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TIME, AGE, AND PREDICTORS OF PSYCHOSOCIAL OUTCOME IN BORDERLINE PERSONALITY DISORDER

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Abstract

In longitudinal studies, BPD symptoms diminish over time, though psychosocial functioning lags far behind. The effects of time and advancing age on BPD are poorly understood. We sought prospective predictors of psychosocial outcome and recovery in 150 BPD subjects followed 2 to 31 years (mean 9.94 years) using a multidimensional assessment method and biannual follow-ups. Time-in-study had no significant effect on achieving diagnostic remission in BPD, good psychosocial outcomes, meaningful interpersonal relationships, full employment, or total recovery; however, younger age was associated with social and vocational achievement independent of BPD remission. Significant contributions to psychosocial outcome were found for age, employment status, MDD, SUD, Any Anxiety Disorder, and Alcohol abuse/dependence (ALC). Remission from BPD was neither necessary or sufficient for good interpersonal relationships or full-time employment. Full-time employment and social and vocational adjustment (SAS-sr) predicted good psychosocial outcome. Axis I comorbidity with Any Anxiety Disorder, MDD, or SUD predicted poor outcome.

Keywords

borderline personality disorder; outcome; remission; recovery; comorbidity; age

Long-term prognosis for the large majority of patients with borderline personality disorder (BPD) is for symptomatic and diagnostic remission. Two landmark longitudinal studies, the McLean Study of Adult Development (MSAD; Zanarini, Frankenburg, Reich, & Fitzmaurice, 2010a, 2010b) and the Collaborative Longitudinal Personality Disorders Study (CLPS; Gunderson et al., 2011), reported diagnostic remission in 85%–93% of BPD cases over a 10-year period. Core diagnostic criteria, such as emotion dysregulation, impulsivity, aggression, suicidal behavior, and self-injurious behavior, all diminished dramatically. However, half of remitted patients failed to attain full psychosocial recovery (Zanarini et al., 2010a). We recently reported similar results among BPD subjects followed 10 years in a prospective longitudinal study of suicidal behavior (Soloff & Chiappetta, 2018).

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Diagnostic remission was attained by 69% of the subjects, but 44% of the subjects had poor psychosocial outcomes. Failure in vocational attainment rather than in social function was the most prominent cause of failed recovery in the MSAD study (Zanarini et al., 2010a). Similarly, the CLPS reported less full-time employment among BPD subjects compared to clinical comparison groups, with no significant difference between groups in social functioning. Being younger, female, and more educated were associated with greater likelihood of attaining full-time employment at 10-year follow-up (Gunderson et al., 2011). In both the CLPS and MSAD studies, younger age at baseline, less BPD psychopathology, and better psychosocial functioning at baseline were associated with a good psychosocial outcome at 10-year follow-up. An underlying assumption of the CLPS and MSAD studies was that improvement in BPD diagnosis and symptoms would result in improved overall psychosocial functioning. The large gap in outcome between subjects with diagnostic remission and those with good psychosocial functioning begs the question of what other factors are critical to outcome in subjects with BPD. These longitudinal studies reported outcomes at fixed follow-up intervals, ranging from 2 to 16 years. The extent to which time itself and advancing age are related to outcome is unclear and best addressed in analyses where time and age are treated as continuous variables over a wide range. We sought to define prospective predictors of psychosocial outcome and recovery in a sample of BPD subjects, with follow-up assessments ranging from 2 to 31 years.

Retrospective studies of outcome in BPD, conducted many years post-hospitalization, have generally noted improvement with age (McGlashan, 1986; Paris & Zweig-Frank, 2001; Stone, 1990), although older subjects (aged mid 40s to 50s) tended to have poorer outcomes. In the CLPS, Shea et al. (2009) found that age was significantly associated with overall improvement at 6-year follow-up, but with differential effects across age cohorts. Participants entering the study at a younger age (ages 18–24 years at baseline) showed steady improvement across all 6 years, while subjects entering the study at an older age (ages 35–45 years at baseline) improved only for the first 3 years of follow-up, then declined in function during years 4–6 (at ages ranging from 38 to 48 years). At 10-year follow-up, increased age significantly predicted decreased Global Assessment of Functioning (GAF) scores, suggesting a reversal of improvement with older age. In our longitudinal study, we have previously shown that predictors for suicidal behavior change over time, and that time-varying risk factors have differing effects on clinical outcomes in successive follow-up intervals (Soloff & Chiappetta, 2012, 2017, 2018; Soloff & Fabio, 2008). The current analysis assesses the effects of time and advancing age on diagnostic remission in BPD, on risk factors relevant to psychosocial functioning, on psychosocial outcome, and on recovery at final follow-up.

METHOD

PARTICIPANTS

This study was approved by the University of Pittsburgh Institutional Review Board. All subjects provided written informed consent and were enrolled in a prospective longitudinal study of suicidal behavior in BPD. At baseline, a multidimensional method was used to assess putative risk factors for suicidal behavior, derived from the suicide literature. Subjects

were systematically reassessed at 3 months, 6 months, and biannually. Risk factors included demographic, diagnostic, and clinical variables, personality traits, histories of childhood abuse, suicidal and self-harm behavior, family history of psychiatric illness and suicide, lifetime hospitalization, and treatment experience. Because many clinical variables are *time-varying*, both baseline and follow-up values were assessed for association with psychosocial outcomes and recovery. Time and age were also assessed as potential predictors of psychosocial outcome and recovery. Subjects were enrolled between the ages of 18 and 45 years, and they were followed from 2 to 31 years (mean 9.94 years).

Subjects were recruited from inpatient, outpatient, and nonpatient (community) sources. Axis I and II disorders were assessed by a master's-level clinician using the Structured Clinical Interview for *DSM III-R/IV-TR* (SCID; First, Spitzer, Gibbon, & Williams, 2005) and the International Personality Disorders Examination (IPDE; Loranger, 1999). Subjects meeting criteria for a probable or definite lifetime diagnosis of BPD on the IPDE were interviewed by the senior author (P.H.S.) using the Diagnostic Interview for Borderline Patients (DIB; Gunderson, Kolb, & Austin, 1981) and the Revised Diagnostic Interview for Borderlines (DIB-R; Zanarini, Gunderson, Frankenburg, & Chauncey, 1989). (The DIB-R was adopted in 2001 as the interview of record; however, for continuity with the longitudinal database, both interviews were scored concurrently at all follow-ups.) The DIB and DIB-R each have a 2-year time frame. All subjects were newly rediagnosed for the present analysis. Diagnostic remission was determined relative to the interview used at intake, with remission for DIB defined as a Total Scaled Section Score < 7, and for DIB-R as a Total Scaled Score < 8. Because scored statements are not identical in the two interviews, each was analyzed separately for symptom changes. All diagnoses were confirmed in a consensus conference of raters, using a best estimate process, and all available data.

Exclusion criteria included a lifetime (past or current) Axis I diagnosis of schizophrenia, delusional (paranoid) disorder, schizoaffective disorder, *any* bipolar disorder, or psychotic depression; clinical evidence of central nervous system pathology of any etiology (including seizure disorder, acquired brain injury, or developmental deficits); physical disorders or treatments with known psychiatric consequence; or borderline mental retardation.

MEASURES

The core assessment battery for the longitudinal study was adapted from the Mental Health Clinical Research Center (MHCRC) for the Study of Suicidal Behavior (J. J. Mann, MD, Principal Investigator) and has been presented elsewhere (Soloff, Lynch, Kelly, Malone, & Mann, 2000). Standardized assessments included: (a) the MHCRC demographic history; (b) Axis I and II diagnoses using SCID and IPDE interviews, respectively; (c) clinical state scales (Beck Depression Inventory [BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961], Hamilton Rating Scale for Depression-24 item format [HamD-24; Guy, 1976], Beck Hopelessness Scale [Beck & Steer, 1988], and Global Assessment Scale [GAS; Endicott, Spitzer, Fleiss, & Cohen, 1976]); (d) suicidal behavior (MHCRC Suicide History and Lethality Rating Scale [Oquendo, Halberstam, & Mann, 2003], Suicide Intent Scale, Scale for Suicidal Ideation [Beck, Beck, & Kovacs, 1975; Beck, Schuyker, & Herman, 1974], and Reasons for Living Scale [RFL; Linehan, Goodstein, Nielson, & Chiles, 1983]); (e)

personality traits (Barratt Impulsiveness Scale-version-11 [BIS; Barratt, 1965; Barratt & Stanford, 1995], Buss-Durkee Hostility Inventory [BDHI; Buss & Durkee, 1957], Life History of Aggression, adult score [LHA; Brown & Goodwin, 1986], MMPI_Psychopathic Deviate subscale [MMPI_Pd; Hathaway & Meehl, 1951], and NEO Five Factor Inventory [Costa & McCrae, 1978/2010]); (f) MHCRC family history and history of childhood abuse (Soloff, Lynch, & Kelly, 2002); (g) self-rated social adjustment (Social Adjustment Scale-self-report [SAS-sr; Weissman & Bothwell, 1976]); and (h) MHCRC hospitalization and treatment history. Follow-up interviews defined interval changes in the predefined risk factors. All comorbid psychiatric diagnoses were reassessed at each follow-up using an abbreviated interview for *DSM* criteria. Nine of the most prevalent SCID diagnoses are reported in this article: MDD, dysthymia, ALC, SUD, panic disorder, social phobia, specific phobia, posttraumatic stress disorder (PTSD), and generalized anxiety disorder (GAD). For efficiency in specific analyses, all five anxiety disorders (panic disorder, social phobia, specific phobia, PTSD, and GAD) were pooled in one variable, termed Any Anxiety Disorder. Eating disorders had a negligible prevalence in our sample and were not considered in this analysis.

The definition of psychosocial outcome and recovery was adapted from Zanarini et al. (2010b). Poor psychosocial outcome was defined by a GAS score < 61; good outcome by a GAS score ≥ 61 at the time of the last follow-up visit. Total recovery required attainment in four areas: (a) diagnostic remission from BPD, (b) at least one ongoing significant interpersonal relationship (e.g., boyfriend/girlfriend/spouse), (c) full-time employment or school, and (d) a GAS score ≥ 61 at the time of follow-up (Zanarini et al., 2010b, used the related GAF score).

STATISTICAL ANALYSES

Baseline and follow-up variables were compared using *t* tests, chi square, and McNemar's tests (McN) as appropriate (McNemar, 1947). Bonferroni correction for multiple comparisons was calculated for each set of analyses. For example, for comparison of baseline (BL) and follow-up (FU) DIB/DIB-r variables, Bonferroni correction was calculated at $p = .002$. Time and age were defined as continuous variables (as "years in the study" and "age at followup"), but also categorically, as "length of follow-up," defined by short-term (2–5 years), intermediate-term (6–11 years), and long-term follow-up intervals (≥12 years). (There was no reliable way to define time by age of onset of BPD.) Logistic regression was used to define relationships between predefined risk factors as independent variables and "good" psychosocial outcome or recovery at follow-up as dependent variables. Variables were first assessed within content domains (e.g., demographic, diagnostic, clinical state). Significant variables were then entered into a final summary model. Both baseline and time-varying follow-up variables were entered into all models, with time or age as covariates. Results are expressed as odds ratios (OR).

RESULTS

SAMPLE CHARACTERISTICS

The sample consisted of 150 subjects, 26 male (17.3%) and 124 female (82.7%), with a mean (*SD*) age of 38.1 (9.6) years. Time from intake to follow-up ranged from 2 to 31 years, with a mean (*SD*) interval of 9.94 (0.51) years and median of 9.0 years. Comorbid psychiatric disorders were highly prevalent at baseline, especially MDD (56.7%), panic disorder (25%), SUD (24.7%), ALC (23.3%), PTSD (22.7%), and GAD (22.7%).

At follow-up, 66% of subjects had achieved diagnostic remission from BPD, and half (49.3%) had "good" psychosocial outcomes (GAS ≥ 61). A significant interpersonal relationship was endorsed by 62.0%, and 50.0% had full-time employment or attended school. The combination of diagnostic remission with a significant interpersonal relationship was found in 39.3%, with full employment or school in 33.3%, and with both relationship and employment in 22.0%. Total recovery (requiring remission, relationship, employment, and a GAS score ≥ 61) was achieved in only 18.7% of the sample, suggesting that the GAS score accounted for adverse factors not included in the remission, relationship, or employment criteria.

EFFECTS OF TIME IN STUDY AND AGE

Forty subjects were followed for a short-term interval (2–5 years), 68 for an intermediate-term interval (6–11 years), and 42 for a long-term interval (≥ 12 years). The mean (*SD*) ages of subjects in each cohort were: short term, 32.3 (8.2) years; intermediate, 36.8 (7.6) years; and long term, 45.9 (8.7) years, $F(149, 1)$ 30.4, $p < .001$.

Time, assessed continuously as "years in the study," was not related to diagnostic remission, full-time employment, interpersonal relationships, psychosocial outcome, or recovery. Similarly, there were no significant relationships between follow-up intervals and any of the four criteria for recovery assessed individually.

Age at time of follow-up ranged from 22 to 65 years (mean [*SD*] 38.1 [9.6] years) and was not related to diagnostic remission or "good" psychosocial outcome (GAS ≥ 61). However, subjects with meaningful interpersonal relationships were younger (36. 7 [9.8] years) than those with no such relationships (40.4 [8.7] years), $t = 2.31$, $df = 148$, $p = .02$. Subjects with full-time employment were younger (34.6 [8.6] years) than those without full-time employment (41.7 [9.1] years), $t = 4.88$, $df = 148$, $p \leq .001$).

Many subjects endorsed meaningful relationships and full-time employment without_achieving diagnostic remission. Among nonremitted subjects, 66.7% endorsed a meaningful relationship and 49% had full-time employment. The combination of diagnostic remission with an interpersonal relationship was not related to age; however, subjects with diagnostic remission and full-time employment were significantly younger (mean [*SD*] 35.7 [8.9] years) than those who had not achieved these milestones (39.4 [9.7] years), $t = 2.24$, $df = 148$, p .27). Similarly, subjects achieving diagnostic remission, interpersonal relationship and full-employment were significantly younger (34.3 [9.8] years) than those who had not (39.2 [9.2] years), $t = 2.64$, $df = 148$, p .009. With the addition of the fourth criterion for

total recovery (i.e., GAS ≥ 61), age no longer significantly discriminated between fully recovered (35.0 [10.4] years) and nonrecovered subjects (38.8 [9.3] years), although the trend favored younger subjects, $t = 1.92$, $df = 148$, $p = .057$. The final logistic regression model for total recovery selected "younger age" as significantly increasing likelihood of recovery.

EFFECTS OF DIAGNOSTIC REMISSION

There were 145 DIB and 120 DIB-R paired interviews with complete data. For both interviews, all section scores reflected significant changes between baseline (BL) and follow-up (FU), in both total and scaled scores at $p \leq .001$. A comparison of baseline to follow-up interviews (DIB to DIB, DIB-r to DIB-r) found that 66% of subjects achieved diagnostic remission by follow-up. Changes from BL to FU in specific section scores are detailed in Table 1. The most notable improvements across symptom domains in both interviews were in the areas of Affect and Impulse Action.

Diagnostic remission was a significant predictor of "good" psychosocial outcome (GAS ≥ 61) (OR = 3.01, $p = .006$, 95% CI [1.38, 6.55]). Among DIB section scores, high scores at follow-up in Social Adaptation predicted good psychosocial outcome (OR = 1.34, $p = .015$, 95% CI [1.06, 1.70]), while high scores in Impulse Action and Psychosis section scores diminished likelihood of good outcome (Impulse Action: OR = 0.791, $p = .005$, 95% CI [0.672, 0.931]; Psychosis: OR = 0.728, $p = .006$, 95% CI [0.579, 0.914]). Among the DIB-r section scores, high scores at follow-up on Affect and Cognition both decreased likelihood of good outcomes (Affect: OR = 0.733, $p = \leq .001$, 95% CI [0.629, 0.854]; Cognition: OR = 0.794, $p = .018$, 95% CI [0.656, 0.962]).

Among individual predictors of recovery, high scores on DIB Social Adaptation at follow-up increased the likelihood of recovery (OR = 1.44, $p = .013$, 95% CI [1.08, 1.91]), while high scores on Impulse Action and Interpersonal Relations diminished likelihood of recovery (Impulse Action: OR = 0.800, $p = .05$, 95% CI [0.640, .999]; Interpersonal Relations: OR = 0.777, $p = .012$, 95% CI [0.638, 0.946]). Among DIB-r section scores, high scores on Impulse Action at follow-up diminished the likelihood of recovery: OR = 0.674, $p < .001$, 95% CI [0.549, 0.826].

EFFECTS OF PSYCHIATRIC COMORBIDITY (TABLE 2)

At baseline, 92.7% of subjects had at least one Axis I comorbid diagnosis, and 77.3% at follow-up (McN 13.08, $df = 1$, $p < .001$). Comorbidity decreased for all disorders at follow-up, with the notable exception of three anxiety disorders, panic disorder, specific phobia, and GAD, which increased in prevalence (see Table 2). Changes from BL to FU were statistically significant for MDD, dysthymic disorder, and SUD, with Bonferroni correction set at $p = .005$. Decreased prevalence of MDD and increased prevalence of panic disorder were significantly related to time in the study, both in terms of years between BL and FU (MDD: $t = 2.78$, $df = 148$, $p = .006$; panic disorder: $t = 2.95$, $df = 148$, $p \leq .001$) and in terms of their follow-up interval group (MDD: $\chi^2 = 7.75$, $df = 2$, $p = .021$; panic disorder: $\chi^2 = 9.49$, $df = 2$, $p = .009$). Subjects with diagnostic remission of BPD at follow-up had significantly less prevalence of panic disorder ($\chi^2 = 4.10$, $df = 1$, $p = .05$) and PTSD

(χ^2 = 9.883, *df* = 1, *p* =.002). There were no significant relationships between diagnostic remission of BPD and prevalence at follow-up of MDD, dysthymic disorder, SUD, or other anxiety disorders.

Comorbidity with specific comorbid psychiatric disorders diminished the likelihood of "good" psychosocial outcome or recovery. Specifically, comorbidity with MDD, SUD, or Any Anxiety Disorder diminished the likelihood of "good" psychosocial outcomes (MDD: OR = 3.47, *p* = .001, 95% CI [1.66, 7.25]; SUD: OR = 7.18, *p* < .001, 95% CI [2.58, 19.98]; Any Anxiety Disorder: OR = 5.63, *p* < .001, 95% CI [2.62, 12.12]). Similarly, comorbidity with Any Anxiety Disorder diminished the likelihood of psychosocial recovery (OR = 2.39, *p* = .04, 95% CI [1.04, 5.52]).

EFFECTS OF SOCIOECONOMIC VARIABLES

High scores on the self-rated Social Adjustment Scale indicate poorer function and are inversely correlated with observed GAS, both at baseline (*r* = −0.35, *p* < .001) and follow-up (*r* = −0.45, *p* < .001). Subscales dealing with increased Work and Social/Leisure activity at follow-up were predictive of "good" psychosocial outcomes (Work: OR = 0.45, *p* = .008, 95% CI [0.25, 0.81]; Social/ Leisure: OR = 0.45, *p* = .007, 95% CI [0.25, 0.80]). Full-time employment at follow-up was a strong predictor of "good" psychosocial outcome: OR = 4.01, *p* < .001, 95% CI [1.86, 8.63].

FINAL MODELS: PREDICTORS OF GOOD PSYCHOSOCIAL FUNCTIONING (GAS ≥ 61) AND RECOVERY

The final regression model for psychosocial outcome entered significant variables from all variable domains, with age as a covariate. In the final model, full-time employment at follow-up increased the likelihood of good outcome (OR = 2.98, *p* = .009, 95% CI [1.32, 6.75]). The SAS-sr overall score (OR = 0.24, *p* = .001, 95% CI [0.10, 0.56]) also increased likelihood of good outcome. (Recall that the GAS relationship to SAS-sr is inverse.) Finally, the presence of any comorbid psychiatric diagnosis at follow-up decreased the likelihood of good outcome. In particular, a comorbid diagnosis of SUD (OR = 7.18, *p* < .001, 95% CI [2.58, 19.98]), Any Anxiety Disorder (OR = 5.63, *p* < .001, 95% CI [2.62, 12.12]) or MDD (OR = 3.47, *p* = .001, 95% CI [1.66, 7.25]) each significantly decreased the likelihood of good outcome (see Table 3a).

Similarly, the final model predicting total recovery included (a) younger age (OR = 0.92, *p* = .006, 95% CI [0.87, 0.98]), (b) lower scores on DIB-r Impulse Action Patterns (OR = 0.68, *p* = .003, 95% CI [0.53, 0.88]), and (c) DIB Interpersonal Relations (OR = 0.82, *p* ≤ .05, 95% CI [0.67, 0.99]). Lower scores on the DIB/DIB-r measures of Impulse Action Patterns and Interpersonal Relationships are protective, indicating less impulsive behavior and less interpersonal instability. Among all comorbid psychiatric disorders, comorbidity with Any Anxiety Disorder diminished the likelihood of total recovery (OR = 2.39, *p* = .04, 95% CI [1.04, 5.52]) (see Table 3b).

DISCUSSION

Previous studies have described in detail the course of symptomatic and diagnostic remission in BPD over time, extending from 2 to 16 years (Gunderson et al., 2011; Zanarini, Frankenburg, Reich, & Fitzmaurice, 2012; Zanarini et al., 2007, 2014). An underlying assumption of this work is that remission of BPD is directly related to psychosocial outcome. For example, in the CLPS, Skodol et al. (2005) reported an association between improvement in BPD psychopathology at 2-year follow-up and improvement in employment, recreation, and global measures of functioning (although not social relationships). We viewed BPD remission as but one of many potential predictors of psychosocial outcome, and we found that BPD remission and psychopathology did not significantly contribute to psychosocial outcome in our final models. Instead, Axis I comorbidities, employment status, and self-reported social and vocational adjustment (SAS-sr) were the most significant predictors of psychosocial outcome among all variable domains. For the few subjects who did attain total recovery, diminished BPD pathology in the areas of impulse actions and (pathological) interpersonal relations contributed to recovery.

Do patients with BPD improve with the passage of time alone (or advancing age)? This question has profound implications for treatment and patient care. Time alone was not a significant factor in effecting good psychosocial outcomes. Specifically, years of study participation had no significant effects on achieving diagnostic remission, meaningful interpersonal relationships, full-time employment, good psychosocial outcomes, or total recovery. The effects of advancing age were more nuanced. Diagnostic remission of BPD was not related to advancing age. Assessed as a continuous variable, age at follow-up was not significantly related to good psychosocial outcome (defined as GAS ≥ 61); however, younger age was related to success in interpersonal relationships and employment. Younger age increased the likelihood of total recovery, while older age diminished the odds of recovery. Older subjects in our study tended to have more chronic psychiatric comorbidities and socioeconomic deficits such as unemployment, poverty, and reliance on government assistance (Soloff & Chiappetta, 2018). Very few subjects (18.7%) attained total recovery. This was not attributable to the many subjects with little time in the study (i.e., 26.6% with only 2–5 years of participation), but rather to the stringent requirements for recovery, specifically the GAS score. The GAS score was not simply a marker for achieving remission, relationship success, and employment success, but it accounted for symptoms related to psychiatric comorbidities, such as MDD, SUD, and anxiety disorders (as well as intervals of suicidal behavior). Our predictor model suggests that good psychosocial outcome depends more upon remission of these psychiatric comorbidities than upon remission from BPD. Younger subjects with diminished impulsivity and better interpersonal relationships were more likely to achieve total recovery. These few subjects were also among the least impaired at study entry.

The MSAD study found that earlier time-to-remission was associated with younger age (Zanarini et al., 2010a). Similarly, the CLPS reported a loss of previous improvement in older BPD subjects who were 40–50 years of age (Shea et al., 2009). Older subjects with nonremitted BPD represent a chronically impaired cohort at greater risk for social

and vocational failure. In our longitudinal study, severity and chronicity of overall illness, reflected in interval hospitalizations, was a significant contributor to poor psychosocial functioning at 10-year follow-up, and a predictor of interim suicide attempts (Soloff & Chiappetta, 2018). Comorbidity with MDD in half of our subjects at 10-year follow-up may contribute to their poor social and vocational outcomes and suicide risk.

A major finding of the CLPS and MSAD studies showed that BPD psychopathology diminishes steadily across follow-up intervals ranging from 10 to 16 years, but good psychosocial outcome and recovery lag far behind (Gunderson et al., 2011; Zanarini et al., 2010a). Our results support this finding. Diagnostic remission was attained by 66% of our sample, but only 49.3% had good psychosocial outcomes. In our sample, diagnostic remission was neither necessary or sufficient to achieve meaningful interpersonal relationships or full-time employment. A majority of non-remitted BPD subjects in our sample reported significant meaningful relationships, while half had full-time employment. This begs the question of what other factors may be involved in effecting good psychosocial outcome and recovery in the long-term course of BPD. In analyses of individual risk domains, significant contributions to psychosocial outcome were found for age, employment status, and comorbidity with MDD, SUD, Any Anxiety Disorder, and ALC. Zanarini et al. (2014) concluded that predictors of early time-to-recovery in BPD at 16-year follow-up included factors related to chronicity (no prior psychiatric hospitalizations, absence of anxious cluster personality disorder), competence (higher IQ, good full-time vocational record), and adaptive aspects of temperament (high extraversion and agreeableness). Our studies concur on the importance of chronicity of illness, especially Axis I comorbidity, and vocational competence as predictors of good psychosocial outcomes in patients with BPD.

In our sample, all Axis I disorders diminished in prevalence over time except for panic disorder, specific phobia, and generalized anxiety disorder, which increased in prevalence. Comorbidity with psychiatric disorders is highly prevalent in BPD, compared to other Axis II disorders. Zanarini et al. (1998) found that the pattern of Axis I comorbidity in BPD significantly discriminated BPD patients from an Axis II comparison group. BPD patients had a significantly higher prevalence of mood disorders (MDD) and anxiety disorders (panic disorder, simple phobia, social phobia, PTSD). A gender difference has been reported for impulse control disorders in BPD patients. Female BPD patients have a higher prevalence of eating disorders than male BPD patients, who have significantly more substance use disorders, antisocial personality disorders, and intermittent explosive disorders (Zanarini et al., 1998; Zlotnick, Rothschild, & Zimmerman, 2002). Severity and recurrence of MDD and comorbid dysthymic disorder predicted co-occurrence with BPD (Skodol et al., 1999). The MSAD study also reported high prevalence for specific Axis I disorders at 6-year follow-up: 61% with MDD, 41% with dysthymia, 29% with panic disorder, 33% with PTSD, and 28% with eating disorders (Zanarini, Frankenburg, Hennen, Reich, & Silk, 2004). In the MSAD study, decreasing prevalence of comorbid psychiatric disorders over time was greater for those with diagnostic remission of BPD compared to nonremitting patients. In our sample, diminishing prevalence at follow-up was related to diagnostic remission of BPD only for panic disorder and PTSD, while prevalence of MDD, SUD, and other anxiety disorders at follow-up was independent of BPD diagnostic remission. A diagnosis of Any Anxiety

Disorder significantly decreased the likelihood of both good psychosocial outcome and recovery.

Symptoms of comorbid psychiatric disorders may synergize with symptoms of BPD, increasing overall illness severity (Soloff et al., 2000). An overlap in symptom presentation between disorders, especially involving mood and anxiety symptoms, may confound treatment efforts. Gunderson et al. (2004) found that remission rates following treatment for MDD were reduced in the presence of untreated comorbid BPD, while successful treatment of BPD was often followed by improvement in MDD. Comorbidity with MDD, SUD, and Any Anxiety Disorder contributes to overall illness severity and chronicity in BPD subjects and predicted poor psychosocial outcomes in our study.

Full-time employment was a significant predictor of good psychosocial outcome at follow-up in both individual and final models, even after controlling for age. Vocational achievement is a stronger predictor of good outcome than interpersonal relationships, although both have significant positive effects. It is important to note that vocational function was not dependent on diagnostic remission from BPD. Half of nonremitted subjects met this goal, suggesting that factors other than a BPD diagnosis are involved in vocational failure. We suggest that psychiatric comorbidity, especially MDD, SUD, and Any Anxiety Disorder, is a likely contributor to vocational failure in BPD. Furthermore, the onset of significant BPD pathology at an early age may compromise educational and vocational opportunities. In this regard, the socioeconomic cost of BPD resembles that of other chronic mental illnesses with early onset.

The importance of employment as a predictor of psychosocial outcome is not addressed in current treatments for BPD. Psychotherapies for BPD are developed around select theoretical perspectives of core BPD pathology, such as deficits in emotion regulation, interpersonal relatedness, and mindfulness. Translation of benefits into practical work achievement may be a consequence of overall improvement, but it is not a specific target of treatment. Vocational studies among depressed workers have shown that workplace productivity is a significant predictor of treatment outcome (Jha et al., 2016) and that rehabilitation efforts (e.g., “job coaching”) facilitates recovery in employed dysthymic and depressed subjects (Adler et al., 2015; Hees, de Vries, Koeter, & Schene, 2013). Vocational rehabilitation adapted specifically for BPD has been proposed previously as an adjunctive treatment strategy, although it has never been operationalized or widely implemented (Links, 1993).

Could improved social and vocational function be attributed to treatment? A majority of subjects in our longitudinal study reported some treatment experience at baseline (e.g., psychiatric hospitalization in 69.5%, outpatient treatment in 85.7%), although at 10-year follow-up, only 21.2% had experienced hospitalization in the interval, and only 16.1% had any outpatient treatment (Soloff & Chiappetta, 2018). Given the small degree of treatment utilization, it is not surprising that “any treatment” in the interval failed to predict psychosocial outcome or recovery. In our sample, failure to attain good psychosocial outcome in BPD was not due to persistence of BPD psychopathology, but to comorbid Axis I disorders, unemployment, and older age, suggesting chronicity of overall illness.

Rates for diagnostic remission of BPD in our study differ from those of the CLPS and MSAD studies. These results may be due to differences in study design, sample characteristics, and treatment utilization. By design, the time-in-study of our subjects ranged from 2 to 31 years, with a mean of 9.94 years, while outcomes for the CLPS and MSAD studies were reported at fixed intervals. In their 10-year follow-up reports, the authors of the CLPS and MSAD studies noted diagnostic remission rates of 85% and 93%, respectively, compared to 66% for our current sample (Gunderson et al., 2011; Zanarini et al., 2010a). By virtue of our study design, our sample includes 40 subjects (26.7% of the total) assessed at 2–5 years after intake (i.e. the "short-term" interval). "Short-term" subjects were still highly symptomatic and less likely to have achieved remission compared to subjects with intermediate term followups (45.3%, 6–11 years) and long term follow-ups (28%, 12–31 years). A bias toward greater symptom severity in subjects with shorter interval follow-ups would reduce the rate of remission in the overall sample compared to the 10-year outcomes of the CLPS and MSAD studies.

Differences between studies in sample characteristics include sources of recruitment and socioeconomic status (SES) of the subjects. Our subjects were recruited as part of a longitudinal study of suicidal and self-injurious behaviors in BPD, conducted at a public university hospital serving a largely lower class population. The final study sample was roughly balanced among inpatient, outpatient, and nonpatient community subjects. Subjects were predominantly of lower SES (reported as "66% Hollingshead Classes IV–V"), with 60% reporting household incomes below the Federal poverty level at baseline. The MSAD study was conducted at McLean Hospital, a Harvard-affiliated private hospital, highly regarded for its treatment of patients with BPD. An exclusively inpatient sample was recruited, with an average SES of 3.4 on the 5-point Hollingshead–Redlich scale. The CLPS recruited a predominantly outpatient sample of "treatment-seeking" subjects from four university-based sites and 19 clinical subsites. Among their BPD subjects, half were recruited as outpatients, 22% as inpatients. A minority of their subjects, 37.7%, were in Hollingshead Classes IV–V (Gunderson et al., 2000). Clinical setting and SES are related to availability and utilization of psychiatric treatment and community resources helpful in the recovery process.

Using a naturalistic follow-up design, our study participants received no treatment or treatment referrals through research participation. Treatment utilization was assessed as an outcome variable. A 10-year follow-up revealed that only 16.1% of subjects had received any outpatient treatment in the follow-up interval (Soloff & Chiappetta, 2018). By virtue of inpatient recruitment, all MSAD subjects were in active treatment. At 8- and 10-year follow-ups, 70% of borderline subjects in the MSAD study were still in psychotherapy and taking medication (Zanarini et al., 2008). In the CLPS, all subjects were treatment-seeking or already in treatment. Treatment utilization at follow-up was robust, with 64% of subjects receiving psychotherapy and 68% medication consults at 25–36 months (Bender et al., 2006; Grilo et al., 2004). All three studies used a naturalistic, uncontrolled design in regard to treatment, and none of them found treatment intensity to be a predictor of remission of BPD criteria or psychosocial outcomes. The effects of treatment utilization on outcome in an uncontrolled study design may be indirect. That is, patients engaged in ongoing treatment may be more likely to continue participation in the longitudinal studies. Remission rates

for BPD in both CLPS and MSAD studies increased dramatically with years of study participation.

Participant retention rates reflect clinical stability, social and vocational attachments in the community, and commitment to the longitudinal studies. The MSAD study reported a remarkably high retention rate of 88% of surviving subjects at 10-year follow-up (Zanarini, Frankenburg, Hennen, Reich, & Silk, 2006) and 87.5% at 16 years (Wedig, Frankenburg, Reich, Fitzmaurice, & Zanarini, 2013). We (2017) reported a retention rate of 71% at 8-year follow-up, whereas the CLPS reported a retention rate of only 66% at 10-year follow-up (Gunderson et al., 2011). Our BPD subjects tend to be unstable socially and vocationally, and they frequently move within and between cities.

Predictors of outcome also differed among studies, primarily because of differences in definitions of outcome variables and statistical methods. The MSAD study reported predictors for early time-to-remission at 10-year follow-up (Zanarini et al., 2006) and time-to-recovery at 16 years (Zanarini et al., 2014), while our predictor analyses were defined by “good psychosocial outcome” (GAS scores ≥ 61). Although these variables may be conceptually related, they define very different outcomes. In addition, the MSAD study conducted prospective analyses using only baseline variables, while our study included both baseline and time-varying follow-up data. In an analysis of baseline predictors of time-to-remission at 10-year follow-up, the MSAD study found little evidence that psychiatric comorbidity was predictive of outcome. Specifically, they reported that absence of PTSD and anxious cluster disorders (and absence of family history of mood or substance use disorders) were among the 16 variables that contributed to earlier time-to-remission. (An analysis by Zanarini et al., 2014, of baseline data to predict time-to-recovery at 16 years resulted in similar findings with the addition of “no ADHD” as a favorable predictor.) These results contrast sharply with our finding that MDD, SUD, and Any Anxiety Disorder at follow-up are predictive of poor psychosocial outcome. Excluding interval episodes of depression, substance use disorders, and anxiety disorders from prediction models of time-to-remission and recovery diminishes the clinical utility of the analysis.

LIMITATIONS

Time was defined as “years in the study,” not as “years from onset” of BPD, for which there was no accurate determination. Time from onset of BPD, a longer interval, could have different effects on outcome and recovery from the shorter time in study. However, in light of our results, we are confident that study participation per se had no significant effect on outcome variables.

We had insufficient data to address the effects of stressful life events on psychosocial outcome, although previous research has shown a relationship to psychosocial functioning and suicidal behavior in BPD (Kelly, Soloff, Lynch, Haas, & Mann, 2000) and to decreased psychosocial functioning in BPD over time (Pagano et al., 2004). Interpretation of our results is also limited by the absence of clinical and healthy comparison groups drawn from the same socioeconomic setting. Despite great differences in study design, our quantitative results for diagnostic remission and psychosocial outcomes support reports of the CLPS and MSAD studies.

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TABLE 1.

DIB and DIB-R Section Scores, Baseline vs. Follow-up

	Baseline Mean (*SD*)	Follow-up Mean (*SD*)	Paired *t* test *t, df, p* value
DIB (*n* = 145)			
Social Adaptation	4.84 (1.6)	4.17 (1.6)	$t = 4.35$, $df = 144$, $p = < .001$
Impulse Action Patterns	7.39 (2.2)	3.95 (2.8)	$t = 12.36$, $df = 144$, $p = < .001$
Affects	6.48 (1.3)	4.74 (2.4)	$t = 8.25$, $df = 144$, $p = < .001$
Psychosis	3.23 (2.1)	2.14 (2.0)	$t = 4.81$, $df = 144$, $p = < .001$
Interpersonal Relations	6.83 (2.0)	4.63 (3.1)	$t = 7.94$, $df = 144$, $p = < .001$
Section Score Total	28.77 (4.5)	19.63 (7.7)	$t = 12.91$, $df = 144$, $p = < .001$
DIB-R (*n* = 120)			
Affect	9.13 (1.4)	7.18 (2.7)	$t = 6.92$, $df = 119$, p = < .001
Cognition	3.05 (1.7)	2.10 (1.9)	$t = 4.19$, $df = 119$, $p = < .001$
Impulse Action Patterns	7.23 (1.8)	4.11 (2.7)	$t = 10.75$, $df = 119$, $p = < .001$
Interpersonal Relationships	9.96 (2.6)	6.95 (4.1)	$t = 7.90$, $df = 119$, $p = < .001$
Section Score Total	29.37 (4.2)	20.34 (8.9)	$t = 10.56$, df = 119, $p = < .001$

TABLE 2.

Changes in Axis I Comorbidity From Baseline to Follow-up

Axis I Diagnosis	Baseline, % present	Follow-up, % present	McNemar's test, *df* = 1	*p* Value
MDD	56.7	32	17.75	< .001
Dysthymia	22.7	4.7	17.33	< .001
ALC	23.3	13.3	4.56	.03
SUD	24.7	11.3	9.50	.002
Panic Disorder	25.3	36.0	4.69	.03
Social Phobia	20.7	10.0	7.03	.007
Specific Phobia	20.0	24.0	0.57	.45
PTSD	22.7	13.3	4.69	.03
GAD	22.7	35.3	5.68	.02
Any Axis I Diagnosis	92.7	77.3	13.08	< .001

Bonferroni correction set at $p = .005$.

TABLE 3a.

Final Model Predicting Good Psychosocial Outcome (GAS ≥ 61)

Risk Factor	Odds Ratio	*p* Value	95% CI lower	95% CI upper
Full-time Employment at Follow-up	2.98	.009	1.32	6.75
SAS-sr overall score at Follow-up*	0.24	.001	0.10	0.56
No SUD at Follow-up	7.18	< .001	2.58	19.98
No Any Anxiety at Follow-up	5.63	< .001	2.62	12.12
No MDD at Follow-up	4.47	.001	1.66	7.25

Note. Age is a covariate.

*SAS_sr is scored inversely to GAS.

TABLE 3b.

Final Model Predicting Total Recovery

Risk Factor	Odds Ratio	*p* Value	95% CI lower	95% CI upper
Younger age at Follow-up	0.92	.006	0.87	0.98
DIB-R Follow-up Impulse Action Patterns **	0.68	.003	0.53	0.88
DIB Follow-up Interpersonal Relationships **	0.82	< .05	0.67	0.99

Note. Age is a covariate.

** Lower scores are protective.