Psychosom* 1973; 22:255-262
6. Millard RW, Kinsler BL: Evaluation of constricted affect in chronic pain: an attempt using the Toronto Alexithymia Scale. *Pain* 1992; 50:287-292
7. Cox BJ, Kuch K, Parker JD, Shulman ID, Evans RJ: Alexithymia in somatoform disorder patients with chronic pain. *J Psychosom Res* 1994; 38:523-527
8. Kosturek A, Gregory RG, Sousou AJ, Trief P: Alexithymia and somatic amplification in chronic pain. *Psychosomatics* 1998; 39:399-404

9. Barsky AJ, Goodson JD, Lane RS, Cleary PD: The amplification of somatic symptoms. *Psychosom Med* 1988; 50:510–519
10. Feuerstein M, Beattie P: Biobehavioral factors affecting pain and disability in low back pain: mechanisms and assessment. *Phys Ther* 1995; 75:267–280
11. Aronson KR, Barrett LF, Quigley KS: Feeling your body or feeling badly: Evidence for the limited validity of the Somatosensory Amplification Scale as an index of somatic sensitivity. *J Psychosom Res* 2001; 51:387–394
12. Bowlby J: *Attachment and loss, vol. 1. Attachment*. London: Penguin Books, 1969
13. Bartholomew K, Horowitz LM: Attachment styles among young adults: A test of a four-category model. *J Pers Soc Psychol* 1991; 61:226–244
14. Ciechanowski P, Sullivan M, Jensen M, Romano J, Summers H: The relationship of attachment style to depression, catastrophizing and health care utilization in patients with chronic pain. *Pain* 2003; 104:627–637
15. McWilliams LA, Cox BJ, Enns MW: Impact of adult attachment styles on pain and disability associated with arthritis in a nationally representative sample. *Clin J Pain* 2000; 16:360–364
16. Gregory RJ, Berry SL: Measuring counterdependency in chronic pain. *Psychosom Med* 1999; 61:341–345
17. Gregory RJ, Manring J, Berry SL: Pain location and psychological characteristics of patients with chronic pain. *Psychosomatics* 2000; 41:216–220
18. Derogatis LR, Melisaratos NP: The Brief Symptom Inventory: an introductory report. *Psychol Med* 1983; 13:595–605
19. Bagby RM, Parker JDA, Taylor GJ: The Twenty-Item Toronto Alexithymia Scale-I. Item selection and cross-validation of the factor structure. *J Psychosom Res* 1994a; 38:23–32
20. Bagby RM, Taylor G, Parker JDA: The Twenty-Item Toronto Alexithymia Scale-II. Convergent, discriminant, and concurrent validity. *J Psychosom Res* 1994b; 38:33–40
21. Barsky AJ, Wyshak G, Klerman GL: The somatosensory amplification scale and its relationship to hypochondriasis. *J Psychiatr Res* 1990; 24:323–334
22. Griffin DW, Bartholomew K: The metaphysics of measurement. In: Bartholomew K, Perlman D, editors. *Advances in personal relationships, vol. 5*. London: Jessica Kingsley Publishers, 1994, pp. 17–52
23. Rosenbaum PR, Rubin DB: The central role of the propensity score in observational studies for causal effects. *Biometrika* 1983; 70:41–55
24. Hanley JA, McNeil BJ: The meaning and use of the area under a receiver operating characteristic (ROC) curve. *Radiology* 1982; 143:29–36