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RESEARCH ARTICLE

Clinical associations of deliberate self-injury and its impact on the outcome of community-based and long-term inpatient treatment for personality disorder

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ABSTRACT

Background: Deliberate self-injury (DSI) is significantly associated with personality disorder (PD). There are gaps in our knowledge of DSI as an indicator of severity of psychopathology, as moderator of outcome and with regard to its response to different treatment programs and settings

Methods: We compare two samples of PD with (n=59) and without (n=64) DSI in terms of clinical presentation, response to psychosocial treatment and relative outcome when treated with specialist long-term residential and community-based programs. We test the assumption that DSI is an appropriate indicator for long-term inpatient care by contrasting the outcomes (symptom severity and DSI recidivism) of the two DSI sub-groups treated in the two different approaches.

Results: PD with DSI had greater severity of presentation on a number of variables (early maternal separation, sexual abuse, Axis-I comorbidities, suicidality and inpatient episodes) than PD without DSI. With regard to treatment response, we found a significant 3-way interaction between DSI, treatment model and outcome at 24-month follow-up. PD with DSI treated in a community-based program have significantly greater chances of improving on symptom severity and recidivism of self-injurious behavior compared to PD with DSI treated in a long-term residential program.

Conclusions: Although limitations in the study design invite caution in interpreting the results, the poor outcome of the inpatient DSI group suggests that explicit protocols for the management of DSI in inpatient settings may be beneficial and that the clinical indications for long-term inpatient treatment for severe and non-severe personality disorder may require updating.

Keywords: deliberate self-injury, personality disorder, borderline personality disorder, treatment outcome, psychosocial treatment, inpatient treatment, community-based treatment, empirical study

Introduction and background

Deliberate self-injury (DSI), the intentional and direct injury of one's body tissue without conscious suicidal intent, sometimes referred as self-mutilation, non-suicidal deliberate self-harm and self-wounding [1,2], has an approximate prevalence of 4% in the general population [3] with higher rates found in adolescents, young adults

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and in clinical populations [4,5]. Although self-injury is a ubiquitous symptom, which can be present across psychiatric diagnostic entities [6], research has shown that DSI is significantly associated with personality disorder (PD), in particular borderline personality disorder [7,8]. This is not surprising because of the function DSI serves in temporarily relieving negative feelings, regulate emotional storms, ending dissociative states and trying to influence interpersonal transactions [9], all core features of borderline psychopathology. Repeated episodes of self-injury are clinically meaningful as they lead to serious distress in patients themselves, their relatives and mental health professionals, interfere with the ongoing continuation of a therapeutic relationship and increase utilization of medical and mental health services.

Despite the extensive literature on the treatment of DSI, some areas of enquiry have not been sufficiently explored. For example, while clinical evidence suggests that personality disorder with DSI (PDSI) may be a particularly difficult-to-treat group and may be more disturbed on several areas of psychological functioning than personality disorder without DSI (PDnSI) [10], there have been only a handful of studies comparing personality disordered patients with and without deliberate self-injury [11]. In particular, while severe deliberate self-harm is a common indicator for inpatient treatment [12,13], there is no universal agreement regarding the optimal setting and treatment model for treating personality disorder with and without DSI [14]. With some notable exceptions [15-17], there is a corresponding paucity of research comparing the relative effectiveness of different therapeutic settings and treatment approaches for the treatment of personality

disorder. There are also gaps in our knowledge regarding the impact that presence of DSI in personality disorder patients has on treatment compliance, response to specialist treatment and medium-term outcome.

In a previous report we presented evidence that long-term specialist residential treatment in a therapeutic community setting had superior outcomes for individuals with severe PD than treatment as usual, but was significantly less effective compared to a less intense but longer step-down program [18]. However, the results showed a considerable variability between the treatment responses of individual subjects.

The aims of this study are to explore the differences between PDSI and PDnSI in terms of risk factors and severity of clinical presentation, and to reach a better understanding of the role that DSI has in moderating the response to specific treatment effects obtained in different settings and programs. To this ends, first, we compare the two groups on a number of risk factors and clinical variables, including severity of presentation to test the hypothesis that PDSI experienced greater exposure to risk factors and suffered from greater levels of psychopathology relative to PDnSI. Second, we explore the extent to which DSI influences outcome relative to personality disorder without a recent history of self-injurious behavior. Third, we test the hypothesis that DSI was an appropriate indicator for inpatient care and contrasted the outcomes of DSI groups across residential versus community treatment approaches. Fourth, we explore whether the greater number of risk factors associated with PDSI account for differences in outcome and differential responsiveness to residential and community-based treatment.

Clinical Setting

The study was carried out at the Cassel Hospital, Richmond, UK. The Cassel is a state funded tertiary referral centre renowned for its specialist psychosocial approach to personality disorder that offers three treatment programs:

a) A long-term (up to one year) residential model within the therapeutic community setting with no planned specialist outpatient continuation treatment, which includes a combination of sociotherapy (daily unit meetings,

community meetings, structured activities, co-responsibility planning for the running of the therapeutic community and other structured activities), formal psychoanalytic psychotherapy (individual and small group) and psychotropic medication when indicated. The program is more fully described in Griffiths [19].

b) The step-down program, consisting of a short-term (maximum six months) inpatient stay (as above), followed by an outpatient/outreach program (see below) described in Chiesa [20].

c) The community-based direct entry program consists of 18-30 months of outpatient and community-based treatment, which includes twice-weekly group psychotherapy, weekly meetings with a psychosocially trained community outreach nurse, regular reviews with a senior psychiatrist, family and couple therapy and as required psychotropic medication. The program is described in Chiesa et al. [21].

With regard to referral and treatment pathway, patients with severe personality disorders who live outside the Greater London area (GLA), who are unable to attend the outpatient and community program offered by the Cassel for logistic reasons, are admitted the long-term residential program and then discharged back to their local general psychiatric services. Patients within the GLA are referred specifically to either the step-down program or the community-based program according to the referrer indication and preference. At the assessment stage a degree of crossover (<5% of all referrals) in treatment allocation between step-down and direct-entry may occur on clinical grounds.

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[Figure 1]

Although the three programs share reliance on the psychosocial and psychotherapeutic approaches to personality disorder, there are differences in terms of intensity and complexity of implementation, and the implications of these differences for DSI patients will be elaborated in the discussion.

Most patients (80%) were admitted to the programs with a history of non-responsiveness to psychotropic medication, which they were prescribed for several years. The aim in all the arms of the study was to rationalize psychotropic medication by reducing polypharmacy and withdrawing benzodiazepines. We found no differences in the prescription of psychotropic compounds amongst the groups and the typical prescription pattern is described elsewhere [22].

For the purposes of this report, patients allocated to the step-down and the community-based programs were combined and contrasted with the long-term residential group to test the hypothesis that severe DSI should be considered as an indicator for long-term residential treatment provision. PDnSI patients might find community based treatments more effective, particularly in the light of the potential iatrogenic effects on PDnSI patients for being exposed to DSI in a residential treatment setting.

Method

Study sample

As shown in the study sample flow chart (fig. 1), all consecutively admitted patients to the Cassel Hospital therapeutic community for long-term residential treatment (n=79) and to the Cassel Hospital community-based treatment program (n=121) over a period of 5 and 13 years, respectively, were included in the study. Data was available for 70% of the community-based sample (n=85), with approximately 18% refusing to consent to research participation or to complete baseline measures, and 12% dropping out of the study at subsequent stages after intake. A somewhat higher proportion of the long-term residential patients (30%) refused to consent or to complete baseline assessments, while 21% dropped out of the study, leaving 38 patients in the residential sample.

The two groups were well matched on all available demographic, diagnostic and clinical variables, but long-term residential patients had significantly higher rates of paranoid ($\chi^2_{(1)}=9.97$, $p<0.002$) and obsessive-compulsive ($\chi^2_{(1)}=4.62$, $p<0.04$) personality disorders.

The patients included in the sample were, on average, in their early thirties. Two-thirds were female and the majority was white and unemployed. The average length of residential treatment was 8.38 (sd=4.37) months for the long-term residential sample, after which almost all received various outpatient treatments in the location of their original referral. The community sample were in receipt of active outpatient treatment 21.10 (sd=9.56) months.

Of the total sample (residential and community-based), 59 patients (48%) presented with at least one episode of DSI in the year before intake

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(PDSI group), while 64 patients (52%) had no history of DSI in the year prior to intake (PDnSI group). DSI was defined as the intentional infliction of injury to one's body tissue without conscious suicidal intent, resulting in body tissue damage requiring medical or nursing attention. Patients with suicidal gestures without associated DSI (n=14) were included in the PDnSI group.

Measures

Only diagnostic variables, self-reported symptoms and interview-based measures of DSI were assessed in this study.

The Structured Clinical Interview for DSM-IV [23], applied only at intake into treatment, was used to obtain full diagnostic Axis-I & -II profiles.

The Brief Symptom Inventory (BSI) [24] was used as a self-report measure of the severity of symptoms. The BSI consists of forty-five 5-point scales that measures patients' subjective experience of symptoms and yields a highly reliable indicator of overall symptom severity, the General Severity Index (GSI). The BSI was completed at baseline, and at 6, 12 and 24 months after intake.

A modification of the *Suicide and Self-Harm Inventory* (SSHI) [25], was used to assess self-injury. This is an interview based measure where details of self-

harm (DSI and attempted suicides) episodes over the year prior to the assessment are collected and rated using operational definitions for anchor points. Non-suicidal self-injury on this measure includes skin cutting and scratching, head banging, hitting and burning. The interviewer was required to write details of each DSI to be rated blind by a senior psychiatrist. A random sample of the interviews was checked against the records of the patients' General Practitioners, who receive details of all medical and psychiatric procedures concerning their patients, and a second sample was subjected to test-retest reliability checks. This measure was applied at intake, and 12 and 24 months after intake to cover the 12 months period prior to the assessment point. Participants were grouped into non-self-injuring (PDnSI) and self-injuring (PDSI) groups on the basis of SSHI ratings of presence/absence of non-suicidal self injury at intake interviews.

All intake measures were applied after discharge from the residential facility for step-down patients in order to minimize possible carry-over effects of the inpatient treatments they received on the observed outcomes of the community-based treatments and to ensure that that the differences in outcome should be attributable to the outpatient treatment.

Statistical analysis

All analyses were performed using either the Statistical Package for the Social Sciences (SPSS) version 18 or STATA/SE version 11. Comparison of the PDnSI and PDSI samples on categorical variables were based on Pearson chi square statistics or Kendal's Tau-b statistics for ordered contingency tables. On continuous variables, t-test for independent samples with robust standard errors was used, except when distributional properties did not permit the use of parametric statistics, and then appropriate non-parametric equivalent tests were performed.

In order to examine the extent of overlap in predicting DSI from significant demographic, pre-morbid and clinical variables a discriminant function analysis was performed, including discriminating variables, which remained significant predictors when included in the canonical function and improved the percent correctly classified in a jack-knifed classification.

The primary outcome measure (BSI-GSI) assessed at regular intervals over a two-year period was analyzed using mixed effects linear growth curve models [26]. Covariates that could moderate or account for some of the group differences based on differences at baseline (paranoid PD and obsessive-compulsive PD) were included in the models and the results were compared with models without the covariates. None of the covariates we tested yielded a significant improvement on any of the models. In addition, the average pre/post effect size (Cohen's d) for GSI was calculated for each sample [27].

To measure the clinical significance of change, outcome was also analyzed as a categorical variable by calculating a Reliable Change Index (RCI)¹ for BSI-GSI using the formula provided by Jacobson and Truax [28]. A Hierarchical Loglinear analysis with backward elimination, which included reliable change, deliberate self-injury at intake and treatment program was then performed to test the significance of the 3-way interaction between these factors.

For effects on rates of self-injury at 12 and 24-month follow-up, two separate logistic regressions for binary data (self-injury vs. no self-injury) were used, with presence or absence of self-injury at 12 and 24 months as the dependent variable and treatment status and self-injury status at intake as predictors.

Results

DSI and intake variables

Table 1 outlines differences in socio-demographic, risk factors and clinical features between the PDSI and the PDnSI samples. We found no significant difference in age, gender, marital status, education, and employment status. The PDSI group had significantly higher rates of early separation from the primary care-giver ($\chi^2_{(1)}=4.27$, $p<0.04$, $d=0.38$), sexual abuse by a blood relative ($\chi^2_{(1)}=6.17$, $p<0.02$, $d=0.46$), greater exposure to sexual molestation

¹ Reliable change takes into account of measurement error according to the formula: $x_2 - x_1 / S_{diff}$, where x_1 is the pre-test score and x_2 is the post-test score, and S_{diff} is the standard error of difference between the two test scores. RCI values below 1,96 represent changes ascribable to the imprecision of the measurement.

by non-related adults ($\chi^2_{(1)}=5.12$, $p<0.03$, $d=0.42$) and, to a marginally significant extent, physical abuse ($\chi^2_{(1)}=3.61$, $p=0.059$, $d=0.35$), compared to the PDnSI group.

With regard to Axis-I disorders, on average PDSI met diagnostic criteria for a significantly higher number of psychiatric syndromes than PDnSI (Mann-Whitney test: $Z=-3.27$, $p<0.01$). PDSI had significantly higher rates of substance misuse and eating disorders relative to PDnSI ($\chi^2_{(1)}=5.74$, $p<0.02$, $d=0.44$, and $\chi^2_{(1)}=5.28$, $p<0.03$, $d=0.42$, respectively).

As expected, a diagnosis of borderline personality disorder was significantly associated with DSI ($\chi^2_{(1)}=6.39$, $p<0.01$, $d=0.47$): 76.3% of patients with a history of self-injury in the year prior to the rating met criteria for BPD, compared to 54.7% of patients with no record of self-injury. No other Axis-II disorder showed significant differences in DSI.

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[Table 1]

Self-injury appeared to be significantly associated with suicide gestures in the year prior to intake assessment ($\chi^2_{(1)}=6.06$, $p<0.01$, $d=0.46$). Patients with DSI had spent a significantly higher number of days as a psychiatric inpatient in the year prior to the assessment than patients with no DSI ($Z=-2.85$, $p<0.004$). No differences were found between the groups in the severity of other presentation variables, such as the general severity index of the BSI ($Z=-0.59$, $p=0.56$ NS) and the average number of personality disorder for which each patient met diagnostic criteria ($Z=-0.61$, $p=0.54$ NS).

In order to examine if all the significant clinical history and diagnostic variables independently predicted PDSI we performed a discriminant analysis with maternal separation, incest, sexual molestation, BPD diagnosis as independent variables (canonical $r=0.39$, Wilks' $\lambda=.85$, $F_{(4, 118)}=5.24$, $p<0.0006$). Interestingly all independent variables remained significant predictors of DSI (pooled within group correlations with canonical discriminant

function: sexual molestation=0.55, $p<0.001$; incest=0.54, $p<0.001$; BPD=0.53, $p<0.001$ and early separation=0.41, $p<0.001$). With these discriminator variables, 74% of the original grouped cases could be correctly classified using a cross-validation method when each case is classified by the functions derived from all cases other than that case. Including number of PD diagnosis and suicide attempts as discriminators did not improve the discrimination.

With regard to duration of psychosocial treatment, the mean length of treatment of PDnSI and PDSI, in both programs, was 18.9 months ($sd=10.2$) and 15.2 months ($sd=9.9$), respectively ($Z=-1.86$, $p=0.063$). However, dropout by ten months was significantly lower in patients treated in the community-based program com-

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[Table 2]

pared to long-term residential patients (11.9% v 50.0%, respectively; $\chi^2_{(1)}=20.96$, $p<0.0001$). Specifically, PDSI patients treated in the community-based program had considerably lower rates of attrition compared to the residential PDSI subjects (19.5% and 64.7%, respectively).

Outcome

Mean GSI scores for both DSI and non-DSI groups are shown in Table 2. In the mixed effects model applied to the data both participant intercept and slope were allowed to vary randomly. The model with time, self-injury status at intake and the interaction of these factors as predictors provided a highly significant model overall (Wald $\chi^2_{(3)}=41.2$, $p<0.0001$). The coefficient for the slope for the time variable was highly significant ($\beta_{(time)}=-0.21$, 95% CI= -0.28 - -0.13, $z=5.41$, $p<0.0001$). The coefficient for the differences between the mean levels of the two groups (intercepts) was not significant ($\beta_{(DSI)}=-0.13$, 95% CI= -0.24 - 0.51, $z=0.69$, *NS*), but the coefficient for the difference between the slopes of the groups was significant ($\beta_{(time \times DSI)}=0.17$, 95% CI= 0.05 - 0.28, $z=2.75$, $p<0.006$). These results suggest that although

surprisingly there was no overall difference in GSI scores between the PDnSI and the PDSI groups, the latter group improved at a faster rate.

Further, the difference in the likelihood of reliable change in GSI scores favored the PDnSI group with the rates of improvement, no change and deterioration in PDnSI versus PDSI observed to be 65.6% v 51.8%, 26.6% v 28.6% and 7.8% v 19.6%, respectively (Kendall's tau-b=-0.16, p=0.067).

Treatment model, outcome and DSI

In the next phase of the analysis, we explored the hypothesis that long-term residential intensive treatment was particularly indicated for patients who were self-injuring at the time of referral while a community oriented, outpatient treatment model suited non-self-injuring patients better. To test the hypothesis we repeated the mixed-effects regression with our primary outcome variable (GSI scores) as dependent variable, adding treatment program (community-based and long-term residential) to time and self-injury status at intake as predictors. This model was highly significant overall (Wald $\chi^2_{(7)}=76.44$, $p<0.0001$). The coefficient for the slope for the time variable was again highly significant ($\beta_{(time)} = -0.14$, 95% CI= -0.21 - -0.08, $Z=4.1$, $p<0.0001$). The coefficient for the difference between the slopes of the two types of treatment models was significant ($\beta_{(model \times time)} = -0.13$, 95% CI: -0.25 - -0.01, $Z=2.16$, $p<0.03$), suggesting that the rate of decline of GSI scores in the community-based program was steeper overall than in the long-term residential program. A large difference emerged when the 3-way interaction of symptom decline slopes were contrasted between the two treatment modalities separately for the PDnSI and PDSI groups ($\beta_{(DSI \times model \times time)} = 0.30$, 95% CI= 0.12 - 0.47, $Z=3.3$, $p<0.001$).

As Figure 1 illustrates, while the GSI scores of the PDnSI group improved in both treatment modalities, the PDSI group only showed marked change in the community-based treatment. In fact, the PDSI group treated in the long-term residential program did not show changes in GSI over the two-year period ($d=0.05$, 95% CI: -0.11 - 0.22), while PDnSI showed highly significant improvement with a large pre-post effect size ($d=1.88$, 95% CI: 1.75 - 2.01). The pre-post effect sizes for the PDSI and PDnSI groups treated in the community-based psychosocial program improved significantly with moderate

to small effect sizes ($d=0.33$, 95% CI: 0.03 - 0.63, and $d=0.53$, 95% CI: 0.36 - 0.69, respectively). Controlling for variables significantly associated with DSI status, maternal separa-

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[Table 3]

tion, sexual abuse, substance misuse, number of axis-I diagnoses, borderline personality disorder status, eating disorder status, time in inpatient services, and suicide attempts did not affect the strength of the 3-way interaction .

In order to ensure that the effect was associated with community-based versus residential treatment, we excluded those community-based patients who had previous residential treatment at the Cassel and repeated the mixed-effects regressions. The results mirrored the findings reported above. There remained a significant 3-way interaction of symptom decline slopes contrasted between the two treatment modalities separately for the PDnSI and PDSI groups ($\beta_{(DSI \times model \times time)} = 0.26$, 95% CI= 0.03 - 0.50, $Z=2.2$, $p<0.03$). Further, we examined if the two community-based treatment groups (step-down and direct-entry) differed in terms of the impact of DSI on treatment response. The mixed-effects regression model (Wald $\chi^2_{(7)}=47.40$, $p<0.0001$) was significant, but only the effect of time made a significant contribution to the model ($\beta_{(time)} = -0.16$, 95% CI= -0.25 - -0.08, $Z=3.73$, $p<0.0001$). The type of community treatment (step-down or direct-entry) had no main effect ($\beta_{(model)} = 0.16$, 95% CI= -0.37 - 0.70, $Z=0.59$, *NS*) nor did it significantly interact with rate of GSI decline ($\beta_{(model \times time)} = 0.05$, 95% CI: -0.09 - 0.18, $Z=0.71$, *NS*) or DSI status ($\beta_{(DSI \times model)} = 0.29$, 95% CI= -0.52 - 1.10, $Z=0.70$, *NS*) or the combination of the two ($\beta_{(DSI \times model \times time)} = 0.01$, 95% CI= -0.22 - 0.23, $Z=0.09$, *NS*).

Table 3 shows rates of reliable change in PDSI and PDnSI treated in the community-based program and the long-term residential program. Both community-based PDSI and community-based PDnSI similar high rates of in reliable change at the 24-month assessment ($n=23$, 59.0% and $n=25$, 58.1%, respectively). However, rates of reliable change in the residential sample

diverged markedly, with PDSI showing only modest rates of reliable change (n=6, 35.3%) and PDnSI achieving high rates of improvement (n=17, 81.0%). The hierarchical loglinear analysis revealed a significant 3-way interaction between reliable change, treatment program and deliberate self-injury status (Likelihood Ratio $\chi^2_{(1)}=6.12$, $p<0.02$). Thus, contrary to prediction, PDSI had a better chance of achieving reliable change when treated in the community-based program (59% vs. 35%, OR=2.64, 95% CI: 0.81 - 8.59), while PDnSI were more likely to show reliable symptomatic improvement when treated in the long-term inpatient program (81% vs. 58%, OR=3.06, 95% CI: 0.88 - 10.64).

Figure 3 illustrates the percentages of patients in the community-based and long-term residential samples with and without DSI at intake, 12 and 24-month follow-up. We found that DSI was significantly reduced for patients treated in the community-based model (Cochran's $Q=18.07$, $p<0.001$). However, for the long-term residential sample a marked deterioration between intake and 12 months was followed by a return to DSI intake level at 24-months (Cochran's $Q=8.77$, $p<0.01$). Two separate logistic regression analyses showed that belonging to the community-based program significantly predicted lower DSI at 12 and 24 months compared to long-term residential treatment ($B_{(model)}=-1.66$, $SE=0.50$, $p<0.001$, and $B_{(model)}=-1.40$, $SE=0.50$, $p<0.005$, respectively). The odds for subjects treated in the community-based model of not self-mutilating were 5.24 (95%CI 1.97 - 13.89) at 12 months, and 4.04 (95%CI 1.51 - 10.87) at 24 months relative to patients treated in the long-term residential program.

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Discussion

The previously reported finding that personality disorder with DSI presented with greater severity of risk factors, clinical presentation and associated comorbidities [29] has been confirmed in our sample. PDSI had higher incidence of substance misuse, met a higher number of diagnostic criteria for psychiatric syndromes, spent more time in acute psychiatric inpatient services, had

higher incidence of attempted suicide and suffered from a significantly greater disruption of early attachment relationships compared to PD with no recent history of DSI. It is interesting to note that, despite the greater severity of the DSI group, there were no differences in self-report symptom distress ratings between PDSI and PDnSI.

Contrary to our initial hypothesis, we found that PDSI did significantly worse than patients with less severe psychopathology when treated in the long-term residential therapeutic program, in terms of reduction of severity of psychiatric morbidity, treatment compliance and deliberate self-harm episodes at 2 years following intake. Less severe patients had significant benefits from admission, showing the largest size of the effect compared to the other sub-groups although the difference between community and residential treatment outcomes was not statistically significant for the non-DSI group. Controlling for the observed characteristics where we found the DSI group to be different from the non-DSI group, did not impact on the significance of this 3-way interaction raising an intriguing question as to the possible reasons for the difference.

Our findings tally with a recent randomized study that showed no difference in medium-term outcome on several clinical dimensions in personality disorder randomly allocated to either a day-patient psychotherapy program or to out patient psychotherapy [17]. The authors further reported that there was no indication that the more intensive program (day care) was more effective for the most poorly functioning patients.

It is understandable that clinicians might intuitively expect residential treatment with near constant supervision, multi-faceted treatment and constant peer support from patients, to be both a safer and a more effective and appropriate option for DSI patients. Yet, the opposite appears to be the case. A primarily community-based, outpatient model with briefer periods of admission and without extensive supervision outside of individual and group therapy appears to be more effective for these patients.

Over the years, a number of authors have questioned the effectiveness of long-term hospital admission for severe personality disorder [30-32]. An earlier retrospective study carried out at the Cassel Hospital in the 1980's found that 'neurotic' individuals had better outcomes than more disturbed patients who suffered from 'borderline' disorders [33]. It is possible that changes in the in-patient therapeutic program did not keep pace with change in hospital clientele, which shifted from a mainly chronically neurotic group of mild to moderate severity to a borderline group of greater severity of presentation. The intensity in terms of treatment inputs, the overall complexity of a highly structured hospital milieu with its demands for 'healthy' functioning and sharing of responsibilities for running the program, the emotionally charged atmosphere and the intense interpersonal relationships of the therapeutic community setting contribute to the worsening of the emotional dysregulation that a sub-group of these patients present with. However, it should be noted that controlling for borderline status in this sample did not remove the difference in the outcome of the DSI group between the two therapeutic settings. Resorting to deliberate self-injury appears to carry specific significance in relation to treatment readiness, which may not be quite overlapping with the diagnosis of BPD according to DSM-IV criteria.

DSI is a dysfunctional means to obtain relief from negative inner feelings and experiences [34] and from strong aversive inner tension [35]. It is a way to regulate emotional storms, ending dissociative states and trying to influence interpersonal transactions [9]. One or other of these processes appear to undermine the possibility of a patient with DSI engaging with the therapeutic milieu of the residential unit. Perhaps being able to obtain relief from inner tension by DSI decreases patient motivation to engage in the sometimes-stressful therapeutic environment of the hospital.

It should also be remembered that part of the effect arises out of the exceptionally effective way in which non-DSI patients responded to residential treatment. It is likely that in the absence of DSI, these patients received a very valuable input and were able to take full advantage of the intensity of the program and of the opportunities presented by the many therapeutic inputs

available to them. Perhaps, DSI patients experienced more intensely the insidious pressure of sub-group cultures, that occasionally can foster self-harm as a prized currency of expression, communication and gratification and the concomitant process of 'social contagion' [36].

It is likely that the combination of residential setting with a non-DSI focused protocol creates problems for DSI patients, as some other residential treatment programs reported favorable outcomes. For example, dialectical behavior therapy applied in an inpatient setting resulted in better retention rates and greater reductions of

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self-harming behaviors compared with treatment as usual, especially among those with a history of frequent self-mutilation [37]. In any case, if confirmed by further investigations, the poor outcome of the DSI group in this residential unit raises questions concerning the manner in which DSI may be handled in residential programs without explicit protocols for DSI. In the meantime we may need to update the clinical indications for long-term inpatient treatment for severe (with DSI) and non-severe (non-DSI) personality disorder.

The community-based program obtained significant treatment effects with both PDSI and PDnSI, although the effects for PDnSI were smaller than those found in PDnSI treated in the residential model. For patients allocated to the community-based program DSI, and other severity features, appear not to be a negative predictor of outcome and not to affect the medium-term prognosis in terms of both psychiatric morbidity and DSI. Reductions in deliberate self-harm observed at 24-months follow-up are clinically relevant as they appear to be associated with reductions in rates of re-admissions to hospital, overall service utilization and suicide attempts [18,38].

It is possible that a non-residential, community-based team can respond more flexibly to DSI, take into account the multiple motives and functions that DSI can serve across, and within, patients in different stages of treatment.

Contrary to a residential context in which sanctioning, limit setting and contracting is more central, tolerance, containment and working through is more readily implemented in an outpatient treatment context where emotional expression of often-intense anger and use of primitive defenses such as splitting and projective identification can be contained, as it impinges less on other clients [10]. The repeated experience of being contained and understood by a treatment team we may anticipate to gradually reduce the malevolent self-object representations present in these patients [39,40]. Perhaps equally important, the opportunity to organize attachment representations frees the attachment system and generates an appropriate sense of belonging to a benign and accepting social group both in therapy and in the community. The creation of bonds, perhaps more than any other process, has the potential to lift the patients from a sense of emptiness, loneliness, depression and despair. The shift in the inner experience and mentalizing capacities that develop in the course of any treatment and the integration of unwanted emotional experiences reduces the negatively reinforced strategy for coping with stressful emotional arousal, which is one of the reasons for resorting to DSI [35,41].

The potential for both negative and positive therapeutic effects with this patient group underscores the importance of gathering empirical data that might aid the appropriate treatment of DSI across settings and help orientate clinicians to modify current, even potentially iatrogenic, treatment strategies in programs that have sub-optimal outcomes on patients with this distressing and repetitive behavior. Some authors had been calling for distinct diagnostic status for self-harm, and deliberate self-injury merited the status of a distinct and separate disorder in DSM-IV [42]. The above observations are partially consistent with this view, suggesting that DSI is a useful indicator for modifying treatment protocols.

Several limitations are present that need to be borne in mind when interpreting the study results. We compare samples that were not subjected to randomization; hence, the possibility of sampling selection bias cannot be ruled out. Some of the patients in the community-based group had short

residential treatment experiences prior to entering the program, so the comparison is less clear than we might have hoped. Nevertheless, excluding all patients with prior exposure to residential treatment did not substantially affect the results. In any event, the study needs replication with larger number of patients in each group. In addition, generalizability to other inpatient setting is limited given the specialist nature of the inpatient unit where the study took place. Other studies of inpatient psychotherapy using a different approach might have yielded different results, so the findings should not be generalized beyond interventions based on therapeutic community principles [43] without an explicit DSI protocol.

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Table 1

Variable	PDSI (n=59) mean (SD) range	PDnSI (n=64) Mean (SD) range	Z,	sig
Age	32.6 (7.0) 19-64	35.1 (9.8) 20-60	-1.16,	0.25
Number PD diagnosis	3.3 (1.8) 1-8	3.1 (1.4) 1-7	-0.61,	0.54
Number Axis-I diagnosis	2.30 (1.0) 0-4	1.69 (0.80) 0-3	-3.27,	0.01
BSI General Severity Index	2.12 (0.80) 0.27-3.57	1.94 (0.74) 0.64-3.43	-0.59,	0.56
Length previous hospitalization (days)	55.3 (87.3) 0-365	41.8 (80.2) 0-250	-2.85,	0.004
Length of treatment (months)	15.2 (9.9) 0.63-37.73	18.9 (10.2) 2.1-42.0	-1.86,	0.06
	N (%)	N (%)	Chi-square, sig	
DSM-IV diagnosis, Axis-I				
Any mood disorder	41 (69.0)	38 (59.4)	1.37,	0.24
Any anxiety disorder	40 (67.8)	40 (62.5)	0.38,	0.54
Any substance misuse	30 (50.8)	19 (29.7)	5.74,	0.02
Any eating disorder	22 (37.2)	12 (18.8)	5.28,	0.03
DSM-IV diagnosis, Axis-II				
Paranoid	18 (30.5)	25 (39.1)	0.99,	0.32
Schizotypal	9 (15.3)	7 (10.9)	0.51,	0.48
Borderline	45 (76.3)	35(54.7)	6.39,	0.01
Antisocial	2(3.4)	4(6.3)	0.54	0.46
Avoidant	27(45.8)	32 (50.0)	0.22,	0.64
Obsessive-Compulsive	16 (27.1)	14 (21.9)	0.46,	0.50
Dependent	21 (35.6)	23 (35.9)	0.02,	0.97
Maternal separation	23(39.0)	14(22.0)	4.27,	0.04
Incest	23(39.0)	12 (18.8)	6.17,	0.02
Sexual molestation	23 (39.0)	13 (20.3)	5.12,	0.03
Rape	13 (22.0)	8 (12.5)	1.97,	0.16
Physical abuse	35 (59.3)	27 (42.2)	3.61,	0.06
Suicide attempts	26 (52.0)	16 (28.5)	6.06,	0.01

Table 2 Means and standard deviations for BSI general severity index in the PDSI and PDnSI samples

	PDSI (n=59)	PDnSI (n=64)	t, sig
	Mean (sd)	Mean (sd)	
GSI intake	2.12 (0.82)	1.94 (0.74)	-1.31, 0.19
GSI 6 months	1.96 (0.85)	1.75 (0.71)	-1.51, 0.13
GSI 12 months	1.74 (0.98)	1.48 (0.79)	-1.58, 0.12
GSI 24 months	1.77 (0.96)	1.43 (0.75)	-2.15, 0.03

Mixed effects model ($\beta_{(time)} = -0.14$, 95% CI= -0.21 - -0.08, Z=4.1, p<0.0001)

($\beta_{(model \times time)} = -0.13$, 95% CI: -0.25 - -0.01, Z=2.16, p<0.03)

($\beta_{(DSI \times model \times time)} = 0.30$, 95% CI= 0.12 - 0.47, Z=3.3, p<0.001)

Table 3 Difference in rates of GSI Reliable Change (GSI-RC) at 24-month follow-up in the PDSI and PDnSI samples treated in the community-based and long-term residential programs

Treatment model	DSI status	GSI No reliable change N (%)	GSI Reliable change N (%)
Community	PDSI	16 (41.0)	23 (59.0)
	PDnSI	18 (41.9)	25 (58.1)
Residential	PDSI	11 (64.7)	6 (35.3)
	PDnSI	4 (19.0)	17 (81.0)

PDSI personality disorder with deliberate self-injury

PDnSI personality disorder with no deliberate self-injury

3-way interaction (Treatment model * DSI status * GSI-RC) Likelihood Ratio $\chi^2_{(1)}=6.11$, $p<0.01$