Research Article

PATTERNS OF CHANGE IN RESPONSE TO PROLONGED EXPOSURE: IMPLICATIONS FOR TREATMENT OUTCOME

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Background: *Assessment of response to Prolonged Exposure (PE) suggests some patients may experience discontinuous change involving sudden symptom reductions and/or temporary exacerbations. The current study looked to (1) isolate profiles of PE response among treatment-seeking veterans and (2) identify factors associated with unique patterns of change.* **Methods:** *Archival records were examined for veterans receiving PE through a specialty Veterans Affairs Medical Center (VAMC) clinic (N = 109). Latent profile analysis was used to extract response trajectories defined by change in weekly PTSD Checklist (PCL) scores. Associations with provider status (staff vs. intern), setting (in-person vs. telehealth), initial severity (PTSD; depression), and eventual treatment gains were examined.* **Results:** *Three profiles were observed. Rapid Responders (18.3%) evidenced sharp reductions at Week 2 and again between Weeks 5 and 6. Linear Responders (40.4%) demonstrated gradual reductions throughout the 10-week assessment window. Delayed Responder (41.3%) scores were relatively stable over the evaluation period although final session outcomes indicated reliable change (PCLΔ > 10) in 40% of patients. Profiles were similar with respect to provider status, treatment setting, and initial symptom severity. Rapid Responders evidenced lower final session scores relative to Linear (g = 1.13) and Delayed (g = 1.85) groups, with Linear Responders reporting lower end scores than Delayed Responders (g = 1.02).* **Conclusions:** *Anticipating patterns of recovery and their association with therapeutic outcome is of immense clinical value. Sudden gains emerged as a strong predictor of enhanced response. Data also suggest potential benefits of extending standard intervention for patients who fail to demonstrate an immediate response to PE. Depression and Anxiety 33:807–815, 2016.* ©

Key words: *Posttraumatic stress disorder; combat disorder; veteran; psychotherapies; treatment outcome; clinical psychology*

INTRODUCTION

Mental health difficulties involving posttraumatic stress disorder (PTSD) and other trauma-related symptoms are projected to be an ongoing public health concern given the scale of recent military conflicts.[1,2] Current estimates suggest clinically significant symptoms in 8–25% of individuals exposed to

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combat in Iraq and Afghanistan,[3–5] with difficulties in this population coming in addition to the continuing needs of veterans from previous eras.[6] Military-related PTSD is associated with work absenteeism, lower civilian wages, unemployment, and homelessness;[7–9] greater medical morbidity, hospitalization, and health care costs;[10,11] elevated risk of suicidal ideation and behavior;[12–14] and lower levels of overall functioning and life satisfaction.[15,16] Estimates place the 2-year societal cost of PTSD and depression among service members in excess of $900,000,000.[17]

Clinical research provides strong support for the use of trauma-focused interventions in the treatment of PTSD.[18–20] Trauma-focused interventions are those that encourage patients to process painful memories through exposure (i.e., deliberately engaging with places, activities, and memories associated with the trauma) and/or challenging patterns of problematic thinking developed or exaggerated as a consequence of the event. Two specific protocols—Prolonged Exposure (PE)[21] and Cognitive Processing Therapy[22]—have demonstrated positive effects in service members across multiple independent trials.[23–27] Pre- to posttreatment symptom reductions are consistent with large effects (intent-to-treat $d = 0.80–1.40$) with both protocols actively disseminated by the U.S. Department of Veterans Affairs.[28]

Despite evidence of positive group-level effects, concerns that trauma-focused treatment may produce deteriorations in overall patient functioning remain common in the larger clinical community.[29–32] Existing data provide little evidence for a reliable worsening of end-state functioning following trauma-focused treatment[32–35] although transient symptom exacerbations have been noted in patients receiving PE and CPT. Evaluating change in successive, biweekly symptom scores, Foa and colleagues found that approximately 15% of female assault victims receiving standard PE evidenced reliable exacerbations (operationalized as an increase in scores from the previous assessment exceeding Jacobson and Truax's[36] $s_{\text{diff}} = \sqrt{2(SE)^2}$) at Session 4, following the introduction of imaginal exposure in the previous session.[37] Larsen et al.[32] noted similar Session 4 exacerbations in 13.4% of female assault survivors following the introduction of exposure in both PE (imaginal exposure) and CPT (written exposure). Patients with Session 4 exacerbations in these studies evidenced somewhat higher posttreatment symptom scores compared to patients with no exacerbations, although effects were small ($g = 0.20–0.37$) and failed to reach statistical significance.

Contrasting symptom exacerbations, other investigators have noted abrupt and substantial *improvements* in session-to-session scores, specifically in response to PE.[38–40] Doane et al. identified so-called "sudden gains"[41] in 52% women completing PE for assault-related trauma.[39] Sudden gains emerged both before and after the introduction of exposure exercises and were associated with lower symptom levels at posttreatment relative to patients with no sudden gains ($g = 1.33$). Similar effects were noted by Jun et al. among heterogeneous trauma survivors, with 42% of patients reporting sudden gains at some point during treatment.[40]

The literature exploring patterns of discontinuous change in trauma-focused therapy is growing but remains limited in a number of respects. Analysis of rapid symptom fluctuations in response to evidence-based treatment is currently restricted to survivors of civilian trauma.[32,37–40] Existing studies are also limited to a single form of nonlinear response (exacerbations or sudden gains) and classify patients solely on the inspection of session-to-session scores. An emerging literature has taken efforts to address these concerns by incorporating sophisticated person-centered models to extract empirically derived profiles of recovery.[42,43] In one example, Schumm et al. examined three trajectories of treatment response in veterans receiving CPT as a component of routine outpatient care.[42] Profiles were characterized most prominently by differences in pretreatment symptom scores (i.e., high, medium, low; $g = 1.29–3.14$) with some variability in the slope and curvature of individual trajectories. Although these data indicate clear heterogeneity in patient responding, critical evaluation suggests that profiles derived from raw symptom scores may more strongly reflect differences in initial PTSD severity as opposed to variability in patterns of change per se. Furthermore, person-centered techniques employed in existing research are generally ill equipped to isolate response trajectories that deviate from continuous mathematical functions (e.g., those involving rapid symptom fluctuations).[44]

Given these considerations, the current study reviewed archival records to evaluate heterogeneous profiles of recovery in veterans receiving PE through a specialty VAMC clinic. Latent profile analyses (LPA) of *change in weekly symptom data* (i.e., deviation from initial score) were used to identify discontinuous trajectories of responding across 10 weeks of intervention. Archival records available for this research provide an important assessment of patient response within the context of applied clinical care, helping address questions of external validity common in controlled clinical trials.[45,46] Profile correlates also were examined. Consistent with reviews assessing response to trauma-focused intervention more generally,[47] patient-level variables (e.g., demographics, trauma characteristics, personality factors)—with the possible exception of initial symptom severity—demonstrate inconsistent relations with both recovery trajectory and the occurrence of discontinuous change.[32,37,39,40,42,43] For the current project, associations with provider status (licensed Veterans Affairs (VA) staff vs. predoctoral intern), treatment setting (in-person vs. telehealth), initial symptom severity (PTSD; depression), and overall treatment gains were examined in an effort to qualify recovery profiles and to identify clinical markers that may help providers anticipate specific patterns of patient response.

MATERIALS AND METHODS

PARTICIPANTS

Archival data were extracted from a large, Southeastern VAMC clinic specializing in evidence-based treatments for military-related PTSD. Veterans from multiple combat eras were identified for services through facility-wide referrals. Providers included psychologists, social workers, and predoctoral psychology interns. Treatment sessions were administered in-person and via teleconference based on patient needs. All clinicians received specialized training in PE and participated in weekly group supervision facilitated by a national VA trainer. Services offered through the clinic were incorporated as a component of routine clinical care, absent specific protocol-driven inclusion criteria. In addition to assessments at the first and final session, weekly symptoms levels were monitored at the discretion of the treating clinician using self-report scales. Veterans in the current sample received services from March 3, 2008 to November 12, 2014. Institutional Review Board approval was obtained prior to analysis of archival data for this study.

Records containing multiple symptom measures and corresponding dates of administration in the first 10 weeks of treatment were reviewed for this research. Of those veterans identified as receiving PE ($N = 361$), 17 were excluded due to missing symptom scores at the initial session (Week 1). An additional 235 cases were removed given insufficient data enabling the calculation of three or more change scores within the 10-week treatment window.[1] Excluded cases did not differ with respect to provider status ($X^2_1 = 2.32$, $P = .128$; $\varphi = .080$), treatment setting ($X^2_1 = .20$, $P = .195$; $\varphi = .068$), or initial PTSD severity ($t_{359} = 0.12$, $P = .907$; $g = 0.01$) for two-tailed tests. Excluded individuals did evidence slightly longer treatment duration ($t_{359} = 3.08$, $P = .002$; $g = 0.35$) and moderately higher symptom scores at the final session ($t_{359} = 4.62$, $P < .001$; $g = 0.53$). Records in the final sample ($N = 109$) yielded an average of 3.5 (SD = 0.8) change scores (*three* = 65.5%, *four* = 24.8%, *five* = 5.5%, *six* = 4.6%). The average interval between assessments was 2.1 weeks (SD = 1.0).

Participants (81.7% male) identified predominantly as Black (39.4%) or White/non-Hispanic (55.0%). Mean age at the onset of treatment was 47.9 years (SD = 15.3). The majority of patients reported trauma associated with deployments in Vietnam (29.4%), Desert Storm/Desert Shield (14.7%), and Operation Enduring Freedom/Operation Iraqi Freedom (44.0%). Intervention in the final 12% of participants targeted military sexual trauma ($n = 5$) or nondeployment events ($n = 8$). Three-quarters of service members in the current sample (75.2%) were identified as service connected. With respect to intervention, 82% of patients received treatment from a licensed VA clinician, 18% from predoctoral psychology interns. Services in a substantial minority of cases (32.1%) were conducted via teleconference.

INTERVENTION

PE is a manualized, 90-min weekly treatment protocol consisting of (1) psycho-education, (2) self-assessment of subjective anxiety, (3) in vivo exposure to external trauma reminders and objectively safe situations avoided due to exaggerated perceptions of threat, and (4) repeated imaginal exposure to traumatic memories. In vivo exposures are completed between sessions and require the patient to assess their distress before, during, and after the exercises. Imaginal exposures are completed in session and require the patient to provide repeated and emotionally detailed descriptions of the target event(s). Reactions to imaginal exposures are discussed with the clinician at the end of each session. Weekly sessions are audiotaped and reviewed by the patient as homework. PE is typically delivered over 8–12 sessions although treatment duration varied in this naturalistic setting.

MEASURES

PTSD Checklist-Military Version (PCL-M).[48]. Posttrauma symptoms were monitored at the first and final session and at the discretion of treating clinician via the PCL-M. The PCL-M is a 17-item self-report measure corresponding to DSM-IV criteria for PTSD.[49] Scores range from 17 to 85 with higher scores reflecting greater symptom severity. For these data, reductions greater than 10 points on the PCL-M were consistent with Jacobson and Truax's[36] standards for reliable change.[2]

Beck Depression Inventory-II (BDI-II).[52]. Depressive symptoms at the initial session were assessed in a subset of patients ($N = 82$) using the BDI-II. The BDI-II is a 21-item measure with scores ranging from 0 to 63. Higher scores indicate greater severity of depressive symptoms.

ANALYTIC APPROACH

Trajectories were examined over a 10-week treatment window using LPA. LPA is a person-centered modeling technique (similar to cluster analysis) permitting the extraction of unobserved subgroups identified by common profiles of response.[53] Trajectories extracted through LPA are not restricted to continuous mathematical functions making this approach advantageous for identifying discontinuous patterns of recovery. Scores reflecting weekly symptom change relative to the initial session ($PCL_{Week\ j} - PCL_{Week1}$) were evaluated given concerns over the extraction of profiles characterized by overall symptom severity. Data for the current analyses provide a direct index of symptom change over the course of treatment, irrespective of initial PTSD levels. For these naturalistic data, assessments were coded into weekly bins based on recorded time from Week 1 (real lower limit = 0.5, real upper limit = 1.4). The percentage of patients registering change scores at Weeks 2–10 was 12.8, 47.7, 36.7, 44.0, 47.7, 47.7, 34.9, 43.1, and 34.9%, respectively.

LPA were conducted using MPlus 6.1 software with maximum likelihood (ML) estimation.[54] ML accommodates cases with partially missing values and produces unbiased estimates in data with random missingness.[55] Weekly assessments in this naturalistic setting were administered at the clinician's discretion, providing little reason to anticipate systematic patterns of missingness. Little's missing completely at random test failed to reach significance ($X^2_{225} = 228.3$, $P = .426$), supporting the use of ML in these data.

Final model selection was determined by methods integrating theory, substantive interpretation, and statistical fit.[56] Fit indices included Akaike information criterion (AIC), Bayesian information criterion (BIC), adjusted BIC (aBIC), bootstrapped likelihood ratio test (BLRT), and entropy criteria. AIC, BIC, and aBIC are standard information criteria where lower values represent incremental improvement in model fit. BLRT, by contrast, compares an estimated model with a solution containing c-1 classes. Significant P-values suggest statistical gains relative to the more parsimonious model. Entropy provides an index of the degree to which profiles are uniquely characteristic of a given class. Values ≥.80 are indicative of adequate profile separation.[57]

[1]A minimum of three change scores within the 10-week treatment window (i.e., initial symptom levels plus three additional assessments [a total of four symptom assessments]) reflects the minimum number of data points necessary to define a nonlinear pattern of response for a given individual.

[2]Reliable change based on $s_{diff} = 5.46$ given sample $SD_{Intake} = 10.72$ and $r_{test\text{-}retest} = 0.88$.[50] The operationalization of reliable change as a pre- to posttreatment reduction in PCL scores greater than 10 points is similar to thresholds advocated in previous research.[51]

Following extraction, profiles were examined with respect to differences in provider status, treatment setting, clinical presentation, and overall therapeutic response. Analyses were conducted in SPSS 22.0 using two-tailed tests of statistical significance. Effect sizes are reported as η^2 (small = .01, medium = .06, large = .14), g (small = .20, medium = .50, large = .80), and V (small = .10, medium = .30, large = .50) for omnibus, pairwise, and categorical outcomes, respectively.[58]

RESULTS

SAMPLE CHARACTERISTICS

Initial symptom severity was consistent with previous studies of treatment-seeking veterans.[59–62] Mean PCL-M score at intake was 62.5 (SD = 10.7), representing a full standard deviation above the recommended cut score for probable diagnosis (PCL = 50).[62] BDI-II scores in patients completing this measure indicated moderate-to-severe levels of depression ($M = 29.0$, SD = 10.6).[52] Mean duration of treatment was 12.2 weeks (range = 3–24; SD = 5.1). Patients averaged a 19.5-point reduction on the PCL-M over the course of intervention (95% CI [−22.1, −16.9]; $d = 1.47$) with 74.3% of the sample meeting criteria for reliable change.

RESPONSE PROFILES

Indices of model fit are provided in Table 1. AIC and aBIC values decreased with successive solutions whereas BIC achieved minimum at the 3-class model. BLRT also indicated statistical improvement with the extraction of a third response profile. Entropy was maximized in the 2- and 4-class solutions.

TABLE 1. Fit indices for successive models of weekly PTSD symptom change

Model	AIC	BIC	aBIC	BLRT	Entropy
2-Class	2,815.3	2,890.7	2,802.2	$P < .001$	0.87
3-Class	2,784.3	2,886.5	2,766.5	$P < .001$	0.82
4-Class	2,776.6	2,905.7	2,754.1	$P = .308$	0.87

Note: AIC = Akaike information criterion; BIC = Bayesian information criterion; aBIC = adjusted Bayesian information criterion; BLRT = bootstrapped likelihood ratio test.

Given these data, profiles were examined for the 3- and 4-class models. The initial profile of the 3-class solution (18.3%) indicated immediate and substantial reductions by Week 2 with gains meeting criterion for reliable change (see Fig. 1). A second occurrence of abrupt, reliable improvement was estimated between Weeks 5 and 6, followed by more gradual decreases through Week 10 (see Table 2). Comparison of expected change at Week 10 with end-of-treatment gains in this "Rapid Responder" group suggests relatively stable symptom levels through the final session.

Patients in the second profile (40.4%) evidenced a relatively linear trajectory of recovery. Aside from periods of symptom stability, the magnitude of week-to-week reductions in these patients fell consistently between

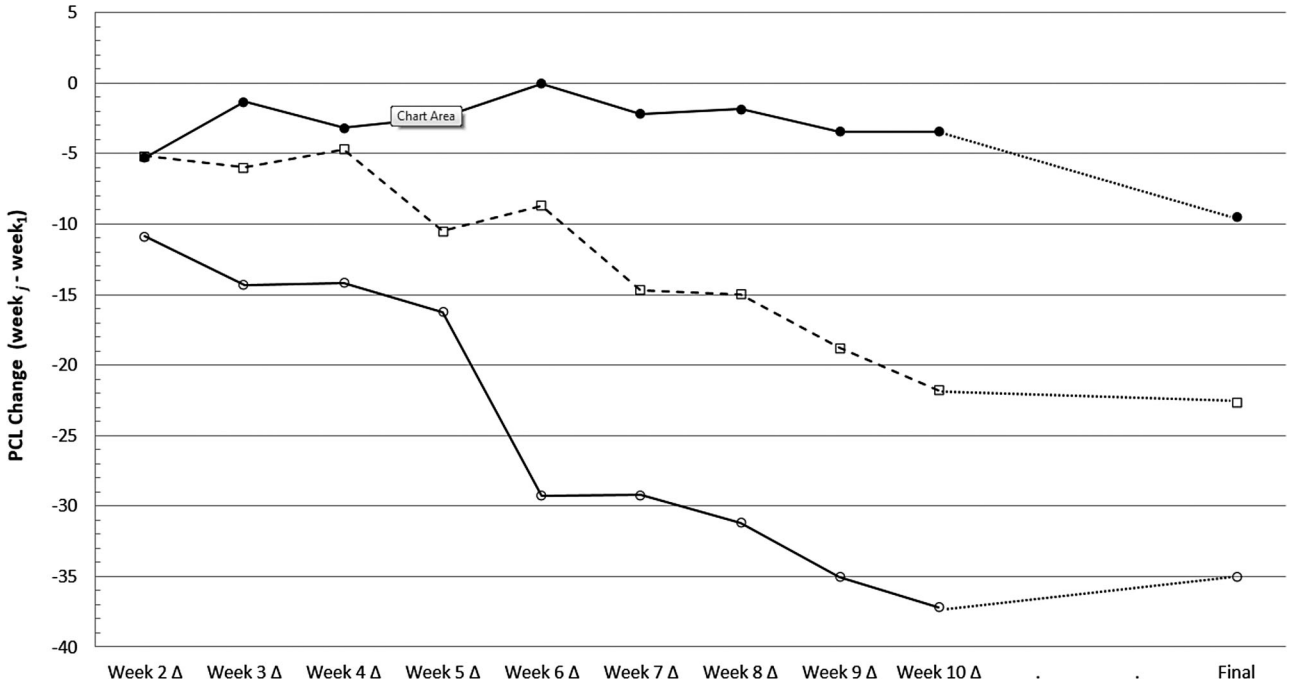

Figure 1. Profiles of change in PCL-M scores relative to Session 1.
Note: PCL-M = PTSD Checklist-Military Version; "Final" scores indicate the mean level of change for a given patient class at the conclusion of treatment. ○——○ Rapid Responder (18.3%). □- - - -□ Linear Responder (40.4%). ●——● Delayed Responder (41.3%).

TABLE 2. Model-implied change in PCL-M scores across responder profiles[a]

Assessment	Rapid	95%CI	Linear	95%CI	Delayed	95%CI
Week 2–Week 1	–10.9	[–19.1, –2.7]	–5.2	[–9.8, –0.5]	–5.3	[–8.5, –2.1]
Week 3–Week 1	–14.3	[–21.0, –7.6]	–6.0	[–9.7, –2.2]	–1.3	[–3.3, 0.6]
Week 4–Week 1	–14.2	[–20.8, –7.6]	–4.7	[–9.6, 0.2]	–3.2	[–6.5, 0.1]
Week 5–Week 1	–16.2	[–20.5, –12.0]	–10.5	[–14.5, –6.5]	–2.4	[–4.6, –0.3]
Week 6–Week 1	–29.3	[–33.4, 25.1]	–8.7	[–11.6, –5.7]	–0.1	[–3.5, 3.4]
Week 7–Week 1	–29.2	[–32.7, –25.7]	–14.7	[–17.8, –11.6]	–2.2	[–5.0, 0.6]
Week 8–Week 1	–31.2	[–38.1, –24.3]	–15.0	[–21.3, –8.6]	–1.8	[–5.7, 2.0]
Week 9–Week 1	–35.0	[–40.1, –30.0]	–18.8	[–23.2, –14.4]	–3.4	[–7.2, 0.3]
Week 10–Week 1	–37.2	[–45.4, –29.0]	–21.8	[–27.4, –16.2]	–3.4	[–8.9, 2.0]

Note: PCL = PTSD Checklist-Military Version.

[a]Variances for PCL change are held constant for all groups in latent profile analysis. Standard deviation estimates across each assessment point were estimated as follows: ΔWeek 2 (SD = 6.21); ΔWeek 3 (SD = 6.09); ΔWeek 4 (SD = 8.12); ΔWeek 5 (SD = 6.34); ΔWeek 6 (SD = 5.48); ΔWeek 7 (SD = 5.11); ΔWeek 8 (SD = 8.66); ΔWeek 9 (SD = 7.42); ΔWeek 10 (SD = 8.15).

3 and 6 points. Comparison of expected Week 10 change relative to final gains in this "Linear Responder" group again suggests stability through the end of treatment.

The final profile identified a patient group (41.3%) with low levels of change during the initial 10 weeks of intervention (i.e., absolute reductions from Week 1 ≤ 5.3). Evaluation of scores at the conclusion of treatment, however, indicates continued potential for late-stage gains in this "Delayed Responder" group.

In addition to replicated Rapid, Linear, and Delayed Responder groups, the 4-class solution extracted an additional profile (6.4%) demonstrating marginal reductions at Week 2 ($\Delta = -2.6$), reliable improvement at Week 3 ($\Delta = -13.2$), followed by a 22.4-point exacerbation at Week 4 ($\Delta = 9.2$). Importantly, symptom levels immediately decreased at Weeks 5 ($\Delta = -7.9$), 6 ($\Delta = -21.0$), and 7 ($\Delta = -29.8$) before stabilizing through Week 10. Although this profile closely follows patterns of exacerbation noted in previous studies,[37–40] the limited sample captured by this trajectory raises concerns regarding the overall stability of the solution. As a result, the 3-class model was selected for further investigation given greater representation within the individual profiles.[3]

PROFILE CORRELATES

Treatment Environment. Data failed to support an association between provider status (VA staff vs. predoctoral intern) and response profile ($X^2_2 = 1.14$, $P = .566$; $V = .102$). The relation between profile and treatment setting (in-person vs. telehealth; $X^2_2 = 4.27$, $P = .118$; $V = .198$) also failed to reach significance.

Clinical Presentation. One-way ANOVA ($F_{2,106} = .08$, $P = .922$; $\eta^2 = .002$) failed to demonstrate reliable differences in initial PCL-M scores across Rapid, Linear, and Delayed Responder groups. Initial depressive symptoms also were similar across profiles ($F_{2,79} = .28$, $P = .754$; $\eta^2 = .007$).

Treatment Response. Large differences were noted in overall PTSD severity at the completion of PE ($F_{3,106} = 30.83$, $P < .001$; $\eta^2 = .368$; see Fig. 2). Tukey post hoc testing identified Rapid Responders as demonstrating lower PCL-M scores at the final session ($M = 28.3$, SD = 7.2) relative to Linear ($M = 39.5$, SD = 11.0; $P = .003$, $g = 1.13$) and Delayed Responder ($M = 53.1$, SD = 15.1; $P < .001$, $g = 1.85$) groups. Linear Responders evidenced lower end-of-treatment scores than those in the Delayed group ($P < .001$, $g = 1.02$).

Differences also were noted with regard to reliable change (Fisher's exact $P < .001$; $V = .659$). Rapid Responders and all but one patient in the Linear Responder profile met criteria for reliable change at the final session. Reliable improvement was noted in 40.0% of Delayed Responders. With respect to overall treatment duration ($F_{3,104} = 6.08$, $P = .003$; $\eta^2 = .103$), differences were noted across Rapid ($M = 9.6$, SD = 3.6) and Delayed Responder ($M = 13.9$, SD = 5.9; $P = .004$, $g = 0.81$) groups. Linear Responders did not differ from other profiles ($M = 11.5$, SD = 4.2) following correction for multiple comparisons.

DISCUSSION

Conventional treatment analyses assume a linear reduction in symptoms that is uniform across patients. The current study suggests that trajectories of response to PE across 10 weeks of treatment are heterogeneous with evidence of discontinuous change in a sizable patient minority. A 3-profile solution was extracted from these archival data. Rapid Responders (18.3%) evidenced sizable improvements by the second week of intervention followed by a large drop between Weeks 5 and 6. Hayes et al.[63] observed a similar trajectory among patients receiving exposure-based cognitive therapy for depression. These authors conceptualized early, rapid

[3]Additional analyses were conducted to explore the possibility that symptom profiles in these naturalistic data emerged as an artifact the number/timing of assessments. Profiles were similar with respect to the number of available change scores (Rapid: $M = 3.8$, SD = 1.1; Linear: $M = 3.5$, SD = 0.9; Delayed: $M = 3.3$, SD = 0.6) and the time between adjacent assessments (Rapid: $M = 1.9$, SD = 1.0; Linear: $M = 2.2$, SD = 1.1; Delayed: $M = 2.3$, SD = 1.0).

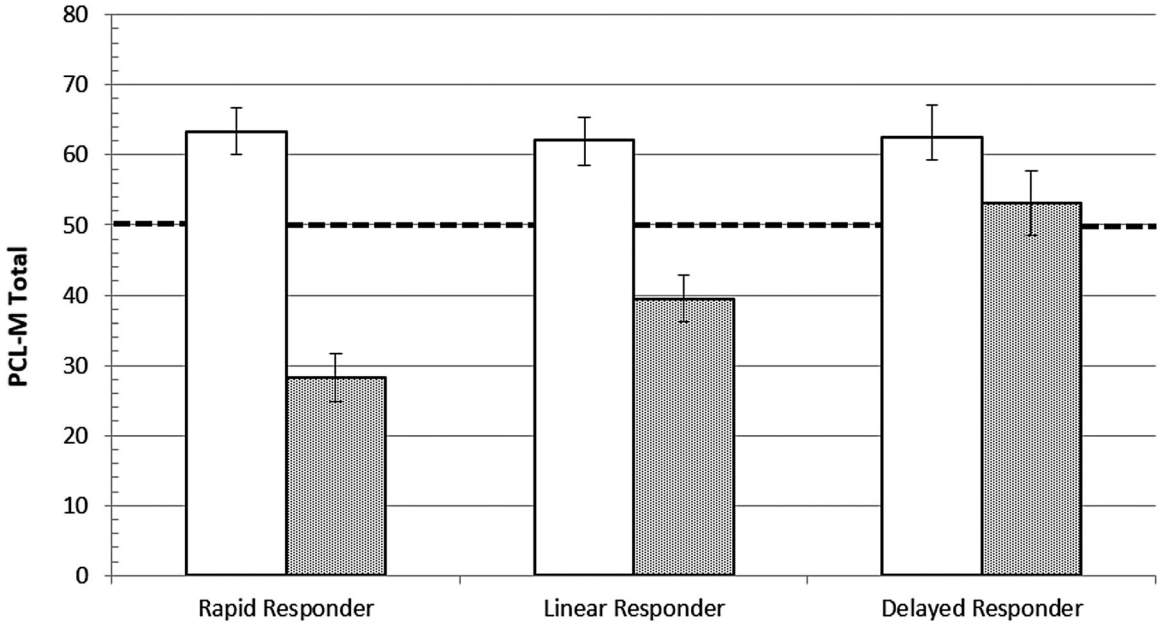

Figure 2. Mean PCL-M scores (with 95% CI) at Session 1 and final session.
Note: PCL-M = PTSD Checklist-Military Version; dashed line at PCL-M = 50 represents cut score for probable diagnosis.

response—often preceding the introduction of active treatment components—as *first-order change* (i.e., "nonspecific factors" change), driven by increased hope and professional support at the onset of intervention. Subsequent improvement was interpreted as *second-order change*—gains attributable to alterations in cognition and behavior as a consequence of active treatment.[63,64] As in the current study, research with survivors of civilian trauma identified sudden gains occurring both before and after the introduction of exposure.[38–40] Given that theoretical models identify exposure as a primary catalyst for the processing of negative trauma-related emotion,[65] early and late gains in this study may be viewed as consistent with Hayes et al.'s[63] conceptualization of first- and second-order change. From a provider standpoint, it is worth noting that sudden gains occurring at any point in treatment consistently predict enhanced outcome.[38–40,66] Within-group change among Rapid Responders in the current project ($d = 4.97$)[4] far exceeds effects typical of intent-to-treat samples.[23–27]

Patients in the Linear Responder profile (40.4%) also evidenced substantial improvement. Expected recovery was more gradual, however, with no change in week-to-week scores meeting criteria for sudden gains.[41] Aggregate response in the Linear profile most closely resembles the continuous pattern of incremental improvement assumed in conventional analyses of change. Although speculative, incremental gains among Linear Responders appear most consistent from Week 4 onward. This pattern introduces the possibility of improvement consistent with second-order change although strong conclusions await replication in larger samples conforming to more systematic assessment. Linear Responders accounted for a greater proportion of patients than Rapid Responders but continued to evidence strong within-group effects ($d = 1.98$).

A final profile of Delayed Responders (41.3%) demonstrated relatively modest reductions with little evidence of first- or second-order change through the 10-week intervention window. It is worth noting, however, that the average treatment duration for Delayed Responders in this naturalistic setting was approximately 14 weeks. Moderate to large within-group improvement was noted by the final session ($d = 0.72$) with 40% of patients meeting criteria for reliable change. Data suggest that stable improvement in these individuals is not established in a standard 10-week treatment window, highlighting the importance of persistence when administering trauma-focused interventions. Although no aspect of the treatment setting or clinical presentation emerged as a reliable predictor of Delayed Responder status, theoretical models suggest that factors prohibiting emotional engagement during exposure (e.g., low perceptions of treatment credibility, limited rapport, avoidance/numbing, poor homework adherence, external stressors) may delay therapeutic effects.[21] Clinicians should be mindful of potential disruptive factors, particularly in the absence of stable improvement by mid-treatment.

[4]Effect sizes for within-subjects change (*d*) were calculated as the mean difference in PCL scores from initial session to posttreatment divided by the square of the average variance at the initial session and posttreatment.

Results should be interpreted within the context of the study's strengths and limitations. The incorporation of LPA to evaluate patterns of change in response to PE is novel, and the use of efficacy data in this treatment-seeking veteran sample is a considerable strength. That said, replication in data collected from systematic clinical trials would address a series of limitations. Extraction of cases from the larger archival set was notably low given the frequency of assessment required for inclusion. LPA readily accommodates missingness, but evaluation in a large set of systematic weekly scores would provide increasingly precise estimates of population change. Inferences regarding the exact timing of change also would be improved in analyses of standardized trial data. Although services provided through the PTSD clinic conform to a standard, manualized schedule, there is no mechanism by which to tie scores to specific treatment sessions in these naturalistic data. Patterns identified in the current sample closely follow those observed in previous studies;[32, 37–40] however, data linking scores to individual sessions would help verify at what point in treatment different response characteristics emerge. Replication with clinical trial data would also provide standardization in terms of the number of sessions and treatment duration and open opportunities to assess the relation between individual profiles and the stability of gains at follow-up. Finally, data collected in a research-focused setting would permit a more comprehensive comparison of patient characteristics across different response trajectories. Empirical reviews suggest treatment-related processes (e.g., motivation, compliance) are likely more predictive of outcome than individual difference factors (e.g., demographics, trauma characteristics),[47] but the relation of patient variables with specific trajectories of response remains largely unexamined.

CONCLUSION

Data indicate that PE delivered in a naturalistic, service-focused setting is effective in reducing PTSD in a majority of patients. Results also identified clinically relevant patterns of discontinuous response likely overlooked in traditional models of change. Specifically, sudden symptom reductions occurring both early and later in treatment appear prognostic of an unusually strong response to PE. Alternatively, extended periods of minimal response—as long as 10 weeks in the current analysis—are not necessarily indicative of eventual treatment failure. An active assessment of treatment-related and/or external factors interfering with therapeutic engagement is strongly encouraged in such cases, but continued treatment (an average of 14 weeks in the current study) appears beneficial for a sizable portion of those demonstrating delayed recovery. Continued research targeting specific patterns of treatment response will help to refine mechanistic models of therapeutic change and inform the development of prognostic tools helping clinicians track and respond to patient needs over the course of evidence-based care.

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