

Cracking the Plaster Cast: Big Five Personality Change during Intensive Outpatient Counseling

Ralph L. Piedmont

Loyola College in Maryland

Published online November 2, 2001

This study attempted to evaluate the ability of an outpatient drug rehabilitation program to effect significant shifts on the five major dimensions of personality. A mostly African American sample of 82 men and 50 women entering a 6-week program were assessed at admission, and the 99 who completed were again measured at termination. Follow-up assessments were completed on 30 clients an average of 15 months later. Results indicated significant shifts on all five personality domains from pre- to posttreatment (mean Cohen's $d = .38$). Significant shifts on Neuroticism, Agreeableness, and Conscientiousness were maintained over follow-up (mean Cohen's $d = .28$). These results suggest that personality change may be possible in the context of treatment. © 2001 Academic Press

Perhaps one of the more important recent developments in personality psychology has been the introduction of the five-factor model (FFM) of personality (Digman, 1990; Goldberg, 1993; McCrae & John, 1992). This robust, comprehensive taxonomy of personality consists of the dimensions of Neuroticism, Extraversion, Openness to Experience (hereafter Openness), Agreeableness, and Conscientiousness. Research has shown that these dimensions represent constructs from a wide range of theoretical orientations (Costa, McCrae, & Holland, 1984; McCrae & Costa, 1989a, 1989b); generalize cross-culturally (Paunonen, Jackson, Trzebinski, & Forsterling, 1992;

This study was supported in part by a grant from the Association for Spiritual, Ethical, and Religious Values in Counseling, a grant from the Institute for Religious and Psychological Research, and a Loyola College Junior Faculty Sabbatical Award. The author acknowledges the efforts of the CHRP clinical staff—John Cooper, Thomas Trigg, Marilyn Clark, and Lynn Lavin—whose efforts in data collection and treatment implementation made all of this possible. Thanks are extended to Robert R. McCrae, Mark F. Peyrot, Martin F. Sherman, and several anonymous reviewers for commenting on earlier drafts of this article. Portions of this article were presented at the 1996 annual meeting of the Eastern Psychological Association, Philadelphia.

Address correspondence and reprint requests to Ralph L. Piedmont, Department of Pastoral Counseling, Loyola College in Maryland, 7135 Minstrel Way, Columbia, MD 21045. E-mail: rpiedmont@loyola.edu.

500

0092-6566/01 \$35.00

Copyright © 2001 by Academic Press

All rights of reproduction in any form reserved.



Piedmont & Chae, 1997); have a substantive degree of genetic heritability (Bergeman et al., 1993; Heath, Neale, Kessler, Eaves, & Kendler, 1992); and predict a number of salient life outcomes relating to physical health (Costa, McCrae, & Dombroski, 1989), mental well-being (Magnus, Diener, Fujita, & Pavot, 1993; Ormel & Wohlfarth, 1991; Piedmont, 1993), and job success (Barrick & Mount, 1991; Piedmont & Weinstein, 1994). These dimensions are not mere summary descriptions of behavior but rather are considered to reflect temperamental dispositions of individuals to think, act, and feel in consistent ways (McCrae & Costa, 1995; McCrae et al., 2000). Taking this trait-based perspective, this article examines perhaps one of the more controversial issues surrounding the FFM: the long-term stability of these factors (see Heatherton & Weinberger, 1994). Costa and McCrae (1992b) provided longitudinal data that indicated impressive stability in terms of both rank order and mean level; the 25-year retest reliability coefficients for markers of these five factors averaged around .80, whereas the estimated 50-year retest coefficients were approximately .60. Costa and McCrae converged on a conclusion, reached by William James more than a century ago, that by the age of 30 years personality "has set like plaster and will never soften again" (James, cited in Costa & McCrae, 1994, p. 21).

Although at first blush this statement appears too implausible to be correct, these two researchers based their assertion on an increasing number of studies that consistently failed to find any appreciable change in adult personality. For example, using participants who were part of an ongoing longitudinal study, Costa and McCrae (1989) asked them to rate the degree to which their whole personalities had changed over the previous 6 years. Three groups emerged: one that indicated no change, another that reported moderate changes, and a final group that believed that their personalities had changed a great deal. Six-year retest correlations on the NEO Personality Inventory (NEO PI, a measure of the five-factor model) were then examined for the three groups. There were *no* significant differences among these groups; indeed, the group indicating the most change had an uncorrected median retest correlation of .80. Mean-level scores on these five domains were also unchanged. Such stability also was reflected in peer ratings that were obtained at these times. Thus, even individuals who claimed to have experienced important personality changes apparently retained the same temperamental dispositions.

Such evidence for stability raises a number of theoretical and philosophical questions. Is psychological growth and adjustment tied to personality change? To what degree do individuals have the capacity to make choices? Caspi (2000) provided longitudinal data linking measurements of temperament taken in 3-year-olds to behaviors, self-reports, and observer ratings obtained at 18 years of age. He found a consistent and pervasive pattern showing how early personality established a trajectory that individuals fol-

lowed through life. McCrae et al. (2000) provided cross-cultural longitudinal data supporting similar conclusions; personality appeared relatively robust over the life span, providing a continuity to behavior. However, these findings have not gone unchallenged. Helson (1993) argued that researchers rarely look for change and that when it is found, they treat it merely as error variance. Lacking models for understanding change, researchers too easily overlook important aspects of development in their samples. Instead, studies explicitly aimed at identifying possible areas of change are needed to address this question. Ormel and Rijksdijk (2000) provided a sophisticated analysis of stability and change in longitudinal data. They examined three models: a trait-only model, a state-only model, and a state-trait model. In evaluating levels of neuroticism over the adult life span, they noted that their data did not support the trait-only model. Consistencies in scores over time were not due to just trait effects. Rather, a combination of trait and environmental influences seemed more likely. They argued that the stability noted in personality over time may have other causes than just trait factors (e.g., the presence of ongoing situational factors that require a particular response), suggesting greater plasticity in personality than was currently thought to exist.

Although the current data are interpreted as evidence for personality stability over time, there is still controversy as to how to view what little change is noted. Clearly, more sophisticated models of change and stability need to be developed. But more important, if adulthood is not characterized by discreet changes in personality, then the use of large samples of normal adults would be inefficient for detecting even modest amounts of change. Instead, the search for change in personality may be better served by examining specific populations who have experienced events likely to have enabled characterological shifts. There are at least three types of events that arguably could provide such transforming opportunities: traumatic or catastrophic experiences (e.g., war), religious conversions, and intensive therapeutic interventions. Of these three, psychotherapy provides the best opportunity for researchers to study the possibility of change in a clearly defined, controlled context (Costa & McCrae, 1998).

The Impact of Therapy on Personality Change

Few studies have explicitly examined personality change on the domains of the FFM as a result of therapy. Bagby, Joffe, Parker, Kalembe, and Harkness (1995) used the NEO PI with a sample of 57 nonpsychotic depressed outpatients who were receiving pharmacotherapy. Participants were assessed at entry into treatment and then 3 months later. Significant changes were noted for Neuroticism and Extraversion, and both domains manifested about a one-half standard deviation change. Trull, Useda, Costa, and McCrae (1995) gave the NEO PI to a sample of 44 individuals visiting one of two outpatient clinics. These individuals were mostly community residents, fac-

ulty, and/or students who were seen for experiencing one of the following: an anxiety disorder, a mild depressive disorder, dysthymia, or a personality disorder. Three assessments were made: at entry, a 3-month follow-up, and a 6-month follow-up. Repeated-measure analyses indicated that there were significant changes on Neuroticism and Agreeableness, and the magnitude of change was about one-half of a standard deviation. Given Neuroticism's linkage to depression and anxiety, these findings make good sense. Although retest correlations in the Trull et al. study for the NEO domains were slightly lower than normative values, they remained relatively high (range = .70-.80).

There are some limitations to these data. First, the treatments employed in these studies were not intensive. The Bagby et al. (1995) study provides *no* psychotherapy of any type. Rather, it relied strictly on medications. Pharmacological agents are not designed to make substantive shifts in personality but rather are directed toward the amelioration of symptomological distress (but see Knutson et al., 1998). Thus, the observed shifts in personality scores may merely reflect changes in distress level. The Trull et al. (1995) study does not provide any details about treatment, but clients' symptoms were relatively mild and it seems reasonable that a more traditional model was followed (i.e., clients were seen once a week). Although this reflects current practice, the treatment is spread out over a long period of time; clients would have received 12 hours of treatment over 3 months and 24 hours over the 6-month period. Given the relatively high level of functioning of these clients to begin with, this treatment might not have had sufficient power to make any substantive shifts in personality. Second, these data apply to very specific clinical populations and might not generalize to other kinds of groups (e.g., inpatients, patients with severe chronic disorders, patients with personality disorders). A more rigorous test of the consistency hypothesis—whether psychotherapy can have an impact on personality status—would be to work with a sample of clients whose ongoing tenuous relations with their environment would require a more substantive shift in their adaptive orientation. Furthermore, the treatment intervention itself would need to be of sufficient intensity and duration as to make a personality shift possible (e.g., meeting multiple times per week for several hours).

To address these issues, this study included a client sample of chronic polysubstance abusers who were attending a vocationally oriented, spiritually based outpatient counseling program in an urban inner city. This multimodal intervention consisted of a 6-week program that met 5 days a week for 6 hours a day, providing more than 180 treatment hours. The focus of this treatment was wide-ranging including a diverse array of interventions that were relevant to all of the domains of the FFM. The treatment included components directed at improving vocational skills (Conscientiousness), coping ability (Neuroticism and Extraversion), spiritual development (Open-

ness), and social skills (Extraversion and Agreeableness) in addition to interventions aimed at overcoming their addictions. The purpose of this study was to determine whether changes in personality would be observed over the course of this intensive, multitarget treatment paradigm. This study also evaluated whether these changes on the five-factor personality domains could be maintained after treatment was completed.

Personality and Symptomological Expression

Because previous research has shown that personality scores do change with the remission or amelioration of symptoms (see Barnett & Gotlib, 1988), some believe that measures of personality are confounded with levels of psychological distress. Still others argue that symptom experience is a component of these larger dimensions of personality (e.g., Watson, Clark, & Harkness, 1994). Thus, any observed changes in personality might not be attributable to substantive changes in temperament but rather might be a concomitant to the alleviation of symptoms. To address this type of issue, Santor, Bagby, and Joffe (1997) argued that three empirical criteria need to be met. First, measures of personality must be shown to be relatively stable over treatment (i.e., demonstrate significant retest stability). Failure to find any relative stability for the personality dimensions would automatically preclude it from being considered as independent of symptomological experience. Second, the relation between personality at posttreatment and personality at baseline must be significant even after controlling for the effects of symptom level at both baseline and posttreatment. Finding a significant level of residualized stability would argue against personality being some type of complication emerging from one's level of psychological distress. Finally, changes in personality scores over treatment cannot be entirely redundant with changes observed in psychological symptomatology. The regression of the change scores in personality on the change scores for symptomological experience can determine whether such confounding is occurring. A relatively small multiple *R* would argue that the observed personality changes reflected a substantive shift in the person's adaptive orientation (i.e., trait standing) rather than being a result of a decline in psychological distress. Such independence argues that changes in both distress and personality do not arise from a common cause.

Given these issues, the current study evaluated the degree to which personality changed in response to participation in an outpatient, substance abuse treatment program. Clients were measured at three separate intervals: pretreatment, posttreatment, and follow-up (the average length of time was approximately 15 months). Relative stability and absolute stability of these measures were assessed using standard correlational and mean-level tests, respectively. Multiple regression analyses were used to evaluate the residual independence of change in the FFM domains from symptom experience over the course of treatment. Being able to document significant changes in per-

sonality that were independent of symptom experience would demonstrate that these shifts in adaptive orientation were real and not merely a reflection of symptomological relief. In other words, changes in personality scores were not acting simply as markers of shifts in state-level functioning.

METHOD

Participants

Participants consisted of 82 men and 50 women, ages 23 to 52 years (mean = 35), who were consecutive admissions to a 6-week, outpatient drug rehabilitation program between October 1993 and July 1995. Most had a high school diploma, and 84% were African American. These individuals constituted a lower socioeconomic category, and many carried dual diagnoses (most secondary diagnoses were related to affective disorders or were characterological). Most participants were alcohol (65%), heroin (42%), and/or cocaine abusers (73%), with an average of 15 years of substance involvement (range = 1–35 years). All members of the program were volunteers, having been recommended by local shelters and social agencies. To be accepted to the program, an individual had to be at least 30 days drug free. Any use of substances during the program was grounds for immediate dismissal. Although the program did not perform any of its own drug tests to ensure drug-free compliance, these individuals were already living in controlled environments (e.g., shelters, halfway houses) where drug testing was being conducted on a random basis. On average, participants had been unemployed for the previous 19 months (range = 1 month to more than 8 years) and had their last rehab experience 4 months previous to entering the current program. These individuals had an average of two previous detox experiences. In addition, 31% were on probation at the time of entering the program.

Of the 132 who began the program, 99 successfully completed (40 women and 59 men). These individuals will serve to evaluate the test-retest reliability of the Revised NEO PI (NEO PI-R). Of the 33 who dropped out of the program, 8 relapsed, 9 lost interest, 1 had legal difficulties, and 10 violated program rules (e.g., missed several sessions, did not comply with regimen); the reason for leaving for the remaining 5 is unknown. The variety of reasons for leaving the program, as well as the relatively small sample size in each category, makes any comparison of these terminators with those who completed tenuous at best. Nonetheless, overall multivariate analyses of variance (MANOVAs) comparing those who dropped out for any reason to those who completed failed to show any significant differences for the groups over both the domains and the facets of the NEO PI-R. This provides some basic assurance that the sample is relatively unbiased by attrition. At the end of the program, more than 95% of those who completed had found gainful employment.

An effort was made to recontact those who completed the program at least 3 months after leaving. Given the relatively transient nature of this sample, this proved to be an arduous task. A total of 12 women and 18 men were followed up an average of 15 months after finishing the program (range = 3–28 months). These individuals did not differ on the NEO PI-R, measured at admission, from the 69 who were not contacted.

Measures

NEO PI-R. Developed by Costa and McCrae (1992a), this 240-item questionnaire was designed through rational and factor analytic methods to measure the five major factors of personality: Neuroticism (N), Extraversion (E), Openness (O), Agreeableness (A), and Conscientiousness (C). For each factor, there are six facet scales that are designed to capture more specific traits. Items are answered on a 5-point Likert scale ranging from 0 (*strongly agree*) to 4 (*strongly disagree*), and scales are balanced to control for the effects of acquiescence. The

items themselves are simple statements describing general tendencies (e.g., "It's often hard for me to make up my mind," "I often crave excitement"). Normative internal consistency estimates for the Form S scales for adults range from .59 to .92 (Costa & McCrae, 1992a). According to the manual, 6-year stability coefficients range from .68 to .83 for N, E, and O. In addition, 6- to 9-year retest coefficients ranging from .67 to .77 were seen for the A and C facet scales (Costa, Herbst, McCrae, & Siegler, 2000). In this sample, alpha reliabilities for the domains (measured at pretreatment) were .89, .83, .83, .83, and .89 for N, E, O, A, and C, respectively. The NEO PI-R has been validated in studies with other self-reports (Costa, McCrae, & Dye, 1991; McCrae & Costa, 1992a; Piedmont & Weinstein, 1993). Scales have shown evidence of convergent and discriminant validity across instruments, methods, and observers, and they have been related to a number of life outcomes including frequency of somatic complaints, ability to cope with stress, and burnout (Costa & McCrae, 1989; Piedmont, 1993). Piedmont and Ciarrocchi (1999) provided evidence for the psychometric viability of the NEO PI-R in this sample.

Brief Symptom Inventory. Developed by Derogatis (1993), the 53-item, self-report Brief Symptom Inventory (BSI) is designed to capture psychological symptom patterns over nine primary clinically relevant dimensions and three global indexes. Each item is responded to on a 5-point Likert scale from 0 (*not at all*) to 4 (*extremely*). For the purposes of this article, only the Global Severity Index (GSI), which is the sum of the nine symptom clusters divided by the total number of responses, is presented. Derogatis, Rickels, and Rock (1976) showed the BSI to converge well with the major content scales of the Minnesota Multiphasic Personality Inventory (MMPI). Other research has shown the BSI to be useful in detecting symptomological distress in clients in a drug treatment context (Buckner & Mandell, 1990; Royse & Drude, 1984). Following guidelines provided in the manual, the scores from participants in this study were evaluated relative to norms provided for the Adult Nonpatient Sample.

Derogatis Psychiatric Rating Form. Developed by Leonard Derogatis, the 18-item Derogatis Psychiatric Rating Form (DPRS) questionnaire was designed to capture therapist assessments of clients' symptoms. This scale was formerly known as the Hopkins Psychiatric Rating Form and was intended to be used in conjunction with the BSI. There are 18 different symptoms assessed. Each item describes a specific symptom, and the therapist rates on a 7-point Likert-type scale the intensity of that symptom from 0 (*absent*) to 6 (*extreme*). As done with the BSI, only the Global Pathology Index (GPI), which is an overall assessment of pathology made on a Likert-type scale from 0 (*absent*) to 8 (*extreme*), is presented in this study. Perconte and Griger (1991) showed the DPRS to be very successful in discriminating different types of treatment responses among Vietnam war veterans suffering from posttraumatic stress disorder (PTSD). Fricchione et al. (1992) showed the DPRS to be able to discriminate among various types of defense mechanisms used by end-stage renal disease sufferers. This instrument was completed by one counselor on each client at both pretreatment and posttreatment.

Procedure

Prior to beginning the treatment program, all clients met with a counselor for a 20- to 40-min interview that was designed to evaluate the suitability and level of impairment of each client. After being interviewed, clients would then complete the NEO PI-R, the CRI, and the BSI (which were presented in random order). This was accomplished in one sitting either after their interview with a counselor or on the first day of the program. The counselor did not have access to clients' responses to these instruments before making his or her own assessments. Clients were told that the purpose of the assessments was for program evaluation purposes only.

The program lasted for 6 weeks. Clients would report 5 days a week, 6 hours a day. The program itself provided a broad-based multimodal intervention. The major focus of the program was to develop useful vocational skills and assist participants in working toward finding

gainful employment by the end of treatment. In addition, participants received individual and group counseling, attended Alcoholics Anonymous/Chemical Dependence Anonymous groups, and engaged in a number of therapeutic activities centering on personal and spiritual growth and development. During the final week of the program, clients were again asked to complete the battery of materials.

An intensive effort was made to contact those who completed the program a minimum of 3 months after finishing. This search consisted of phone calls to the individuals, friends, and families. Searches of local shelters were also conducted. Participants usually were invited back to the program's location to complete the materials, although in a few cases the scales were mailed to the persons with instructions and materials for mailing the instruments back. On average, 15.5 months elapsed between leaving treatment and obtaining the follow-up evaluation (range = 3–28 months).

Therapists also provided clinical ratings of symptomatology on the DPRS at intake and at the end of treatment. One counselor rating was obtained for each participant.

RESULTS

Mean Level, Relative Stability, and Personality Change over Treatment

Mean T-scores on the NEO PI-R personality domains are presented in Table 1 along with retest coefficients for the various assessment intervals. As recommended in the manual, values greater than 55 are considered high, values lower than 45 are considered low, and those in between are considered average. As can be seen, this group scored high on Neuroticism, indicating a high level of negative affect. Similar elevations were found on all of the facets for this domain, indicating that this emotional dysphoria was generalized and pervasive. The low Agreeableness scores reflected more of an antagonistic attitude toward others, especially in regard to trust and straightforwardness. This suggests that these patients are suspicious of the motives of others and are guarded in their interactions. Finally, this sample scored low on Conscientiousness, indicating a more lackadaisical and impulsive attitude. These scores indicated that participants have a low opinion of their abilities, tend to be unreliable and unprepared, and may act hastily. The pattern of results reflects an impulsive personality orientation (see Piedmont, 1998) that is characteristic of a substance abuse disorder (Brooner, Herbst, Schmidt, Bigelow, & Costa, 1993).

Retest coefficients are also presented. For the pretreatment to posttreatment period, values ranged from .52 for Neuroticism to .79 for Openness. All values are significant and indicate that the rank ordering of scores was relatively stable over the course of treatment. This suggests that if clients changed on these domains over the course of treatment, then they did so at a relatively uniform rate. However, this uniformity may belie differential rates of change for younger versus older participants. As noted earlier, individuals under 30 years of age are likely to exhibit changes in personality. Given that 20 of the participants were under 30, this group may have experienced greater shifts than did those over 30. If this were so, then the presented retest correlations would be underestimates of the retest reliabilities for the

TABLE 1
Descriptive Statistics and Retest Correlations for NEO PI-R Domain and Facet Scales at Three Assessment Periods

NEO PI-R domains	Time 1 pretreatment		Time 2 posttreatment		Time 3 follow-up (n = 30)	Retest ^b :		Retest ^c :	
	N = 132	n = 99 ^a	n = 30	n = 99		Time 1 – Time 2	Time 1 – Time 3	Time 2 – Time 3	Time 2 – Time 3
	Neuroticism	60.64	61.34	63.15	54.22	57.59	.52**	.54**	.56**
Extraversion	50.56	50.36	50.64	52.75	50.50	.73**	.46*	.70**	.60**
Openness to Experience	54.03	54.00	54.58	56.25	55.85	.79**	.55**	.60**	.68**
Agreeableness	42.87	41.69	42.37	44.44	47.36	.77**	.78**	.68**	.75**
Conscientiousness	41.17	41.27	40.72	46.72	45.38	.66**	.65**	.75**	.75**

Note. NEO PI-R, Revised NEO Personality Inventory. NEO PI-R scores are presented as T-scores with a mean of 50 and a standard deviation of 10, based on normative data presented by Costa and McCrae (1992a). The Time 1 and Time 2 data were previously published in Piedmont and Ciarracchi (1999).

^a Means are presented for overall sample at each assessment interval as well as the means used in actual cross-interval assessments.

^b n = 99.

^c n = 30.

* p < .05 (two-tailed).

** p < .01 (two-tailed).

TABLE 2
NEO PI-R Domain Partial Retest Coefficients Controlling
for Global Levels of Symptomatology

Retest interval	Neuroticism	Extraversion	Openness to experience	Agreeableness	Conscientiousness
Pretreatment vs post-treatment ^a	.37***	.76***	.81***	.77***	.65***
Posttreatment vs follow-up ^b	.56**	.70***	.61***	.69***	.80***
Pretreatment vs follow-up ^c	.49**	.50**	.50**	.74***	.66***
Therapist ratings Pretreatment vs post-treatment ^d	.50***	.72***	.79***	.76***	.68***

Note. NEO PI-R, Revised NEO Personality Inventory; GSI, Global Severity Index; GPI, Global Pathology Index.

^a Pretreatment and posttreatment GSI controlled, $n = 93$.

^b Posttreatment and follow-up GSI controlled, $n = 26$.

^c Pretreatment, posttreatment, and follow-up GSI controlled, $n = 25$.

^d Pretreatment and posttreatment GPI controlled, $n = 81$.

** $p < .01$. (two-tailed).

*** $p < .001$ (two-tailed).

NEO PI-R domains. To examine this possibility, all 15 retest correlations in Table 1 were recalculated partialling out the effect for age. The only substantive change was found for the correlation of Openness between pretreatment and follow-up, which *decreased* from .55 to $r(27) = .39$, $p < .05$. Overall age did not mediate the retest stability of the personality domains.

Partial retest correlations were also calculated for the NEO PI-R domains, controlling for pre- and posttreatment levels of global psychological distress (i.e., GSI). These results are presented in Table 2. Three findings are of interest. First, all retest values were significant, indicating that the relative stability in scores on these personality domains was maintained irrespective of individual differences in symptomological severity. Second, it is interesting to note that the Neuroticism domain appeared more influenced by symptomological distress than did the other domains. Finally, the NEO PI-R domains continued to remain quite reliable even when therapist GPI ratings obtained at pre- and posttreatment were partialled out. The linkage of Neuroticism's retest stability to global symptom severity was less pronounced in this data set, suggesting that method overlap may have inflated the degree of correlation observed with the self-report instruments.

To evaluate mean level changes on the FFM domains, a one-way repeated-measures MANOVA was performed using the NEO PI-R domain scores as the dependent variables and the three times of assessment as the within-subjects effect (Table 1 presents the actual means used in these cross-interval analyses). An overall significant effect emerged, Wilks's lambda = .69, mul-

tivariate $F(10, 108) = 2.25$, $p < .05$, $\eta^2 = .17$ (based on 30 participants), indicating that there were significant changes on the five domains over the three intervals. More specific multivariate and univariate analyses were then conducted for each of the time comparisons.¹

From pretreatment to posttreatment, clients changed significantly on all five NEO PI-R domains. Individuals decreased their overall levels of Neuroticism, $F(1, 97) = 48.79$, $p < .001$, $\eta^2 = .33$, and they increased their feelings of Conscientiousness, $F(1, 97) = 31.22$, $p < .001$, $\eta^2 = .24$, and Openness, $F(1, 97) = 13.71$, $p < .001$, $\eta^2 = .12$. Finally, there were changes toward an interpersonal style characterized by greater Extraversion, $F(1, 97) = 13.57$, $p < .001$, $\eta^2 = .12$, and Agreeableness, $F(1, 97) = 14.22$, $p < .001$, $\eta^2 = .13$. The magnitude of these changes over the five domains was moderate (mean Cohen's $d = .38$); values for N, E, O, A, and C were .69, .27, .24, .26, and .46, respectively.²

Because natural changes in personality are more likely to be observed in younger participants, the moderating effect of age needed to be examined. If indeed the noted personality changes were observed only in the younger participants, then a significant interaction between age and time of assessment would be found. To examine the effect of age, participants were dichotomously coded as being either younger than 30 years of age or 30 or over. A 2(Age: under 30 vs 30 or over) \times 2(Time of Assessment: Time 1 vs Time 2) mixed MANOVA was performed, and the resulting interaction term was nonsignificant, Wilks's lambda = .94, multivariate $F(5, 90) = 1.08$, *ns*. Thus, younger participants did not evidence larger changes in NEO PI-R scores than did older participants.

When comparing the pretreatment and follow-up scores, personality

¹ The values presented in Table 1 are based on all participants available at the given assessment interval. Different subsets of these participants were incorporated into the various cross-time analyses. To give the reader a better sense of the accuracy of the descriptive statistics presented, various within-group analyses were conducted comparing those involved in a cross-analysis to those who were not. For example, there are 132 individuals with Time 1 data, but only 99 of them were included in the comparison of Time 1 to Time 2 personality change. A series of t tests were performed comparing the Time 1 NEO PI-R scores of the 99 participants who had Time 2 data to the 33 who did not on their Time 1 NEO PI-R scales. Of the five tests, a significant difference was found only for the Agreeableness domain. A similar analysis was conducted with the Time 2 data comparing the 30 who had Time 3 data to the 69 who did not. No differences in domain scores were found. Finally, using the Time 1 data again, the 30 individuals who had Time 3 scores were compared to the 102 who did not. No significant differences emerged. These analyses indicate that, for the most part, the mean values presented in Table 1 were not significantly different from the actual means submitted to the various multivariate and univariate cross-time analyses.

² Cohen's d was calculated using the formula presented by Dunlap, Cortina, Vaslow, and Burke (1996) and was $d = t_c/[2(1 - r)/n]^{1/2}$, where t_c is the correlated pairs t value, r is the correlation between scores for the two groups or the retest coefficient, and n is the number of pairs.

changes were maintained for three of the domains: Neuroticism, $F(1, 28) = 7.57, p < .01, \eta^2 = .21$, Agreeableness, $F(1, 28) = 9.15, p < .01, \eta^2 = .24$, and Conscientiousness, $F(1, 28) = 6.86, p < .05, \eta^2 = .19$. Scores on Extraversion and Openness appeared to have dipped somewhat from their Time 2 levels. Again, age did not moderate this effect; the Age \times Time of Assessment interaction was not significant, Wilks's lambda = .88, multivariate $F(5, 24) = 0.66, ns$. It should be noted that there were no significant changes in personality scores over the posttest to follow-up interval, Wilks's lambda = .92, multivariate $F(5, 25) = 0.44, ns$. The average size of personality change from pretreatment to follow-up was moderate (mean Cohen's $d = .28$). After treatment, these changes were maintained and participants continued on a consistent path personologically.

Significant absolute changes in personality were experienced over the course of treatment. However, it is not clear whether the changes in personality were a result of the reduction in symptoms or a result of changes in adaptive orientation. The final set of analyses examined the extent of overlap between these two areas of change. Following the methodology outlined by Santor et al. (1997), raw change scores for each personality domain were regressed on comparable change scores from the GSI and GPI.³ The results are presented in Table 3.

Changes in the personality domains from pretreatment to posttreatment shared from 3% (for Openness) to 13% (for Neuroticism), with comparable changes in GSI scores. In general, Neuroticism change scores shared more in common with changes in self-reported overall symptom experience than did the other domains. The magnitude of overlap with the GSI noted for Neuroticism is consistent with other research (Santor et al., 1997). R^2 values for the posttreatment and follow-up intervals were somewhat higher, perhaps due to the smaller sample sizes, which tend to generate larger correlations. A similar pattern of overlap was found with regard to the therapist ratings on the global pathology rating on the DPRS. Changes in self-reported Neuroticism were much less overlapping with GPI change than was found with

³Change scores were created by subtracting the earlier time value from the later time value. There has been much controversy in the use of raw change scores, although recent comments are providing more support for their use over residual change scores (for a detailed discussion of these issues, see Rogosa, 1988). Santor, Bagby, and Joffe (1997) pointed out that raw change scores and residual change scores capture very different qualities. The latter represents how an individual has changed relative to some group as a whole, whereas the former examines the absolute amount of change that has occurred. Although raw change scores were used here because the interest was in understanding how the amount of change in symptom experience was related to absolute changes in personality, these analyses were repeated using residual analyses as outlined by Trull and Goodwin (1993). These results, which are available from the author, were similar in pattern to those obtained with the raw change scores, although the magnitude was slightly higher.

TABLE 3
Adjusted R^2 Values from the Regression of NEO PI-R Domain Changes on GSI and GPI Changes over Treatment

Regression interval	Δ Neuroticism	Δ Extraversion	Δ Openness to experience		Δ Agreeableness	Δ Conscientiousness
			Δ Extraversion	Δ Openness to experience		
Δ GSI posttreatment - pretreatment ^a	.13***	.10***	.03*	.08**	.06**	
Δ GSI follow-up - posttreatment ^b	.27**	.15*	.24**	.07	.34***	
Δ GSI follow-up - pretreatment ^c	.19**	.08	.01	.00	.06	
Therapist ratings						
Δ GPI posttreatment - pretreatment ^d	.03*	.08**	.01	.01	.06*	

Note. NEO PI-R, Revised NEO Personality Inventory; GSI, Global Severity Index; GPI, Global Pathology Index.

^a $n = 97$.

^b $n = 30$.

^c $n = 30$.

^d $n = 85$.

* $p < .05$ (two-tailed).

** $p < .01$ (two-tailed).

*** $p < .001$ (two-tailed).

the self-reports. Nonetheless, these results show that the great majority of the variance in personality change (>85%) observed from pretreatment to posttreatment was apparently independent of symptom experience as measured by both self-reported and therapist ratings. Thus, the observed changes in personality might not be attributed to symptom severity.

DISCUSSION

The purpose of the current study was to evaluate whether changes in trait standing would occur over the course of an intensive outpatient counseling program. To accomplish this, it was first necessary to examine the relations between personality and symptom experience, specifically to show that (a) the personality constructs of the NEO PI-R are correlated over time, even during times of absolute mean-level change; and (b) the observed relative stability and change are not a function of individual differences in symptom experience. The results confirmed the relative independence of personality and symptoms and that the majority of variance in the observed changes in personality were orthogonal to changes in overall symptom levels. These findings were quite robust, emerging over both self-report and observer ratings of symptom severity. The results show that changes in personality scores in a clinical sample are not completely confounded with changes in overall levels of psychological distress (see also Bagby et al., 1998; Shea et al., 1996).

Evaluating Personality Change

First and foremost, it appears that over the course of this treatment program participants experienced significant reductions in symptomological distress as well as changes in their underlying dispositions. The shifts noted here indicated an enhanced sense of self-esteem and coping ability (i.e., declines in Neuroticism) as well as an increased sense of personal responsibility and control (i.e., increases in Conscientiousness), factors that are positively correlated with job success (Piedmont & Weinstein, 1994). The increases in Extraversion and Agreeableness from pretreatment to posttreatment suggest an emerging interpersonal style that will foster more positive and emotionally sustaining relationships with others. For three of the personality domains, these shifts were maintained over the approximately 15-month average follow-up period.

The magnitude of change from pretreatment to end of treatment on Neuroticism in this study was comparable to that found in earlier studies, about one-half of a standard deviation (or 5 T-score points), resulting in a moderately large effect size (Cohen's *d* for the pretreatment to posttreatment change was .69). What is different here is that changes in personality were noted on *all* of the personality dimensions; each showed moderate to large changes from pretreatment to posttreatment (mean Cohen's *d* was .38).

These results are certainly encouraging for clinicians, but they are overwhelmed by a larger literature that continues to document the stability of these personality dimensions during adulthood (see Costa et al., 2000, who showed changes in these domains of 1 to 2 T-score points in a nonclinical sample of adults over a 6- to 9-year period). Even the two clinical outcome studies reviewed here showed limited change over the course of treatment. Thus, the reader must be cautious in drawing inferences from these results. Without a no-treatment control group, numerous alternate explanations are possible. For example, one could argue that the pretreatment assessments were done on individuals who were in a period of acute distress both physically and psychologically. Therefore, scores were inflated by these situational stressors. The lowered scores over time merely reflect these individuals regaining their own internal equilibrium as they returned to their "baseline" levels of functioning. These shifts would have been noted even if they did not receive any treatment.

However, one needs to consider that participants were not in a time of acute crisis and stress that is characteristic of those beginning the detoxification process. Such individuals usually manifest a high degree of physical and psychological symptoms such as bouts of anxiety, nausea, restlessness, and delirium. Being in such a state would no doubt significantly raise scores on all clinical indexes (if such information could be obtained at all). However, these individuals were seen *at least* 30 days after completing their detoxification process and had gone, on average, more than 3 months without using drugs of any type. Thus, there was ample time for these clients to move beyond this acute situation with its associated dysphoria. As a result, it seems likely that the pretreatment scores more closely resemble clients' more chronic, ongoing psychosocial difficulties than being the result of any situationally induced distortion. Thus, the changes noted here are not likely to be due entirely to a regression toward the mean effect.

Another alternate explanation for these data is that they reflect very specific distortions in self-reported scores. It may be possible that participants exaggerated symptoms initially to gain admission to the treatment program and then provided less distressed profiles at the end of treatment. Although validity scales are usually thought to be effective for answering such questions (e.g., Ben-Porath & Waller, 1992), there is a growing body of information suggesting that validity scales lack such validity (Piedmont, McCrae, Riemann, & Angleitner, 2000). Weiss et al. (1998) provided data showing that self-report ratings in dually diagnosed substance abusers are indeed quite valid, especially in a close supportive context such as the program involved here. Finally, in another article on this sample, Piedmont and Ciarrocchi (1999) showed that self-reported scores on the NEO PI-R agreed significantly with observer ratings of personality obtained on another instrument. Such cross-observer convergence makes it unlikely that the observed

changes in personality noted in this article were due to deliberate manipulations of self-reported scores.

Nonetheless, there are important limitations to this study that restrict our ability to conclude that personality had indeed changed over the course of treatment. The lack of an adequate no-treatment control group and the lack of any independent personality data are two such factors. One must also consider whether there were other important differences between those for whom complete data were available and those who dropped out; those with less ability to change temperamentally may have left the program early on. Also, it needs to be determined whether a longer follow-up interval would have yielded fewer long-term personality changes. No doubt, having more extensive observer ratings of personality across the various assessment intervals would provide another perspective on the durability of these self-reported changes. However, this study does have methodological features that critics of clinical research do favor (e.g., Cronbach, 1982; Speer & Newman, 1996) such as the use of multidimensional standardized assessments and multiple observations. It is clear, however, that given the methodological constraints faced in this applied context, replication of these findings in another sample would certainly add to the value of these results. Until then, these findings should be considered speculative and serve as an impetus for researchers to evaluate possible personality change in populations where significant shifts in context are occurring.

Perhaps this study's most interesting feature is its use of an inner-city, community-based treatment center and hints at the clinical potential of such programs to effect major changes in clients' life contexts. What is noteworthy about this treatment program is its spiritual orientation and goal to make characterological transformations in clients. Unlike the previous studies where treatment was focused on helping high-functioning people cope with specific issues, this program aimed at making broad changes in how people with more tenuous adaptive skills view themselves and their role in the world. Such a transcendent orientation can be quite powerful in affecting people's lives in general (Allport, 1950; Emmons, 1999; Frankl, 1959) and in a substance abuse context in particular (Borman & Dixon, 1998; Green, Fullilove, & Fullilove, 1998; Warfield & Goldstein, 1996). Thus, we need to look more closely at these data and the possibilities that they hold for providing effective, broad-ranging changes. Perhaps these data are an artifact of any number of methodological confounds. No doubt, better designed outcome studies could do much to generate more controlled data. But both the magnitude and the extent of change should make us begin to consider the possibility that real changes in personality can be obtained under the right circumstances. Helson (1993) was right when she pointed out that personality change is always quickly dismissed; it is seen as method error or design artifact. This study showed significant changes in personality over the course

of treatment that were not merely the by-product of symptom relief. The magnitude of these changes should serve as both a caution for us not to be uncritically persuaded by data showing stability and a clarion for calling for us to develop better models of personality growth that speak to how change may be expressed and evaluated.

CONCLUSIONS

Overall, these results suggest that individuals might not be locked into a specific personality configuration. Durable personality change may be obtainable from psychotherapy, and such shifts might not be the mere result of clients experiencing symptom relief. What might be needed are treatment programs that completely immerse an individual in a therapeutic context that is powerful enough to call forth substantive adaptive changes and that lasts long enough to allow these changes to become characteristic patterns. The increasing trend toward shorter, more problem-focused treatment might be preempting people's chances of finding long-lasting, meaningful change.

The role of spirituality as a factor in therapeutic change is worthy of additional investigation. I have argued elsewhere that spirituality may represent a sixth factor of personality (Piedmont, 1999), and an increasing empirical literature supports this conclusion (e.g., MacDonald, 2000; Piedmont, 2001; Saucier & Goldberg, 1998). Spirituality reflects individuals' efforts at constructing a broad sense of personal meaning and, as such, may offer an entirely new medium for both understanding and intervening in people's lives in a way that can influence personality. Research has certainly demonstrated the value of spirituality in rehabilitation contexts such as this one (e.g., Borman & Dixon, 1998). More rigorous examinations of this construct, and its role as a potential agent of change, may open a new door for clinical research, one that supports the growing focus on positive psychology (e.g., Sheldon & King, 2001).

If indeed the changes reported here were the product of the therapeutic program, then future research is needed to determine which aspects of treatment are responsible for effecting these changes. It also needs to be determined what these noted changes in personality mean in terms of these individuals' life outcomes. Do persons who know the participants observe similar changes in behavior and attitudes? Are there noticeable changes in work behavior, health care utilization, life satisfaction, and well-being? These findings also need to be extended to other types of treatment populations and with other measurement models of personality. Are some treatment-seeking groups and personality measures more prone to change than others? The need for more rigorous research designs (e.g., the use of no-treatment control groups, observer ratings, and longer follow-up intervals) is certainly warranted to clarify better the issues raised in this article. For now, however, if the stability in adult personality indicates the presence of

a cast, then these data suggest that such a cast might only be made out of plaster. With sufficient force and focus, it might be possible to break it.

REFERENCES

- Allport, G. W. (1950). *The individual and his religion*. New York: Macmillan.
- Bagby, R. M., Joffe, R. T., Parker, J. D. A., Kalemka, B., & Harkness, K. L. (1995). Major depression and the five-factor model of personality. *Journal of Personality Disorders, 9*, 224-234.
- Bagby, R. M., Rector, N. A., Bindseil, K., Dickens, S. E., Levitan, R. D., & Kennedy, S. H. (1998). Self-report ratings and informants' ratings of personality of depressed outpatients. *American Journal of Psychiatry, 155*, 437-438.
- Barnett, P. A., & Gotlib, I. H. (1988). Psychosocial functioning and depression: Distinguishing among antecedents, concomitant, and consequences. *Psychological Bulletin, 104*, 97-126.
- Barrick, M. R., & Mount, M. K. (1991). The Big Five personality dimensions and job performance: A meta-analysis. *Personnel Psychology, 44*, 1-26.
- Ben-Porath, Y. S., & Waller, N. G. (1992). "Normal" personality inventories in clinical assessment: General requirements and the potential for using the NEO Personality Inventory. *Psychological Assessment, 4*, 14-19.
- Bergeman, C. S., Chipuer, H. M., Plomin, R., Pedersen, N. L., McClearn, G. E., Nesselroade, J. R., Costa, P. T., Jr., & McCrae, R. R. (1993). Genetic and environmental effects on Openness to Experience, Agreeableness, and Conscientiousness: An adoption/twin study. *Journal of Personality, 61*, 159-179.
- Borman, P. D., & Dixon, D. N. (1998). Spirituality and the 12 steps of substance abuse recovery. *Journal of Psychology and Theology, 26*, 287-291.
- Broner, R. K., Herbst, J. H., Schmidt, C. W., Bigelow, G. E., & Costa, P. T., Jr. (1993). Antisocial personality disorder among drug abusers: Relations to other personality diagnoses and the five-factor model of personality. *Journal of Nervous and Mental Disease, 181*, 313-319.
- Buckner, C. J., & Mandell, W. (1990). Risk factors for depressive symptomatology in a drug-using population. *American Journal of Public Health, 80*, 580-585.
- Caspi, A. (2000). The child is father of the man: Personality continuities from childhood to adulthood. *Journal of Personality and Social Psychology, 78*, 158-172.
- Costa, P. T., Jr., Herbst, J. H., McCrae, R. R., & Siegler, I. C. (2000). Personality at midlife: Stability, intrinsic maturation, and response to life events. *Assessment, 7*, 365-378.
- Costa, P. T., Jr., & McCrae, R. R. (1988). Personality in adulthood: A six-year longitudinal study of self-reports and spouse ratings on the NEO Personality Inventory. *Journal of Personality and Social Psychology, 54*, 853-863.
- Costa, P. T., Jr., & McCrae, R. R. (1989). Personality continuity and the changes of adult life. In M. Storandt & G. R. VandenBos (Eds.), *The adult years: Continuity and change* (pp. 45-77). Washington, DC: American Psychological Association.
- Costa, P. T., Jr., & McCrae, R. R. (1992a). *NEO PI-R professional manual*. Odessa, FL: Psychological Assessment Resources.
- Costa, P. T., Jr., & McCrae, R. R. (1992b). Trait psychology comes of age. In T. B. Sondegger (Ed.), *Nebraska Symposium on Motivation, Psychology, and Aging*. Lincoln: University of Nebraska Press.
- Costa, P. T., Jr., & McCrae, R. R. (1994). "Set like plaster"? Evidence for the stability of adult personality. In T. F. Heatherton & J. L. Weinberger (Eds.), *Can personality change?* (pp. 21-40). Washington, DC: American Psychological Association.
- Costa, P. T., Jr., & McCrae, R. R. (1998). Trait theories of personality. In D. F. Barone, M. Hersen, & V. B. Van Hasselt (Eds.), *Advanced personality* (pp. 103-121). New York: Plenum.
- Costa, P. T., Jr., McCrae, R. R., & Dombroski, T. M. (1989). Agreeableness vs. antagonism: Explication of a potential risk factor for CHD. In A. Siegman & T. M. Dombroski (Eds.), *In search of coronary-prone behavior: Beyond Type A* (pp. 41-63). Hillsdale, NJ: Erlbaum.
- Costa, P. T., Jr., McCrae, R. R., & Dye, D. A. (1991). Facet scales for Agreeableness and Conscientiousness: A revision of the NEO Personality Inventory. *Personality and Individual Differences, 12*, 887-898.
- Costa, P. T., Jr., McCrae, R. R., & Holland, J. L. (1984). Personality and vocational interests in an adult sample. *Journal of Applied Psychology, 69*, 390-400.
- Derogatis, L. R. (1993). *Brief Symptom Inventory: Administration, scoring and procedures manual* (3rd ed.). Minneapolis, MN: National Computer Systems.
- Derogatis, L. R., Rickels, K., & Rock, A. (1976). The SCL-90 and the MMPI: A step in the validation of a new self-report scale. *British Journal of Psychiatry, 128*, 280-289.
- Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology, 41*, 417-440.
- Dunlap, W. P., Cortina, J. M., Vaslow, J. B., & Burke, M. J. (1996). Meta-analysis of experiments with matched groups or repeated measures designs. *Psychological Methods, 1*, 170-177.
- Emmons, R. A. (1999). *The psychology of ultimate concerns: Motivation and spirituality in personality*. New York: Guilford.
- Frankl, V. E. (1959). *From death-camp to existentialism*. Boston: Beacon.
- Fricchione, G. L., Howanitz, E., Jandorf, L., Krosesler, D., Zervas, I., & Woznicki, R. M. (1992). Psychological adjustment to end-stage renal disease and the implications of denial. *Psychosomatics, 33*, 85-91.
- Goldberg, L. R. (1993). The structure of phenotypic personality traits. *American Psychologist, 48*, 26-34.
- Green, L. L., Fullilove, M. T., & Fullilove, R. E. (1998). Stories of spiritual awakening: The nature of spirituality in recovery. *Journal of Substance Abuse Treatment, 15*, 325-331.
- Heath, A. C., Neale, M. C., Kessler, R. C., Eaves, L. J., & Kendler, K. S. (1992). Evidence for genetic influences on personality from self-reports and informant ratings. *Journal of Personality and Social Psychology, 63*, 85-96.
- Heatherton, T. F., & Weinberger, J. L. (1994). *Can personality change?* Washington, DC: American Psychological Association.
- Helson, R. (1993). Comparing longitudinal studies of adult development: Toward a paradigm of tension between stability and change. In D. C. Funder, R. D. Parke, C. Tomlinson-Keasey, & K. Widaman (Eds.), *Studying lives through time: Personality and development*. Washington, DC: American Psychological Association.
- Knutson, B., Wolkowitz, O. M., Cole, S. W., Chan, T., Moore, E. A., Johnson, R. C., Terpstra, J., Turner, R. A., & Reus, V. I. (1998). Selective alteration of personality and social behavior by serotonergic intervention. *American Journal of Psychiatry, 155*, 373-379.
- MacDonald, D. A. (2000). Spirituality: Description, measurement, and relation to the five-factor model of personality. *Journal of Personality, 68*, 153-197.

- Magnus, K., Dicner, E., Fujita, F., & Pavot, W. (1993). Extraversion and neuroticism as predictors of objective life events: A longitudinal analysis. *Journal of Personality and Social Psychology*, *65*, 1046-1053.
- McCrae, R. R., & Costa, P. T., Jr. (1989a). Reinterpreting the Myers-Briggs Type Indicator from the perspective of the five-factor model of personality. *Journal of Personality*, *57*, 17-40.
- McCrae, R. R., & Costa, P. T., Jr. (1989b). The structure of interpersonal traits: Wiggins' circumplex and the five-factor model of personality. *Journal of Personality*, *56*, 586-595.
- McCrae, R. R., & Costa, P. T., Jr. (1992). Discriminant validity of the NEO PI-R facet scales. *Educational and Psychological Measurement*, *52*, 229-237.
- McCrae, R. R., & Costa, P. T., Jr. (1995). Trait explanations in personality psychology. *European Journal of Personality*, *9*, 231-252.
- McCrae, R. R., Costa, P. T., Jr., Ostendorf, F., Angleitner, A., Hrebicková, M., Avia, M. D., Sanz, J., Sánchez-Bernardos, M., Kusdil, M. E., Woodfield, R., Saunders, P. R., & Smith, P. B. (2000). Nature over nurture: Temperament, personality, and life span development. *Journal of Personality and Social Psychology*, *78*, 173-186.
- McCrae, R. R., & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality*, *60*, 175-215.
- Ormel, J., & Rijksdijk, F. V. (2000). Continuing change in neuroticism during adulthood: Structural modelling of a 16-year, 5-wave community study. *Personality and Individual Differences*, *28*, 461-478.
- Ormel, J., & Wohlfarth, T. (1991). How neuroticism, long-term difficulties, and life situation change influence psychological distress: A longitudinal model. *Journal of Personality and Social Psychology*, *60*, 744-755.
- Paunonen, S. V., Jackson, D. N., Trzebinski, J., & Forsterling, F. (1992). Personality structure across cultures: A multimethod estimation. *Journal of Personality and Social Psychology*, *62*, 447-456.
- Perconte, S. T., & Griger, M. L. (1991). Comparison of successful, unsuccessful, and relapsed Vietnam veterans treated for posttraumatic stress disorder. *Journal of Nervous and Mental Disease*, *179*, 558-562.
- Piedmont, R. L. (1993). A longitudinal analysis of burnout in the health care setting: The role of personal dispositions. *Journal of Personality Assessment*, *61*, 457-473.
- Piedmont, R. L. (1998). *The Revised NEO Personality Inventory: Clinical and research applications*. New York: Plenum.
- Piedmont, R. L. (1999). Does spirituality represent the sixth factor of personality? Spiritual transcendence and the five-factor model. *Journal of Personality*, *67*, 985-1013.
- Piedmont, R. L. (2001). Spiritual transcendence and the scientific study of spirituality. *Journal of Rehabilitation*, *67*, 4-14.
- Piedmont, R. L., & Chae, J-H. (1997). Cross-cultural generalizability of the five-factor model of personality: Development and validation of the NEO PI-R for Koreans. *Journal of Cross-Cultural Psychology*, *28*, 131-155.
- Piedmont, R. L., & Ciarrochi, J. W. (1999). The utility of the NEO PI-R in an outpatient drug rehabilitation context. *Psychology of Addictive Behaviors*, *13*, 213-226.
- Piedmont, R. L., McCrae, R. R., Riemann, R., & Angleitner, A. (2000). On the invalidity of validity scales: Evidence from self-reports and observer ratings in volunteer samples. *Journal of Personality and Social Psychology*, *78*, 582-593.
- Piedmont, R. L., & Weinstein, H. P. (1993). A psychometric evaluation of the new NEO

- PI-R facets scales for Agreeableness and Conscientiousness. *Journal of Personality Assessment*, *60*, 302-318.
- Piedmont, R. L., & Weinstein, H. P. (1994). Predicting supervisor ratings of job performance using the NEO Personality Inventory. *Journal of Psychology*, *128*, 255-265.
- Rogosa, D. (1988). Myths about longitudinal research. In K. W. Schaie, R. T. Campbell, W. Meredith, & S. C. Rawlings (Eds.), *Methodological issues in aging research* (pp. 171-210). New York: Springer.
- Royce, D., & Drude, K. (1984). Screening drug abuse clients with the Brief Symptom Inventory. *International Journal of Addictions*, *19*, 849-857.
- Santor, D. A., Bagby R. M., & Joffe, R. T. (1997). Evaluating stability and change in personality and depression. *Journal of Personality and Social Psychology*, *73*, 1354-1362.
- Saucier, G., & Goldberg, L. R. (1998). What is beyond the Big Five? *Journal of Personality*, *66*, 495-524.
- Shea, M. T., Leon, A. C., Mueller, T. I., Solomon, D. A., Warshaw, M. G., & Keller, M. B. (1996). Does major depression result in lasting personality change? *American Journal of Psychiatry*, *153*, 1404-1410.
- Sheldon, K. M., & King, L. (2001). Why positive psychology is necessary. *American Psychologist*, *56*, 216-217.
- Trull, T. J., & Goodwin, A. H. (1993). Relationship between mood changes and the report of personality disorder symptoms. *Journal of Personality Assessment*, *61*, 99-111.
- Trull, T. J., Umeda, D., Costa, P. T., Jr., & McCrae, R. R. (1995). Comparison of the MMPI-2 Personality Psychopathology Five (PSY-5), the NEO PI, and the NEO PI-R. *Psychological Assessment*, *7*, 508-516.
- Watson, D., Clark, L. A., & Harkness, A. R. (1994). Structures of personality and the irrelevance to psychopathology. *Journal of Abnormal Psychology*, *103*, 18-31.
- Warfield, R. D., & Goldstein, M. B. (1996). Spirituality: The key to recovery from alcoholism. *Counseling and Values*, *40*, 196-205.
- Weiss, R. D., Najavits, L. M., Greenfield, S. F., Soto, J. A., Shaw, S. R., & Wyner, D. (1998). Validity of substance use self-reports in dually diagnosed outpatients. *American Journal of Psychiatry*, *155*, 127-128.