

Improvement and Recovery From Suicidal and Self-Destructive Phenomena in Treatment-Refractory Disorders

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Abstract: Long-term data about recovery from suicidal and self-destructive phenomena are limited. We examined these phenomena in a naturalistic, follow-along study of 226 adults with treatment-refractory disorders admitted at the Austen Riggs Center. Follow-along interviews systematically rated suicidal ideation, suicide attempts, self-mutilation, and other self-destructive phenomena. We identified vital status in 98.7%, finding 1 death by suicide. Among 79 who made at least 1 suicide attempt in the 6 months before admission, 61 (77.2%) were estimated to be free of suicidal acts by a median of 7.18 years. Self-mutilation and other self-destructive phenomena showed slightly longer times to recovery. Among 156 individuals with suicidal ideation, 79 (50.6%) attained sustained recovery at a median of 8.69 years. On average 2.9 to 5.2 years were required from the last observed self-destructive event to attain sustained recovery. Most participants showed significant improvement in suicidal phenomena, whereas between 50.6% and 77.2% attained sustained recoveries.

Key Words: Suicide attempts, self-mutilation, suicidal ideation, self-harm, time to recovery.

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Suicide attempts, suicidal ideation, self-mutilation, and other self-destructive phenomena are a serious source of concern to patients, families, and professionals. Many of these individuals have disorders that are refractory to treatment, including chronic or recurrent depressive disorders and personality disorders, especially borderline personality disorder (BPD) for which repeated suicidal and self-destructive phenomena are a criterion. One report of up to 5-years follow-up indicated that BPD patients in treatment tended to decrease their frequency of suicide attempts, and possibly self-mutilation, whereas suicidal ideation remained relatively persistent (Sabo et al., 1995). Another study found that 3.8% of BPD subjects died by suicide over 6-years of follow-up, whereas self-mutilation declined from a prevalence of 81% at baseline to 28% by 6 years (Zanarini et al., 2005). Self-mutilation, in the form of deliberate cutting, burning, and abrading skin, presents significant clinical challenges because it

also occurs among treatment refractory groups of seriously disturbed patients (Linehan et al., 1993; Favazza and Favazza 1987; Favazza and Conterio, 1988; Fowler et al., 2000; Plakun, 1994). Although self-mutilation is not life threatening, the presence of self-mutilation in BPD patients doubles the risk of completed suicide in comparison with other patients with a diagnosis of BPD (Stone et al., 1987).

Treatments in outpatient (Linehan et al., 1993; Linehan et al., 2006; Weinberg et al., 2006) day or partial hospital (Bateman and Fonagy, 2001), inpatient (Lieberman and Eckman, 1981), and combined treatment settings (Chiesa et al., 2004; Chiesa et al., 2006) have shown a significant diminution in suicidal and self-destructive phenomena. However, studies rarely examine suicide attempts, self-mutilation, other forms of self-harm, and suicidal ideation together. Furthermore, our knowledge of the long-term course in these studies is limited by the follow-up period, generally 6 years or less, and reporting prevalence only. As a result we do not have a clear delineation of the natural history of recovery from suicidal and self-destructive behavior, including a way to determine when cessation of these phenomena reflects temporary remission or sustained recovery. One result is a recent call to develop a better picture of the long-term course of suicidality (Berman, 2007). This report addresses these concerns.

A phenomenon whose course is intermittent, infrequent or fluctuating raises conceptual issues in determining when cessation is temporary or sustained enough to become a recovery. Remission typically refers to the cessation of an episode. Recovery refers to remission that has continued for a certain time period, indicating that the individual is clearly out of the episode (Frank et al., 1991). However, for events, such as suicide attempts, or intermittent, fluctuating subjective states, such as suicidal ideation, the subsequent time requirement for a remission to be considered a recovery is not obvious, nor are there any a priori grounds for consensus. This report brings long-term follow-along data to bear upon this issue. By using a follow-along design and identifying the time at which relevant events occur, change in severity, or cease, we examine trends over time and compare different approaches to estimating the proportion of individuals recovered, thereby empirically delineating sustained recovery from remission.

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METHODS

Setting

The Austen Riggs Center is a voluntary, hospital-based residential treatment center in rural New England for adults referred with treatment-refractory disorders. The hospital has an open setting in which patients are free to come and go at will. Treatment is usually long-term, including a range of step-down programs. The core of the treatment program is intensive psychodynamically oriented psychotherapy of 4 sessions weekly by licensed doctoral level therapists, integrated with comprehensive psychopharmacologic treatment, family therapy, insight-oriented groups, an elected pa-

tient-directed government, an activities program, and opportunities to work and study.

Design

The study uses a naturalistic, observational design of a cohort entering treatment with periodic follow-along interviews during and after treatment at the Center. The overall aim is to delineate the course and outcome of patients entering treatment.

Participants

All patients admitted to the Center between September 1992 and August 2001 were eligible and had the study explained to them after admission. Of 442 patients admitted over this period, 226 (51.1%) gave informed consent to join the study.

Procedures

At baseline, participants underwent a Guided Clinical Interview taking from 2.5 to 5 hours to obtain a personal history and Axes I to V diagnoses (including Axis II disorders in appendices of DSM-III-R and IV). Interviews were recorded, transcribed, and checked for reliability (Perry et al., 1999). Subsequently, a research assistant administered the Longitudinal Interval Follow-up Evaluation (Keller et al., 1987) adapted for the study of personality (LIFE-ASP), along with a number of self-report measures, and a Relationship Anecdote Paradigm interview, which gathered interpersonal vignettes (Luborsky and Crits-Christoph, 1991). Each LIFE-ASP covered the interval of time from 6 months before admission until admission, then was readministered every 6 months until year 5, after which yearly administration covered the past year's interval. At 8 years, participants were interviewed biannually for the most recent year interval only.

Measures

A measure of lifetime histories of impulsive and self-destructive behaviors was taken at intake (Perry, 1996). Suicidal ideation was scored as 0 = never, 1 = once or twice, 2 = sometimes, 3 = often, 4 = very often or almost daily. Suicide attempts required lethal intent and means, whereas suicide gestures (without clear intent or lethal means) were excluded. Self-cutting and other self-harm (e.g., burning, flagellation, head-banging) were scored as the number of episodes, but not double-coded if any were definite suicide attempts. The latter 3 scales were scored from 0 to 5, with 0 = never, 1 = once, 2 = twice, 3 = 3 times, 4 = 4 times, and 5 = 5, or more times, or occasions.

The LIFE-ASP follow-along versions of the same items were scored similarly, noting each occurrence over follow-up of the 3 behavioral items, whereas suicidal ideation was scored on an ordinal scale from 0 to 3 for each week of follow-along, with 0 = never, 1 = 1 to 2 days a week, 2 = 2 to 4 days a week, and 3 = 5 to 7 days a week. The intraclass R inter-rater reliability of these items was 0.65 for suicide attempts, 0.99 for self-mutilation, and 0.99 for suicidal ideation. No self-harm was scored in the reliability sample, although agreement on its absence was 100%.

Time

Entry into the study occurred at admission to the index Riggs hospitalization and was labeled lifeweek 1. Week by week ratings of suicidal ideation were made at each interview, analogous to the method of Keller et al., (1987). These were then summarized as mean ratings for each follow-along interview. Events, such as suicide attempts, cutting episodes, or other self-destructive behaviors, were recorded in the lifeweek of occurrence. Each was then summarized as an occurrence rate (number of incidents divided by number of weeks) for each follow-along interval. The lifeweek of the interview was used as the time variable in subsequent analyses. Conversion of events to a rate over an interval allowed us to

minimize underestimating the frequency of events because of missed interviews and the respective interval data.

The baseline interview covered the 6-month interval before admission (from lifeweeks -26 to 1). However, the statistical procedures required time to be positive, so for this report we relabeled lifeweek -26 as lifeweek 1; hence admission typically occurred at modified lifeweek 26 (lifeyear 0.50).

Ascertainment of Vital Status

Project staff tracked address and name changes of patients through interviews. For subjects not returning telephone or written inquiries, vital status and cause of death were obtained by submitting all names to the National Death Index and obtaining death certificates.

Statistical Analyses

All analyses were done with SAS 9.1 for Windows (SAS Institute, 2004). Medians, quartiles, and distribution-free 95% confidence intervals (CI) are presented, as many distributions were non-normal. Correlations were nonparametric Spearman (r_s).

Given the length of follow-along, we experienced subject attrition and subsequent re-entry ("drop-out/drop-in"). To assess the potential impact of missing data because of the periods in which the subject refused interviews or was unavailable, we calculated the proportion of total time in follow-along for which we obtained complete interview data. The sample was then dichotomized at the median for subsequent analyses of the influence of missing data. Missing data analyses are noted in the results only when a significant effect was found.

For each self-destructive phenomenon, we noted the last lifeweek across all follow-ups with an actual event or positive score. We designated this as a remission. To qualify as the last observed event, we required a subsequent follow-up in which the event score was zero. If instead the last observed follow-along interview contained at least 1 positive event or score, the subject's course was considered still positive and right censored (i.e., coming to the end of follow-along). We used survival analysis (Proc Lifetest) (Cantor, 1997; Hosmer and Lemeshow, 1999) to examine the Kaplan-Meier estimates of the time to the last observed event (remission), from which we present the medians, quartiles, and 95% CIs.

Although technically the individual remits an instant after the last occurrence of the phenomenon, it is not known what proportion of remissions are followed by a recurrence versus a sustained recovery. We addressed this concern by estimating the time to recovery, using all available interview ratings. Taking a conservative approach, we calculated individual simple linear regression models for each subject with at least 2 follow-along interviews to estimate predicted scores at intake (intercept) and last observed follow-up, slope (rate of change), and the lifeweek at which the subject's score was predicted to become zero, indicating recovery. We then examined this model-based time to recovery using nonparametric descriptive statistics and the Kaplan-Meier estimates from survival analysis. To avoid extrapolation, participants were considered recovered only if the predicted recovery time was within the range of the observed data; others were considered right censored. Finally, we compared each subject's actual time of last observed event against the modeled time to recovery for those for whom neither value was censored. We further examined whether this difference score was influenced by the proportion of missing data. The Wilcoxon and Log-Rank tests are both reported.

RESULTS

Participant Characteristics

Participant characteristics ($N = 226$) at intake were as follows. Mean age was 31.0 years ($SD = 10.3$), 75.2% were women, and most were single (67.3%) or married (21.2%). Participants had a mean of 4.7 lifetime and 3.5 current Axis I disorders. Eighty-eight percent had lifetime mood disorders, principally major depression (78.3%) and dysthymic disorders (61.5%), whereas 81.4% had lifetime anxiety disorders, principally generalized anxiety (50.4%), specific phobia (34.2%), posttraumatic stress (29.7%), social phobia (29.7%), panic (23.9%), and obsessive-compulsive (22.1%) disorders. Personality disorders were found in 82.3% of participants, particularly borderline (42%), depressive (19.8%), self-defeating (17.7%), PD-NOS (14.2%), and dependent (10.6%) types. The median GAF was 42 (mean 42.7, $SD = 7.4$) and the median best level in the past 12 months was 53. Several additional characteristics support the designation of participants as having treatment-refractory disorders. Previous hospitalizations occurred in 78.5% of participants, whereas 21.5% had more than 5. Histories of becoming regressed in previous psychiatric treatments occurred in 73.7% of participants, with 27.4% reporting regressions at least monthly. Virtually all reported multiple trials of psychotropic medications without attaining sustained responses.

Length of Stay

The index admission lasted a median of 175.5 days (mean = 306, $SD = 395$, range 9–3048 days; 95% CI = 141–214 days). Thirty-four (15.0%) individuals had only 1 subsequent readmission to the Center, 11 (4.9%) a second readmission, and 3 (1.3%) a third readmission. Combining all admissions resulted in a total length of stay at the Center: median = 234.5 days (mean = 427, range 19–3048, 95% CI = 189–279 days).

Completeness of Data

The proportion of time in the study with complete follow-along interval data was non-normally distributed with a median of 0.563 (95% CI 0.488–0.619).

Mortality and Completed Suicide

Using recent follow-along data (up to May 2006) and the National Death Index (September 2006), we ascertained the vital status of 223 (98.7%) participants. Vital status was unavailable on 3 foreign participants. There were 10 deaths: 3 were accidental, 5 were natural, 1 was indeterminate, and 1 was a suicide. Death certificates and National Death Index reports ruled the causes of death in 7 deaths. We were unable to obtain death certificates for 3 of the natural deaths, but confirmed the causes through other sources. The indeterminate case had brittle juvenile diabetes without a history of

suicidality. This yields 1 definite suicide in a total of 1164.9 subject-years of follow-along, yielding a nonage corrected suicide rate of 86 per 100,000 subject-years.

Suicidal and Self-destructive Phenomena

Baseline Life History

At baseline 194 (85.8%) subjects gave lifetime history information indicating that only 12 (6.2%) reported no lifetime suicidal ideation, whereas 148 (76.3%) reported it sometimes or more often. Ninety-four (48.5%) had made at least 1 suicide attempt, whereas 63 (32.5%) made 2 or more serious attempts. Ninety-six (49.5%) had histories of self-cutting, with 62 (32.0%) reporting cutting on 5 or more occasions. Finally, 74 (38.1%) gave histories of other self-injurious behaviors.

Baseline 6-Month Follow-Along Interval

Of the total sample, 12 (5.3%) participants did not complete the baseline or any subsequent follow-along interviews, leaving 214 (94.7%) subjects with usable information at baseline and/or thereafter. In the 6 months before the index hospitalization, 79 (36.9%) reported 1 or more suicide attempts, 71 (33.2%) reported self-cutting, 64 (29.9%) reported other self-harm behaviors, whereas suicidal ideation was found in 156 (72.9%) (Table 1). Suicidal ideation was found in 100% of those who made suicide attempts [Odds Ratio (OR) = 120.02, 95% CI = 7.29–1975.96], 97.2% of those self-cutting (OR = 22.21; 95% CI = 5.23–94.24), and 93.8% of those engaging in other self-harm (OR = 8.44; 95% CI = 2.91–24.49). Conversely, self-destructive behavior was uncommon in subjects without suicidal ideation.

Suicide Attempts

The 79 participants reporting suicide attempts in our baseline follow-along interview gave a median length of follow-along of 7.62 years (95% CI = 5.94–8.33) from intake. Of these, 33 (41.8%) made no further suicide attempts, whereas 46 (58.2%) subjects made 1 or more observed suicide attempts after admission, 7 of whom reported an attempt in their last follow-up and were designated censored. Using modified lifeyears, Table 2 indicates the last observed suicide attempt occurred at a median of 0.71 years, with the 75th percentile at 2.63 years. However, there was a significant effect because of proportion of missing data (Wilcoxon Test chi-square = 4.23, $df = 1$, $p = 0.04$; Log-Rank Test chi-square = 4.85, $df = 1$, $p = 0.03$). The median time to last observed suicide attempt was shorter among those with more missing data than among those with more complete data.

Based on the simple linear regression models [Table 1 (Model 1)], participants started with a median score indicating suicide attempts at a rate of about 1 per year decreasing to a median rate of

TABLE 1. Suicidal and Self-Destructive Phenomena Modeled Over Follow-Along

| Variable and Model | N | Initial Median | Final Median | Slope Median | 95% CI | Improving <i>n</i> (%) | Recovered <i>n</i> (%) | <i>p</i> * |
|-----------------------------------|-----|----------------|--------------|--------------|----------------------|------------------------|------------------------|------------|
| 1. Suicide acts [†] | 79 | 0.986 | 0.000 | -0.1640 | -0.2041 to -0.1297 | 70 (88.6%) | 61 (77.2%) | 0.0001 |
| 2. Self-cutting [‡] | 71 | 0.163 | 0.000 | -0.0338 | -0.05603 to -0.01249 | 66 (93.0%) | 53 (73.2%) | 0.0001 |
| 3. Other self-harm [‡] | 64 | 0.161 | 0.000 | -0.0177 | -0.02834 to -0.00471 | 51 (79.7%) | 40 (62.5%) | 0.0001 |
| 4. Suicidal ideation [§] | 156 | 1.546 | 0.000 | -0.1630 | -0.1999 to -0.1306 | 134 (85.9%) | 79 (50.6%) | 0.0001 |

**p* value refers to the Wilcoxon Sign Rank Test of the probability that the slope = 0.

[†]Actual count in the follow-along interval is divided by the number of weeks in the follow-up × 52 to create a yearly rate.

[‡]Actual count in the follow-along interval is divided by the number of weeks in the follow-up to create a weekly rate.

[§]Score is 0–3 for each week in each follow-up: 0 = not at all, 1 = once or twice/wk, 2 = 2–4 d/wk, 3 = 5–7 d/wk, which is then converted to the mean rating over the follow-up interval to create a weekly rate.

TABLE 2. Kaplan-Meier Estimates of Time to Event: Median Years and Quartiles with 95% Confidence Intervals: Time Until Last Observed Suicidal and Self-Destructive Events (Remission)

| | Suicide Attempts <i>n</i> = 79 | Self-Mutilation <i>n</i> = 71 | Other Self-Harm <i>n</i> = 64 | Suicidal Ideation <i>n</i> = 156 |
|-----------------|--------------------------------|-------------------------------|-------------------------------|----------------------------------|
| Censored | 7, 8.9% | 13, 18.3% | 14, 21.9% | 83, 53.2% |
| 75% | 2.63 (1.63–4.17) | 6.87 (5.23–8.15) | 6.48 (5.15–9.52) | * (11.00–*) |
| 50% | 0.71 (0.48–1.29) | 3.94 (1.31–5.13) | 2.96 (1.83–5.15) | 8.03 (6.44–9.48) |
| 25% | 0.40 (0.35–0.48) | 0.75 (0.63–1.25) | 0.76 (0.65–1.42) | 3.19 (1.77–4.08) |

*Indicates indeterminate value.

zero per year. Of those positive for suicide attempts at baseline, 70 (88.6%) were improving, whereas 61 (77.2%) had recovered. The median rate of improvement (negative slope) was highly significant. Of 135 participants with no suicide attempts at baseline, only 2 (1.5%) subsequently made a suicide attempt. This difference in outcomes between the 2 groups was significant (chi square = 26.70, *df* = 1,213, *p* < 0.0001).

Table 3 indicates that the median predicted time to recovery was 7.18 years. Table 4 compares the difference between the 2 approaches to cessation of suicide attempts. Among 60 subjects for whom neither time (i.e., last observed attempt, or recovery) was censored, the predicted time to recovery was a median 5.21 years longer than the time of the last observed attempt. No participant's model predicted that recovery occurred before the last observed suicide attempt. Among those 7 participants who made a suicide attempt during their last follow-along interval (censored subgroup), only 1 individual had a model indicating an improving slope, indicating that overall the subgroup was still at risk.

Self-Mutilation (Cutting)

Seventy-one subjects reported episodes of self-mutilation at baseline. They had a mean length of follow-along of 7.85 years (95% CI = 6.58 to 8.90). Table 2 indicates the last observed cutting episode occurred at a median of 3.94 years.

Table 1 (Model 2) shows that participants started with a median score of 0.163 per week—indicating 1 self-cutting episode every 6.1 weeks or 8.5 per year—decreasing to a median rate of zero. Of those positive for self-cutting in the baseline interval, 66

(93%) were improving and 52 (73.2%) were recovered. The median rate of improvement (negative slope) was highly significant. Of 143 with no self-cutting at baseline, only 4 (2.8%) subsequently began self-cutting. This difference in outcomes between the 2 groups was significant (chi-square = 28.40, *df* = 1213, *p* < 0.0001).

Tables 3 and 4 indicate that median predicted time to recovery was 7.33 years, which was a median 3.24 years longer than the last observed self-cutting event. Only 2 subjects (4.3%) had a model that predicted recovery before the last observed self-cutting episode.

Other Self-Harm

Sixty-four subjects reported episodes of other self-harm at baseline. They had a median length of follow-along of 7.63 years (95% CI = 6.02–8.46). The last observed self-harm episode occurred at a median of 2.96 years, with the 75th percentile at 6.48 years (Table 2).

Table 1 (Model 3) shows that participants started with a median score indicating other self-harm episodes at a rate of about 8.4 per year (0.161 per week) or 1 episode every 6.2 weeks, decreasing to a median rate of zero. Of those positive for self-harm at baseline, 51 (79.7%) were improving and 40 (62.5%) were recovered. The median rate of improvement (negative slope) was highly significant. Of 150 with no self-harm at baseline, only 4 (2.7%) subsequently began other self-harm behaviors. This difference in outcomes between these 2 groups was significant (chi-square = 47.64, *df* = 1213, *p* < 0.0001).

Tables 3 and 4 shows that the median predicted time to recovery was 7.29 years, which was a median 3.81 years longer than the last

TABLE 3. Kaplan-Meier Estimates of Time to Event: Median Years and Quartiles With 95% CIs: Time Until Recovery for Suicidal and Self-Destructive Phenomena Using Regression Model-Based Estimates

| | Suicide Attempts <i>n</i> = 79 | Self-Mutilation <i>n</i> = 71 | Other Self-Harm <i>n</i> = 64 | Suicidal Ideation <i>n</i> = 156 |
|-----------------|--------------------------------|-------------------------------|-------------------------------|----------------------------------|
| Censored | 18, 22.8% | 19, 26.8% | 24, 37.5% | 77, 49.4% |
| 75% | 8.41 (7.50–8.89) | 9.14 (7.98–10.01) | 8.32 (7.63–*) | 10.25 (9.75–14.23) |
| 50% | 7.18 (6.05–7.50) | 7.33 (6.36–7.98) | 7.29 (6.44–7.82) | 8.69 (8.09–9.16) |
| 25% | 5.18 (3.92–5.87) | 5.18 (4.49–6.23) | 5.88 (4.75–6.78) | 5.49 (4.83–7.15) |

*Indicates indeterminate value.

TABLE 4. Kaplan-Meier Estimates of Time to Event: Median Years and Quartiles With 95% Confidence Intervals: Years Difference: Model-Based Estimate Minus Last Observed Event; Estimates on Noncensored Data Only

| | Suicide Attempts <i>n</i> = 60 | Self-Mutilation <i>n</i> = 47 | Other Self-Harm <i>n</i> = 38 | Suicidal Ideation <i>n</i> = 60 |
|-----|--------------------------------|-------------------------------|-------------------------------|---------------------------------|
| 75% | 6.69 (6.10–7.47) | 5.51 (3.49–6.75) | 6.23 (5.29–6.86) | 4.68 (3.51–6.81) |
| 50% | 5.21 (4.20–6.10) | 3.24 (2.78–3.78) | 3.81 (2.82–5.43) | 2.88 (1.88–3.51) |
| 25% | 3.40 (2.36–3.89) | 2.57 (1.16–2.85) | 2.04 (1.31–3.12) | 1.34 (0.99–1.84) |

*Indicates indeterminate value.

observed event. Only 2 subjects (5.3%) had a model that predicted recovery occurring before the last observed self-harm episode.

Suicidal Ideation

The 156 participants reporting suicidal ideation at baseline gave a median length of follow-along of 6.29 years (95% CI = 5.46–7.23). Of these, only 8 (5.1%) ceased having further suicidal ideation by the end of the baseline interview. Eighty-three (53.2%) of the 156 participants still reported suicidal ideation at some point in their last interview and were considered censored. Table 2 indicates that the median time until last observed suicidal ideation was 8.03 years. However, there was a significant effect because of level of missing data (Wilcoxon Test chi-square = 11.27, $df = 1$, $p = 0.0008$; Log-Rank Test chi-square = 8.63, $p = 0.003$). Those with more missing data ($n = 61$) had an earlier median time to last observed suicidal ideation than those with more complete data ($n = 95$): 4.48 years (95% CI = 3.10–8.73) versus 8.83 years (95% CI = 7.10–indeterminate).

In Table 1 (Model 4), the initial median score indicates that participants had suicidal ideation slightly less than half the days of the week, whereas the final median score was zero. Of those positive for suicidal ideation at baseline, 134 (85.9%) were improving and 79 (50.6%) were recovered. The median rate of improvement (negative slope) was highly significant. Of 58 participants without suicidal ideation at baseline, 5 (8.6%) subsequently reported some on follow-along. This difference in outcomes between the 2 groups was significant (chi-square = 29.55, $df = 1, 213$, $p < 0.0001$).

Tables 3 and 4 indicate that the median time to recovery was 8.69 years, a median 2.88 years longer than the last observed time of suicidal ideation among the noncensored subgroup. In only 1 subject (1.7%) did the model predict recovery just before the last observed suicidal ideation (half a week earlier). We next examined the censored subgroup. Among those who were still reporting suicidal ideation in their last follow-along interval (the censored subgroup), the median difference between the model-based predicted time to recovery and last observed suicidal ideation was 0 (95% CI = 0–0). The difference between the censored and noncensored subgroups was significant (Kruskal-Wallis chi-square = 111.19, $df = 1$, $n = 156$, $p = 0.0001$). Among the censored subgroup, 17 (27.4%) participants had models that predicted recovery occurring before the last observed suicidal ideation (range –0.08 to –2.54 years earlier). Censorship was associated with about 1 year less duration of follow-up. Comparing those below or above the median proportion of missing data, we found an association (Kruskal-Wallis chi-square = 4.39, $df = 1$, $n = 156$, $p = 0.04$) with the median difference score (1.83 vs. 4.42 years), indicating that more complete data was associated with a narrower difference between observed remission and modeled recovery.

DISCUSSION

The principal finding of this study is that the majority of individuals with treatment-refractory disorders admitted with any of 4 suicidal and self-destructive phenomena attained sustained cessation of these phenomena over the course of follow-up (median lengths between 6.29–7.85 years). By modeling all available data for each subject, sustained recovery was observed in 77.2% of those making suicide attempts at baseline, 73.2% of those who self-mutilated, and 62.5% of those with other self-harm behaviors. By contrast, 50.6% of those with suicidal ideation were observed to recover in the study's time-frame. The differences between the last time an event was observed, and the onset of sustained recovery, according to the models, is informative about the question: how much time is required to pass after the last self-destructive event (remission) to warrant designating the individual as recovered?

The median time to last observed event occurred at 0.71 years for suicide attempts, 2.96 years for other self-harm, 3.94 years for self-cutting, and 8.03 years for suicidal ideation. That the more self-destructive actions ceased earlier, whereas suicidal ideation ceased later, is consistent with the risk that suicidal ideation seems to confer on the former, as indicated by the high odds ratios at intake.

The model-based estimates of time until recovery were generally longer than the last observed event for each phenomenon ranging from 94.7% of those with self-harm to 100% of those with suicidal ideation. Sustained recovery required a median of 5.21 additional years beyond the last observed suicide attempt to indicate that the rate of making definite attempts had reached zero, reflecting negligible risk. Suicide attempts occurred infrequently, leaving the estimation of rates more variable, resulting in a longer period of time after the last attempt to indicate a sustained recovery. The less dangerous phenomena of self-mutilation and other self-harm initially occurred more frequently, and took longer until the last event was observed. However, these required medians of only 3.24 and 3.81 years, respectively, after cessation for the models to estimate that the risk for recurrence became zero, indicating sustained recovery. Finally, suicidal ideation, the most frequent phenomenon at baseline and over follow-along, changed most slowly, but yielded the closest convergence between observed cessation and model-based recovery—only a median of 2.88 years difference.

The order in which these phenomena attained recovery converges with several studies of personality disorders, especially BPD, the group with the highest prevalence of suicidal and self-destructive phenomena (Sabo et al., 1995; Zanarini et al., 2005; Chiesa et al., 2006; McGlashan, 1986). Although none of these studies directly addressed the question of sustained recovery of individuals initially positive for suicidal or self-destructive phenomena, their findings converge with our own as to the order of cessation: suicide attempts first, self-mutilation next, suicidal ideation last. Methodological differences make comparisons of the time frame to recovery more difficult, but those studies found that by 5 to 6 years suicide attempts and self-mutilation appeared in fewer than a quarter to one-half, whereas suicidal ideation was still persistent, taking up to 14 years to cease in the majority of patients.

At baseline our study found that the presence of suicidal ideation was a large risk factor for the other phenomena. By the end of the follow-along period, we found that if suicidal ideation was still present, there was a significant elevated risk that recovery had not yet occurred for suicide attempts, self-cutting, and other self-harm among those positive at baseline (data not shown). The clinical implication is that persistent suicidal ideation itself may require treatment until recovery to ensure that recovery of the other phenomena becomes sustained.

Our proportion of completed suicides (0.44%, 95% CI = 0.01%–2.44%) is low, like the 2.47% obtained by McGlashan (1986) at 14 years, or the 3.8% reported in a six-year follow-up of BPD inpatients by Zanarini et al. (2005). However, our own analyses indicate that 22.8% of those initially making suicide attempts are still at risk. Strikingly, none of the 92 BPD patients we followed committed suicide. These figures represent lower mortality due to suicide than those who previously reported cumulative figures of up to 8% to 10% completed suicides in up to 15 years in the naturalistic follow-up studies of BPD (Perry, 1993; Black et al., 2004).

Limitations

As a naturalistic study, the lack of controlled treatments limits one to discovery rather than validation or testing causal relationships. Treatment itself is complicated in this sample because it includes time at the residential facility and afterward, with no controls as to setting, duration, intensity, or type of psychotherapy and pharmacotherapy.

Exploration of the potential mediating effects of naturalistic treatments received will require a separate examination.

The choice of study groups affects the generalizability of our results. The participants were deemed to have treatment-refractory disorders and referred for and accepted residential treatment. Both clinical factors bias the study group toward a higher risk for suicidal and self-destructive behavior viewed over time. Counterbalancing this is that participants entered a long-term residential facility and continued treatment in some form after discharge, which McGlashan (1986) found associated with a low suicide rate in the Chestnut Lodge follow-up study. At this juncture the associations between the amount and type of treatment and recovery remain to be examined, but it is reasonable to expect some associations.

Another potential threat to generalizability is due to the self-selection bias that informed consent (an ethical requirement in research) introduces, as those refusing to join may differ in some important ways from those agreeing to participate. We are currently studying this in our eligible population and will subsequently report any known biases when data become available.

Although the sample had a high level of Axis I and II comorbidity, the mean number of definite PD types (1.3) is lower than reported in many other studies (Skodol et al., 2005). These differences do not necessarily imply variation in the level of impairment, but likely reflect differences in diagnostic assessment methods. One comparison of our systematic clinical interview (GCI) by experienced clinician interviewers versus a structured interview administered by trained nonclinician research assistants found that the latter had higher levels of false positive diagnoses (hence higher mean number of diagnoses) when compared with multiple methods (Perry et al., 1987; Perry, 1992).

An alternative statistical approach to analyzing data such as ours involves the use of random-intercept random-slope regression approaches (Fitzmaurice et al., 2004; Hedeker and Gibbons, 2006). Those approaches provide linear or curvilinear estimates of the rate of change, but are subject to distributional requirements across the sample. Our approach instead calculated individual simple linear regressions for each subject on each outcome variable (Hoke et al., 1992); the resulting values for the output parameters were then examined using robust methods not requiring transformation of variables such as time. When we examined our data using the first approach (Proc Mixed) we obtained estimates indicating more rapid rates of improvement compared with those we obtained by the individual regression approaches. As a consequence we chose to report nonparametric statistics and distribution-free CIs to ensure conservative estimates. Analyses of the last time a suicide attempt or suicidal ideation was observed found that those individuals with more missing data had a significantly lower median time to last event. Not surprisingly, some missing intervals may have included suicide attempts or suicidal ideation. By contrast, the effect of missing data on the model-based estimates—which used all longitudinal data—was negligible, consistent with the greater robustness of this approach (Fitzmaurice et al., 2004; Hedeker and Gibbons, 2006).

CONCLUSIONS

Individuals with self-destructive phenomena can recover with time and treatment, despite the presence of treatment-refractory disorders. Although 85% of those studied showed improving courses, strikingly sustained recovery was obtained in the majority, ranging from 50.6% of those with suicidal ideation to 77.2% of those making suicide attempts immediately before admission. The modeling of sustained recovery was robust as to missing data, and indicated that each phenomenon required a number of years after remission (range of median figures: 2.88 for suicidal ideation to 5.21

for suicide attempts) to designate attaining sustained recovery. The potential impact of treatment requires further study.

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