12-1-2021

Change in Self-compassion, Psychological Inflexibility, and Interpersonal Courage in Intensive PTSD Treatment: A Latent Growth Curve Analysis

Peter Philip Grau
Marquette University

Timothy Melchert
Marquette University, timothy.melchert@marquette.edu

Mauricio Garnier-Villarreal
mauricio.garniervillarreal@marquette.edu

Lynne M. Knobloch-Fedders
Marquette University, lynne.knobloch-fedders@marquette.edu

Chad T. Wetterneck
Rogers Memorial Hospital

Mindfulness, Vol. 12, No. 12 (December 2021): 2983-2996. DOI.

Change in Self-compassion, Psychological Inflexibility, and Interpersonal Courage in Intensive PTSD Treatment: A Latent Growth Curve Analysis

Peter P. Grau
Department of Counselor Education and Counseling Psychology, Marquette University, Schroeder Health and Education Complex, 317, Milwaukee, WI
Timothy P. Melchert
Department of Counselor Education and Counseling Psychology, Marquette University, Schroeder Health and Education Complex, 317, Milwaukee, WI
Mauricio Garnier-Villarreal
Vrije Universiteit Amsterdam, Amsterdam, Netherlands
Lynne M. Knobloch-Fedders
Department of Counselor Education and Counseling Psychology, Marquette University, Schroeder Health and Education Complex, 317, Milwaukee, WI
Chad T. Wetterneck
Rogers Behavioral Health, West Allis, USA

Abstract

Objectives

Despite numerous advances in the understanding of the development and maintenance of posttraumatic stress disorder (PTSD), current research is often narrowly focused on symptom reduction. Despite this, the impact of PTSD also extends into areas such as interpersonal relationships, pursuit of valued activities, and self-acceptance. These processes appear to be especially relevant in chronic/complex PTSD but are rarely represented in controlled trials. As a result, there is a need to expand the focus of PTSD research beyond symptom reduction to include processes of well-being.

Methods

Using a latent growth curve analytical approach, this study examined the impact of change in self-compassion, psychological inflexibility, and interpersonal courage on PTSD symptom reduction, trauma-related shame, quality of life, and valued living for participants in an exposure-based PTSD partial hospitalization program (n = 537; 75% White; 83% female; mean age = 36).

Results

All key processes assessed except for interpersonal courage showed clinically meaningful change over the course of the program. For the PTSD and valued living three-piece spline model slopes, only the three self-compassion slopes were significant predictors ($p < .001$). The psychological inflexibility slope predicted the quality of life slope ($p < .001$), while the interpersonal courage slope predicted the trauma-related shame slope ($p < .001$).

Conclusions

Results supported the importance of broadening the focus of PTSD conceptualization, treatment, and outcome assessment to include processes such as psychological inflexibility, self-compassion, and interpersonal courage.

Trauma has a deleterious impact on many aspects of psychological well-being, including psychological flexibility, self-compassion, and vulnerability and connection in interpersonal relationships (Au et al., 2017; Cloitre, 2015; Seligowski et al., 2015). However, many PTSD treatment researchers have noted an exclusive focus on outcomes defined by symptom reduction and, in some limited cases, quality of life, while neglecting many other indicators of well-being (Cloitre, 2015; McGuigan, 2013; Najavits & Hien, 2013; Steenkamp & Litz, 2013). While it is essential that PTSD research continues to assess symptom reduction and quality of life, research also needs to explore how change in processes of well-being over the course of treatment impact relevant outcomes (Hofmann & Barlow, 2014).

The lack of comprehensive outcome data in PTSD research is especially concerning given the well-documented consequences of failing to inform clinical practice with clinical data (Spinazzola et al., 2005). Without consistently gathered patient outcome data, the quality, consistency, and accountability of care environments cannot be reliably determined (Brown et al., 2001). There is also evidence that failing to collect consistent patient outcome data can lead to deterioration in therapist skill, which can also result in poorer delivery of service and the inability to demonstrate value to customers (e.g., taxpayers and patients; Fortney et al., 2017). On the other hand, the benefits of

conducting comprehensive outcome research and using that research to inform practice are clear. Measurement-based care (MBC) can help providers identify high-risk patients, foster coordination between care team members, improve the therapeutic relationship, and identify treatment approaches that are most effective for reducing symptoms and improving quality of life (Fortney et al., 2017; Prescott et al., 2017).

An important next step is to examine the impact of change in core processes of well-being on PTSD outcomes. To do this, a thorough conceptualization of well-being, along with a comprehensive explication regarding how these processes function to promote or restrict the cultivation of well-being in people with PTSD, is required. Though the research is not yet definitive, prior work has identified several key well-being processes that should be explored further. Most of these are rooted in mindful awareness of the self and others, including psychological flexibility (Seligowski et al., 2015), emotion regulation (Boyd et al., 2018), present-moment awareness (Gu et al., 2015), self-compassion (Au et al., 2017), and interpersonal vulnerability and connection (Hoffart et al., 2015). The evidence supporting present-moment awareness (e.g., Boyd et al., 2018) and emotion regulation (Barlow, 2014) as core processes of well-being in PTSD is established and strong. Evidence also suggests that exposure-based treatments are especially effective at addressing emotion regulation and present-moment awareness, as the movement towards willingly tolerating distressing emotions in the moment builds emotion regulation skills behaviorally and neurobiologically (Frank et al., 2014; Gratz & Tull, 2010; Yehuda et al., 2015).

The importance of psychological flexibility, self-compassion, and vulnerability and connection in interpersonal relationships on PTSD outcomes is less clear. Evolutionary psychologists have hypothesized that compassion towards others, compassion towards self, and receiving compassion from others (Gilbert, 2010) are core components of multi-level evolutionary selection processes that allow human beings to successfully function in groups (Hayes, 2019). From this perspective, creating a context in which interpersonal connection can occur is likely to facilitate the cultivation of well-being. This view is supported by findings that people with PTSD experience improvements in quality of life following an explicit focus on positive interpersonal interactions (e.g., Markowitz et al., 2015). Importantly, there is also evidence that a willingness to engage in interpersonal interactions characterized by vulnerability must be present for positive interpersonal interactions to occur (Jordan, 1990; Kohlenberg et al., 2015). These findings suggest that the courage to engage in interpersonal relationships might be a key process of well-being. While the courage to engage in interpersonal relationships has been integrated in evidence-based treatment (e.g., addressing intimacy and trust in cognitive processing therapy [CPT]), it has not yet been fully explored in the literature on PTSD outcomes (Cloitre, 2015).

Engaging and strengthening these core evolutionary processes may also serve as powerful motivators for sustained behavior change via establishing life meaning and purpose. Past research has demonstrated that the cultivation of mindfulness (Shapiro et al., 2006), psychological flexibility (Mak & Cheung, 2010), self-compassion (Mak et al., 2021), and interpersonal connection (Roush et al., 2018) are positively related to valued living. The ability to engage with oneself and others with mindful awareness facilitates the process of freely choosing the direction of one's life and finding meaning in it, even in the face of challenging life circumstances (Mak et al., 2021; Roush et al., 2018). Based on these

conceptual rationales and empirical findings, psychological flexibility, self-compassion, and vulnerability and connection in interpersonal relationships may be especially important factors in helping people with PTSD explore and develop aspects of their lives beyond trauma.

Processes involved in interpersonal connection and interpersonal courage have often been neglected in traditional PTSD treatment models as the need to reduce core PTSD symptoms (e.g., avoidance, hyperarousal) has taken precedence (Cloitre et al., 2005). Indeed, this symptom reduction approach targets essential components of the PTSD experience, and contemporary evidence-based approaches such as prolonged exposure for PTSD and CPT have considerable evidence supporting their ability to reduce PTSD symptomatology (Cusack et al., 2016). These evidence-based approaches focus on restructuring dysfunctional beliefs about self, others, and the world. However, for people with PTSD who endorse high levels of shame, avoidance of emotions and intimacy, and difficulties connecting with others, altering relationships between fear-triggering stimuli and associated networks via habituation fail to consistently improve quality of life (Au et al., 2017; Cloitre, 2015).

The experience of shame inherently limits the ability of the individual to connect with others, because shame is based in strongly held beliefs that one's identity is flawed, wrong, or broken (Lee et al., 2001). One of the most promising interventions for targeting shame in PTSD is the cultivation of self-compassion. The definition of self-compassion most commonly used originated from Neff (2003). In this definition, self-compassion comprises three components: (1) self-kindness vs. self-criticism, (2) common humanity vs. isolation, and (3) mindfulness vs. overidentification. According to Neff and Dahm (2015), "In order to give oneself compassion, one must be able to turn toward, acknowledge, and accept that one is suffering" (p. 2). In some ways, this definition of self-compassion provides an alternative definition for shame, as the "negative" pole of self-compassion are related to viewing the self as being broken or wrong. Empirically, studies of the validity of self-compassion scales have demonstrated links between the "negative" aspects of self-compassion (e.g., self-criticism) and shame (Kelly et al., 2014).

Evidence in support of interventions designed to increase self-compassion and decrease shame is moderate in strength but growing (Neff & Dahm, 2015). Shame has been effectively targeted both cognitively and behaviorally in empirically supported treatments such as CPT with relatively consistent levels of success (Schoenleber & Gratz, 2018), though the reduction of reported levels of shame is not necessarily equivalent to active engagement in connection with self and others. Additionally, some evidence suggests that change in these processes may be best explained by change in psychological flexibility (e.g., Levin et al., 2012; Seligowski et al., 2015).

Given the previous discussion, clarifying the relationships between psychological flexibility, self-compassion, and interpersonal courage in people with PTSD is an important research and clinical goal. As has been noted by Cloitre (2015), these variables should be examined not just in terms of their relationship to PTSD symptom severity. Quality of life is an important clinical target as well (Steenkamp & Litz, 2013). Trauma-related shame may also be an important clinical target, as suggested by the evidence that high levels of shame are often a barrier to successful PTSD treatment (Kelly et al., 2014; Neff & Dahm, 2015). Finally, recent evidence suggests that evidence-based treatments for PTSD can benefit from including as motivational and behavioral targets core values such as connection with others and fulfilling family relationships (Donahue et al., 2017). Incorporating these additional variables

into PTSD treatment research may clarify the processes involved in effective treatment, which may lead to more enduring, comprehensive, and meaningful treatment outcomes.

The present study attempted to explore how self-compassion, psychological flexibility, and interpersonal courage function as predictors of PTSD symptom severity, quality of life, trauma-related shame, and valued living. The study used clinical outcome data obtained from patients who completed treatment at a prolonged exposure–based partial hospitalization program for PTSD. Using latent growth curve analyses (Grimm et al., 2016; Little, 2013), this study examined whether within-person rates of change in self-compassion, psychological flexibility, and interpersonal courage predicted within-person rates of change in PTSD symptom severity, quality of life, trauma-related shame, and valued living. Specifically, we predicted that the within-person rates of change in psychological inflexibility (decrease), self-compassion (increase), and interpersonal courage (increase) would predict the within-person rates of change of PTSD symptom severity (decrease), quality of life (increase), trauma-related shame (decrease), and valued living (increase). To test these predictions, we used the null hypothesis that there was no difference between the slopes of the rates of change for each predictor variable (Grimm et al., 2016).

Method

Participants

Data were obtained from 537 adult patients who enrolled in an exposure-based PTSD partial hospitalization program (PHP) in eight satellite hospital locations across the Midwest. Full demographic data are presented in Table 1. Seventy-five percent of patients identified as White and 83% identified as female. The average age of the participant sample was 36.10 (min = 17, max = 79). Most patients had been in previous treatment.

Table 1 Sample demographics

From: Change in Self-compassion, Psychological Inflexibility, and Interpersonal Courage in Intensive PTSD Treatment: A Latent Growth Curve Analysis

Variables	***N* (%) or *M* (*SD*)**
N	537
Female	446 (83%)
Male	90 (17%)
Race	
White	400 (75%)
Black	41 (8%)
Pacific Islander	4 (1%)
Native American	8 (2%)
Asian	6 (1%)
Multiple	1 (< 1%)
Unknown	46 (9%)
Ethnicity	
Hispanic or Latino	27 (5%)
Not Hispanic or Latino	457 (85%)

Did not indicate	30 (5.6%)
Age	36.10 (12.7); (range: 17–79)
Education	
Some college	156 (29%)
Bachelor's degree	90 (17%)
High school degree	50 (9%)
Other	142 (26%)
Associate's degree	32 (6%)
Master's degree	43 (8%)
Marital status	
Married	137 (26%)
Divorced	62 (12%)
Single	261 (49%)
Separated	24 (5%)
Widowed	11 (2%)
Unknown	19 (3%)
Sexual orientation	
Heterosexual	183 (80%)
Gay, lesbian, or bisexual	31 (14%)
Did not indicate	14 (6%)

The majority (78%) of this sample had at least one comorbid diagnosis, with major depressive disorder (48%), bipolar disorder (17%), generalized anxiety disorder (13%), and alcohol dependence (9%) being the most common comorbid conditions. Other comorbid diagnoses included borderline personality disorder (6%), panic disorder (5%), and opioid dependence (5%).

Trauma exposure was assessed using the Life Events Checklist (Weathers et al. 2013a, 2013b, 2013c), a self-report measure designed to allow participants to report lifetime exposure to a wide variety of traumatic events. Fourteen percent of participants did not indicate trauma exposure, so these data are not available for analysis. In this sample, total trauma exposure (M = 12.05, SD = 4.05) was approximately four times higher than rates found in the general population (cf. Benjet et al., 2016). The most common trauma exposures were physical assault (77%), sexual assault (74%), and transportation accidents (72%), while the least common trauma exposures were causing serious injury to someone else (15%) and combat/warzone exposure (25%). In this sample, only 3% of participants indicated experiencing non-interpersonal traumas (e.g., transportation accident, natural disaster) without experiencing interpersonal trauma (e.g., sexual assault, physical assault, emotional abuse). As such, 97% of this sample experienced at least one interpersonal trauma. It should be noted that the Life Events Checklist (LEC) does not measure total number of exposures, so it is likely that the vast majority of patients in the program experienced more than one instance of an indicated trauma (i.e., multiple assaults).

Procedure

The treatment in these evidence-based PTSD programs focused concurrently on symptom reduction (via prolonged exposure for PTSD) and improving quality of life via the pursuit of meaning, personal

values, and engagement in contextual behavior treatment components (e.g., acceptance and commitment therapy, dialectical behavioral therapy, and compassion-focused therapy). The treatment involved a mix of individual therapy focused on exposure-based approaches (i.e., in vivo and imaginal exposure) and group therapy focused on emotion regulation skills, interpersonal effectiveness, and mindfulness skills. All patients were screened by a psychologist and psychiatrist for diagnostic fit with the program. While PTSD was required as the primary diagnosis for admission to the program, most patients presented with at least one comorbid condition. Besides meeting criteria for a primary diagnosis of PTSD, there were no strict exclusionary criteria for program participation, as the supervising psychologist and psychiatrist had final authority with respect to admission. However, active psychosis, significant cognitive impairment, and untreated substance use disorder generally resulted in admission to alternative treatment programs. All patients were given the Clinician-Administered PTSD Scale and the Mini-International Neuropsychiatric Interview (MINI; Sheehan et al., 1998) upon admission to further assess a primary diagnosis of PTSD, as well as the PTSD Checklist for DSM-5 (Weathers et al., 2013a). Data from these assessments were not integrated into the database available for research purposes, so they were not included in analyses.

Study data were collected at three timepoints during patients' stay in the program: upon admission to treatment, at the step-down transition from partial hospitalization to intensive outpatient programming, and upon discharge. These timepoints were approximately 6 weeks apart. Additionally, self-compassion, PTSD, and valued living were measured weekly. Patients spent approximately 6 weeks in partial hospitalization and 6 weeks in intensive outpatient programming, though these timeframes were not rigidly adhered to given differing treatment needs across patients. Assessments were given in a uniform assessment battery administered on a HIPPA-compliant computer tablet. Patients were required to provide signed informed consent prior to beginning the program indicating their consent to have their deidentified assessment data utilized for research purposes. All patients who consented to have their data used for research purposes were included in this study. IRB approval was obtained before any analyses were conducted.

Measures

Standard deviations and mean scores were calculated for all scales. Because Cronbach's alpha is a measure of inter-item consistency and not reliability (Sijtsma, 2009), omega (ω) and maximal reliability (Peters, 2014) were also calculated to evaluate scale reliability.

PTSD Checklist (PCL-5)

The PCL-5 (baseline $M = 54.17$, $SD = 12.70$) is a 20-item self-report measure examining symptoms of PTSD severity based on DSM-5 criteria (Weathers et al. 2013a, 2013b, 2013c). The measure uses a 5-point Likert scale (1 = Not at all, 4 = Extremely) where higher scores indicate greater symptom severity. The PCL-5 has demonstrated strong convergent validity, discriminant validity, and adequate inter-item correlation (Blevins et al., 2015). In this sample, inter-item correlation ($\alpha = 0.88$) and reliability results for the PCL-5 ($MR = 0.91$, $\omega = 0.88$) indicate a high proportion of shared variance that defines the underlying construct.

Quality of Life Satisfaction Questionnaire — (Short Form; Q-LES-Q-SF)

The Q-LES-Q-SF (baseline $M = 42.10$, $SD = 16.13$) is a 16-item self-report measure examining quality of life and satisfaction (Endicott et al., 1993). The measure uses a 5-point Likert scale (1 = very poor,

5 = very good) where higher scores suggest greater life satisfaction and quality of life. The Q-LES-Q-SF has demonstrated strong convergent validity, discriminant validity, and inter-item correlation (Riendeau et al., 2018). In this sample, inter-item correlation (α = 0.86) and reliability results for the Q-LES-Q-SF (*MR* = 0.90, ω = 0.84) were strong.

Acceptance and Action Questionnaire (AAQ-II)

The AAQ-II (baseline *M* = 39.49, *SD* = 6.99) is a 7-item self-report measure of psychological inflexibility, defined as the attempt to alter the form, frequency, or situational sensitivity of negative thoughts and emotions (Bond et al., 2011). The measure uses a 7-point Likert scale (1 = never true, 7 = always true) where higher scores indicate elevated levels of psychological inflexibility. The AAQ-II has demonstrated convergent and discriminant validity, as well as adequate inter-item correlation (Gloster et al., 2011). In this sample, inter-item correlation (α = 0.89) and reliability results for the AAQ-II (*MR* = 0.90, ω = 0.89) indicated adequate reliability.

Awareness, Courage, and Responding (ACR)

The Courage subscale (baseline *M* = 26.34, *SD* = 6.34) of the Awareness, Courage, and Responding Scale (ACR-C; Kuczynski et al., 2020) is a 7-item measure of interpersonal courage, or the willingness to be vulnerable in interpersonal interactions. The measure is scored using a 7-point Likert scale (1 = never true, 7 = always true) where higher scores indicate higher levels of interpersonal courage. Initial validation of the scale shows convergent validity, discriminant validity, and adequate inter-item correlation (Kanter et al., in press). In this sample, inter-item correlation (α = 0.84) and reliability results for the ACR-C (*MR* = 0.85, ω = 0.84) were also strong.

Valued Living Questionnaire (VLQ)

The VLQ is a two-part self-report measure of values importance and committed action to those values assessed across 10 life domains (Wilson et al., 2010). The measure uses a 10-point Likert scale (1 = not at all important, 10 = extremely important) where higher scores reflect greater valued living. The Importance scale asks the participant to rank 10 life domains based on the importance of each value, while the Consistency scale asks the participant to report how consistent their actions have been with those same values. A composite score (*M* = 40.67, *SD* = 19.02) is calculated by taking the mean of the products of corresponding importance and consistency scores for each domain. This score indicates total valued living. Importantly, item-by-item internal consistency is not necessarily an expectation for the VLQ, as not all domains are expected to be related to one another. For this study, the inter-item correlation (α = 0.80), maximal reliability (*MR* = 0.81), and omega (ω = 0.80) for the VLQ were high.

Life Events Checklist (LEC-5)

The LEC-5 is a 17-item self-report measure assessing trauma exposure history (Weathers et al., 2013b). Participants rate 16 trauma-related events (e.g., sexual assault, combat or exposure to a war zone), as well as a potential unspecified stressful event or experience, using 6 nominal responses (happened to me, witnessed it, learned about it, part of my job, not sure, doesn't apply). The LEC-5 is administered directly before the Clinician-Administered PTSD Scale for DSM-5 as the identifying mechanism for a person's most prominent PTSD criterion A traumatic experience.

Self-compassion Scale (Short Form; SCS-SF)

The SCS-SF (baseline *M* = 26.33, *SD* = 7.38) is a 12-item self-report measure assessing self-compassion, including showing self-kindness vs. self-judgment, being mindful vs. fused with thoughts/emotion, and connecting with others vs. isolating (Neff, 2003; Raes et al., 2011). Responses are given on a 5-point Likert-type scale (1 = almost never, 5 = almost always) where higher scores indicate elevated levels of self-compassion. Neff (2003) demonstrated that the SCS-SF has a "near-perfect correlation with the long form SCS" and has almost no loss in inter-item correlation for total scores. The SCS-SF has also demonstrated strong convergent and divergent validity (Castilho et al., 2015). In this sample, inter-item correlation (α = 0.80) and reliability results for the SCS-SF (*MR* = 0.82, ω = 0.80) indicated a high proportion of shared variance that defines the underlying construct.

Trauma-Related Shame Inventory (TRSI)

The TRSI (baseline *M* = 41.84, *SD* = 18.30) is a 24-item self-report measure of internal and external trauma-related shame (Øktedalen et al., 2014). The measure uses a 4-point Likert scale (0 = never true, 3 = always true) where higher scores indicate elevated levels of trauma-related shame. The TRSI has demonstrated convergent and discriminant validity, as well as adequate inter-item correlation (DeCou et al., 2019). In this sample, inter-item correlation (α = 0.96) and reliability results for the PCL-5 (*MR* = 0.96, ω = 0.95) were strong.

Data Analyses

Latent Growth Curve Models

Latent growth curve analysis was used to assess if the rate of change in designated predictor variables predicted the rate of change in designated outcome variables (Grimm et al., 2016). This was achieved using a structural equation modeling (SEM), which allows for non-linear change models (Grimm et al., 2016). Latent growth curve analysis can be conducted with three timepoints, so it is an appropriate method of analysis for these data (Little, 2013). While it would be possible to assess longitudinal variable change using other statistical methods (e.g., longitudinal panel modeling), latent growth curve analysis allowed for the assessment intraindividual growth trends (Little, 2013), which is the focus of the research questions in this study. In clinical settings, this intraindividual focus can help identify core processes of change that can become treatment targets in efficient, transdiagnostic approaches (Hayes & Hofmann, 2018). In this study, the unit of time was 1 week, which reflected programmatic administration of assessment batteries. For measures that were only given at stepdown to intensive outpatient programming and discharge from the program, the time interval is approximately 6–8 weeks. In addition to linear growth models that estimated a change matrix for the variables under study, SEM allowed for the estimation of multiple forms of growth models (i.e., quadratic, cubic, and spline models) that could be tested against one another to ascertain the best-fitting growth model for each individual longitudinal measure. Quadratic models adjust the change matrix by adding an additional growth factor that squares the linear values from the original linear model. Cubic models adjust the change matrix by adding another growth factor to a quadratic model that cubes the linear values from the original linear model. Finally, spline growth models adjust the change matrix at knot points that represent theoretical or data-driven turning points between distinct, time-based linear slopes (Grimm et al., 2016). All analyses were conducted in R 3.5.0 (R Core Team, 2017) using the *lavaan* (Rosseel, 2012) package.

The large number of latent regressions required for each dependent variable generated estimation problems for the full model, and as such, four separate models were estimated to test each outcome variable separately (i.e., PTSD symptoms, valued living, quality of life, and trauma-related shame, respectively). Linear, quadratic, cubic, and spline slopes were estimated and compared via likelihood ratio test (LRT, χ^2) model comparison to retain the best-fitting model to the data (Little, 2013). The AAQ-II, ACR-C, TRSI, and Q-LES-Q-SF contained three timepoints for all included participants. The PCL-5, SCS-SF, and VLQ were administered weekly and, as such, contained a variable range of timepoints. The largest number of timepoints available for analysis was 25.

Model fit statistics, including absolute and relative fit approximate indices, were calculated for all estimated latent growth curves. In line with recommendations from Beauducel and Wittmann (2005), fit indices were not interpreted as strict cutoffs for model interpretation. Instead, multiple fit indices, including Gamma Hat, were estimated to provide an overall view of the fit of each model to the data (Cheung & Rensvold, 2002). For the linear models, the majority of models displayed poor relative fit indices. This may be a result of model complexity or elements of misspecification; however, the Gamma Hat index, which is a more robust fix index than the *TLI* and *CFI* (Fan & Sivo, 2007; Garnier-Villarreal & Jorgensen, 2020), was above 0.90 for all models.

Latent Growth Curve Regressions

From the estimated latent growth curve models, latent regressions were estimated to predict the intercept and slope of the PCL-5, Q-LES-Q-SF, VLQ, and TRSI, respectively. The intercepts and slopes of the AAQ-II, SCS-SF, and ACR-C were set as predictor variables in the latent regression models. In line with recommendations from Little (2013), pruned models, in which non-significant relationships are set to zero, were generated and compared to the initial models via LRT (χ^2). Model pruning continued until a non-significant chi-square result was found. Final, pruned model results are reported.

Missing Data

Missing data were handled using full information maximum likelihood, which increases power and reduces the chance for bias in parameter estimation due to missing data (Enders, 2010). Growth curves were calculated using all available data with at least two primary timepoints (e.g., admission, stepdown, and discharge). All participants completed at least one baseline assessment in order to be included in the analyses. If a participant did not have at least two timepoints, they were considered to have dropped out of treatment. Because this was a secondary data analysis, a power analysis was not conducted, and all available and qualified participants were included.

Results

Latent Growth Curve Models

PTSD Symptoms Growth Model (PCL-5)

First, linear, quadratic, and cubic slopes were estimated for the PCL-5. Only the linear slope model converged, preventing model comparison via LRT. Upon examination of plotted values, a three-piece spline model was estimated. Spline models are especially useful when each knot point is associated with a discernable reason for the change in slope (Grimm et al., 2016). For the PCL-5, knot points were discovered after week 6 of treatment and after week 16 of treatment. Week 6 is especially meaningful, as it represents a full course of partial hospitalization programming and the stepdown to intensive

outpatient programming. Week 16 is approximately 4 weeks after the intended discharge date from intensive outpatient, though given the variable length of treatment for participants, this knot point also represents data from patients who required additional treatment time to complete the program. This spline model was compared to the linear model via LRT (**Δ** X^2 = 659.33, **Δ** *df* = 9, *p* < .001), after which the spline model was retained as the best-fitting model to the data. Model fit for the PCL-5 spline model was also acceptable (X^2 (*337*) = 882.28, *RMSEA* = .05 *CI*[.05, .06], *CFI* = .86, *TLI* = .86, Gamma Hat = .93). The estimated PCL-5 intercept (at admission) was 54.39 (*SE* = .56, *p* < .001). The first two linear slopes were significant at *p* <. 001. However, the third linear slope was not significant (*p* = .068). For the first linear slope, on average, PCL-5 scores decreased 2.01 units (*SE* = .15, *p* <. 001) per week. For the second linear slope, on average, PCL-5 scores decreased 1.34 units (*SE* = .20, *p* <. 001) per week. Finally, for the third linear slope, PCL-5 scores increased .38 units (*SE* = .21, *p* = .068) per week.

Self-compassion Growth Model (SCS-SF)

For the SCS-SF, a spline model was retained as the best-fitting model to the data. Model fit for the SCS-SF spline model was acceptable (X^2 (*337*) = 944.12, *RMSEA* = .05 *CI*[.05, .06], *CFI* = .86, *TLI*= .87, Gamma Hat = .92). The estimated SCS-SF intercept (at admission) was 26.13 (*SE* = .35, *p* < .001). The first two linear slopes were significant at *p* < .001. However, the third linear slope was not significant (*p* = .580). For the first linear slope, on average, SCS-SF scores increased .73 units (*SE* = .08) per week. For the second linear slope, on average, SCS-SF scores increased .46 units (*SE* = .10) per week. Finally, for the third linear slope, SCS-SF scores increased .06 units (*SE* = .10) per week.

Valued Living Growth Model (VLQ)

For the VLQ, a spline model was retained as the best-fitting model to the data. Model fit for the VLQ spline model was also acceptable (X^2 (*337*) = 942.56, *RMSEA* = .06 *CI*[.06, .07], *CFI* = .86, *TLI* = .87, Gamma Hat = .91). The estimated VLQ intercept (at admission) was 38.62 (*SE* = .17, *p* < .001). The first two linear slopes were significant at *p* <. 05. However, the third linear slope was not significant (*p* = .589). For the first linear slope, on average, VLQ scores increased .85 units (*SE* = .17) per week. For the second linear slope, on average, VLQ scores increased .53 units (*SE* = .15) per week. Finally, for the third linear slope, VLQ scores increased .09 units (*SE* = .16) per week.

Psychological Inflexibility Growth Model (AAQ-II)

For the AAQ-II, only the linear model converged, which prevented model comparison via LRT. Based on recommendations from Marsh, Hau, and Wen (2004), model fit for the AAQ-II linear model was acceptable (X^2 (*475*) = 35.88, *RMSEA* = .27 *CI*[.20, .35], *CFI* = .71, *TLI* = .13, Gamma Hat = .95). Scores decreased consistently from admission to discharge. The estimated AAQ-II intercept (at admission) was 25.73 (*SE* = 5.96, *p* < .001). The linear slope was significant at *p* < .001 On average, AAQ-II scores decreased .36 units (*SE* = .06) per 6 weeks.

Interpersonal Courage Growth Model (ACR-C)

For the ACR-C. Only the linear model converged, which prevented model comparison via LRT. Based on recommendations from Marsh, Hau, and Wen (2004), model fit for the ACR-C linear model was acceptable (X^2 (*484*) = 2.97, *RMSEA* = .06 *CI*[.00, .15], *CFI* = .99, *TLI* = .98, Gamma Hat = .99). Scores increased gradually from admission to discharge. The estimated ACR-C intercept (at admission) was

21.99 (*SE* = 2.94, *p* < .001). The linear slope was not significant (*p* = .918). On average, ACR-C scores increased .002 units (*SE* = .02, *p* < .001) per 6 weeks.

Trauma-Related Shame Growth Model (TRSI)

For the TRSI, only the linear model converged, which prevented model comparison via LRT. Based on recommendations from Marsh, Hau, and Wen (2004), model fit for the TRSI linear model was acceptable (X^2 (*515*) = 23.21, *RMSEA* = .21 *CI*[.14, .29], *CFI* = .87, *TLI* = .62, Gamma Hat = .97). Scores decreased gradually from admission to discharge. The estimated TRSI intercept (at admission) was 41.01 (*SE* = .85, *p* < .001). The linear slope was significant at *p* <. 001. On average, TRSI scores decreased .77 units (*SE* = .04, *p* < .001) per 6 weeks.

Quality of Life Growth Model (Q-LES-Q-SF)

For the Q-LES-Q-SF, only the linear model converged, which prevented model comparison via LRT. Based on recommendations from Marsh, Hau, and Wen (2004), model fit for the Q-LES-Q-SF linear model was acceptable (X^2 (*512*) = 23.68, *RMSEA* = .21 *CI*[.14, .29], *CFI* = .92, *TLI* = .75, Gamma Hat = .97). Scores increased gradually from admission to discharge. The estimated Q-LES-Q-SF intercept (at admission) was 42.62 (*SE* = .73, *p* < .001). The linear slope was significant at *p* <. 001. On average, Q-LES-Q-SF scores increased .62 (*SE* = .18) units per 6 weeks.

Latent Growth Curve Regressions

After calculating intercepts and slopes for each variable under study, latent regressions were estimated to predict the intercept and slope of the PCL-5, Q-LES-Q-SF, VLQ, and TRSI, respectively. Per recommendations from Little (2013), because the tested models are theory-based and not exploratory, non-significant relationships were pruned, or set to zero, after which the pruned models were compared to previous models via LRT (χ^2). Model pruning continued until a non-significant chi-square result was found. Final, pruned model results are reported.

PTSD Symptoms Latent Growth Curve Regression Model

For the first model, the PCL-5 intercept and the three PCL-5 linear slopes were set as outcome variables. The SCS-SF intercept, the three SCS-SF linear slopes, the AAQ-II intercept, the AAQ linear slope, the ACR-C intercept, and the ARC-C linear slope were set as predictor variables.

PCL-5 Final Latent Growth Curve Regression Model

A pruned PCL-5 model was compared to the original model via LRT (**Δ** X^2 = 47.12, **Δ** *df* = 14, *p* < 0.001), after which the pruned model was retained. After model pruning, only the AAQ-II intercept (β = 1.98, *SE* = 0.18, *p* < 0.001) and the ACR-C intercept (β = 0.36, *SE* = 0.15, *p* = 0.018) were significant predictors of the PCL-5 intercept. Thus, we reject the null hypothesis of these intercept relationships being equal to zero. As the AAQ-II intercept increased by one standard deviation, the PCL-5 intercept increased by 0.97 deviations. As the ACR-C intercept increased by one standard deviation, the PCL-5 intercept increased by 0.16 standard deviations. For the first PCL-5 linear slope, after model pruning, only the first SCS-SF linear slope (β = − 1.58, *SE* = 0.13, *p* < 0.001) was a significant predictor. Thus, we reject the null hypothesis of this regression slope being equal to zero. As the first SCS-SF linear slope increased by one standard deviation, the first PCL-5 linear slope decreased by 0.91 standard deviations. For the second PCL-5 linear slope, after model pruning, only the second SCS-SF linear slope (β = − 1.60, *SE* = 0.21, *p* < 0.001) was a significant predictor. Thus, we rejected the null hypothesis of

this regression slope being equal to zero. As the second SCS-SF linear slope increased by one standard deviation, the second PCL-5 linear slope decreased by 0.87 standard deviations. For the third PCL-5 linear slope, after model pruning, only the third SCS-SF linear slope ($\beta = -1.81$, $SE = 0.61$, $p = 0.003$) was a significant predictor. Thus, we rejected the null hypothesis of this regression slope being equal to zero. As the third SCS-SF linear slope increased by one standard deviation, the third PCL-5 linear slope decreased by 1.02 standard deviations.

Valued Living Latent Growth Curve Regression Model

For the second model, the VLQ intercept and the three VLQ linear slopes were set as outcome variables. The SCS-SF intercept, the three SCS-SF linear slopes, the AAQ-II intercept, the AAQ linear slope, the ACR-C intercept, and the ARC-C linear slope were set as predictor variables.

VLQ Final Latent Growth Curve Regression Model

A pruned VLQ model was compared to the original model via LRT ($\mathbf{\Delta}\ X^2 = 66.58$, $\mathbf{\Delta}\ df = 20$, $p < 0.001$), after which the pruned model was retained. After model pruning, only the first SCS-SF linear slope ($\beta = 4.81$, $SE = 1.85$, $p = 0.009$) was a significant predictor of the VLQ intercept. Thus, we rejected the null hypothesis of these intercept relationships being equal to zero. As the first SCS-SF linear slope increased by one standard deviation, the VLQ intercept increased by 0.47 standard deviations.

For the first VLQ linear slope, after model pruning, the first SCS-SF slope ($\beta = 0.62$, $SE = 0.15$, $p < 0.001$), the AAQ-II intercept ($\beta = -0.07$, $SE = 0.03$, $p = 0.026$), and the AAQ-II linear slope ($\beta = -1.49$, $SE = 0.60$, $p = 0.013$) were significant predictors. Thus, we rejected the null hypothesis of these regression slopes being equal to zero. As the first SCS-SF linear slope increased by one standard deviation, the first VLQ linear slope increased by 0.41 units. As the AAQ-II intercept increased by one standard deviation, the first VLQ linear slope decreased by 0.18 standard deviations. As the AAQ-II linear slope increased by one standard deviation, the first VLQ linear slope decreased by 0.29 standard deviations. For the second VLQ linear slope, after model pruning, only the second SCS-SF linear slope ($\beta = 0.96$, $SE = 0.11$, $p < 0.001$) was a significant predictor. Thus, we rejected the null hypothesis of this regression slope being equal to zero. As the second SCS-SF linear slope increased by one standard deviation, the second VLQ linear slope decreased by 0.78 standard deviations. For the third VLQ linear slope, after model pruning, only the third SCS-SF linear slope ($\beta = 0.96$, $SE = 0.12$, $p < 0.001$) was a significant predictor. Thus, we rejected the null hypothesis of this regression slope being equal to zero. As the third SCS-SF linear slope increased by one standard deviation, the third VLQ linear slope increased by 0.79 standard deviations.

Quality of Life Latent Growth Curve Regression Model

For the third model, the Q-LES-Q-SF intercept and the Q-LES-Q-SF linear slope were set as outcome variables. The SCS-SF intercept, the three SCS-SF linear slopes, the AAQ-II intercept, the AAQ linear slope, the ACR-C intercept, and the ARC-C linear slope were set as predictor variables.

Q-LES-Q-SF Final Latent Growth Curve Regression Model

A pruned PCL-5 model was compared to the original model via LRT ($\mathbf{\Delta}\ X^2 = 40.66$, $\mathbf{\Delta}\ df = 10$, $p < 0.001$), after which the pruned model was retained. After model pruning, only the SCS-SF third linear slope ($\beta = 2.08$, $SE = 1.04$ $p = 0.045$) and the AAQ-II intercept ($\beta = -2.08$, $SE = 0.23$, $p < 0.001$) were significant predictors of the Q-LES-Q-SF intercept. Thus, we rejected the null hypothesis of these intercept

relationships being equal to zero. As the third SCS-SF linear slope increased by one standard deviation, the Q-LES-Q-SF intercept increased by 0.24 standard deviations. As the AAQ-II intercept increased by one standard deviation, the Q-LES-Q-SF intercept decreased by 0.93 standard deviations.

For the Q-LES-Q-SF linear slope, after model pruning, only the AAQ-II linear slope ($\beta = -1.00$, $SE = 0.20$, $p < 0.001$) was a significant predictor. Thus, we rejected the null hypothesis of this regression slope being equal to zero. As the AAQ-II linear slope increased by one standard deviation, the Q-LES-Q-SF linear slope decreased by 0.62 standard deviations.

Trauma-Related Shame Latent Growth Curve Regression Model

For the fourth model, the TRSI intercept and the TRSI linear slope were set as outcome variables. The SCS-SF intercept, the three SCS-SF linear slopes, the AAQ-II intercept, the AAQ linear slope, the ACR-C intercept, and the ARC-C linear slope were set as predictor variables.

TRSI Final Latent Growth Curve Regression Model

A pruned PCL-5 model was compared to the original model via LRT ($\mathbf{\Delta}\ X^2 = 14.67$, $\mathbf{\Delta}\ df = 10$, $p = 0.145$), after which the original model was retained. In the original model, the second SCS-SF linear slope ($\beta = -8.49$, $SE = 4.07$, $p = 0.037$), the third SCS-SF linear slope ($\beta = -9.39$, $SE = 4.15$, $p = 0.024$), and the AAQ-II intercept ($\beta = 2.10$, $SE = 0.20$, $p < 0.001$) were significant predictors of the TRSI intercept. Thus, we rejected the null hypothesis of these intercept relationships being equal to zero. As the second SCS-SF linear slope increased by one standard deviation, the TRSI intercept decreased by 0.84 standard deviations. As the third SCS-SF linear slope increased by one standard deviation, the TRSI intercept decreased by 0.91 standard deviations. As the AAQ-II intercept increased by one standard deviation, the TRSI intercept increased by 0.74 standard deviations.

For the TRSI linear slope, only the SCS-SF intercept ($\beta = 0.01$, $SE = 0.01$, $p = 0.010$), AAQ-II linear slope ($\beta = 0.88$, $SE = 0.16$, $p < 0.001$), and the ACR-C linear slope ($\beta = -2.50$, $SE = 0.61$, $p < 0.001$) were significant predictors. Thus, we rejected the null hypothesis of this regression slope being equal to zero. As the SCS-SF intercept increased by one standard deviation, the TRSI linear slope increased by 0.13 standard deviations. As the AAQ-II linear slope increased by one standard deviation, the TRSI linear slope increased by 0.40 standard deviations. As the ACR-C linear slope increased by one standard deviation, the TRSI linear slope decreased by 0.28 standard deviations.

Discussion

The growth curve results, especially from the three-piece spline models, provide important information concerning the time frames during which patients achieved the most significant symptom changes. For PTSD symptom severity, valued living, and self-compassion, the greatest symptom change occurred during the first 6 weeks of treatment. For valued living and self-compassion, the first week to 2 weeks of treatment resulted in little to no improvement, though these trends reversed dramatically during the next 3 to 4 weeks of intervention. Treatment results from weeks 6 through 16 showed consistent, yet much more gradual, symptom change on all three measures.

Because the third linear slope within each spline model was non-significant, it is difficult to draw any conclusions concerning rates of change in the major study variables after week 16. This is likely because the typical length of stay in the program is approximately 12 weeks, and sample size decreases

when approaching week 16. However, an examination of plotted values allows for some tentative observations. After week 16, PTSD symptoms appeared to continue declining gradually, but self-compassion and valued living both increased at a steeper rate than was seen between week 6 and week 16. While it is difficult to draw conclusions concerning the reasons behind these trends, it is possible that, with respect to PTSD symptoms, a high dose of treatment engagement (i.e., 6–7 h of programming per day) leads to near-immediate benefit that continues over the entire course of partial hospitalization programming. These early gains were then translated into gradual, consistent improvements in PTSD symptoms, self-compassion, and valued living over the rest of treatment.

These results are consistent with previous studies linking substantial early gains with improved treatment outcomes and engagement in exposure-based therapy for PTSD (Doane et al., 2010). In this study, the initial reduction in PTSD symptoms followed by improvements in processes of well-being may reflect a pattern found by Schnurr and Lunney (2016), who demonstrated that the best predictor of quality of life improvements for people who engaged in exposure therapy for PTSD was the remission of the PTSD diagnosis. This pattern has also been found in partial hospitalization programs that address serious mental illness alongside PTSD (Slade et al., 2017). Additionally, studies of mindfulness-based interventions in PTSD populations, which form a core component of self-compassion and acceptance-based treatments, have shown evidence of consistent improvement over time in both symptom reduction and quality of life (Earley et al., 2014; Kearney et al., 2012).

It is important to note that these results are unique in that few, if any, published treatment approaches integrate evidence-based PTSD interventions (e.g., PE, CPT) with mindfulness, compassion, or acceptance-based interventions; for those that do, the included assessments are limited to measures of symptom severity (e.g., Zalta et al., 2018). These results suggest that symptom reduction and improvements in processes of well-being do not follow the same trajectory, and that a narrow focus on symptom reduction might lead clinicians to miss potentially important impacts of patient quality of life and well-being. This also underscores the need for follow-up research (e.g., after 2 months and 6 months) to assess how treatment impacted patients' long-term well-being, as there is concerningly little research to point clinicians in the direction of interventions that result in sustained improvements in both PTSD symptoms and well-being. The existing research in this area points to targeting a broad range of deficits and comorbid diagnoses in PTSD treatment (Richardson et al., 2014), loss of diagnosis (Schnurr & Lunney, 2016), and continued engagement in core treatment elements (e.g., mindful movement; Rhodes et al., 2016) as predictors of long-term maintenance of treatment gains. While this empirical literature must be expanded, it may be that the program's early emphasis on mindfulness, compassion, and acceptance-based practice allowed for the gradual development of a present-moment-focused, non-judgmental view of the self and others. Previous literature has suggested that cultivating a mindful approach characterized by compassion for the self and others might augment exposure-based approaches because mindfulness can help patients develop a practice of willingly approaching their difficult or traumatic experiences without the use of covert avoidance or safety behaviors (Follette et al, 2006). It is important to note that these are tentative implications that could not be tested within the scope of this project.

In addition to the specific findings regarding the timing of change in PTSD symptom severity, valued living, and self-compassion, these results also provide the basis for several general conclusions. The

surprising robustness of the effect of self-compassion, as well as the strong associations between baseline psychological inflexibility and the outcome variables, is important to note. While self-compassion and psychological inflexibility were expected to be strongly related to the outcome variables, the lack of effect from interpersonal courage was somewhat surprising. While the research literature supports the importance of interpersonal courage and connection in healing from trauma (Cloitre, 2015), it may be that strengthening psychological flexibility and self-compassion plays a more prominent role in successful treatment. It is also possible that increased treatment emphasis on interpersonal connection, potentially via groups explicitly focused on interpersonal engagement and skill building, might result in a more robust effect on PTSD symptoms and quality of life. Previous research has suggested this trend (e.g., Au et al., 2017), and it is likely that the lack of significant change in interpersonal courage impeded comparison of the effect of interpersonal connection to the development of self-compassion and psychological flexibility. Even so, the finding that the within-person rate of change in interpersonal courage predicted the within-person rate of change in trauma-related shame is encouraging, as interventions focused on trauma-related shame have emphasized the importance of sharing seemingly "broken" or "wrong" parts of themselves with trusted others (Lee et al., 2001). It should be noted that these assertions are tentative because it is difficult to draw such construct-based conclusions from a new scale, and additional research using the Acceptance, Courage, and Responsiveness Scale is needed.

Taken together, these findings suggest that psychological inflexibility, self-compassion, and interpersonal courage appear to be important in trauma-focused treatment, albeit in different ways. Over the course of treatment, self-compassion appeared strongly linked to the reduction in PTSD symptom severity and an increase in valued living, while psychological inflexibility emerged as an important predictor of change in quality of life and trauma-related shame. When working specifically with trauma-related shame, interpersonal courage also appears to play an important role. Thus, effective trauma treatment is characterized by the development of compassionate and flexible connections with the self and others (e.g., ACT, DBT), along with simultaneous engagement in evidence-based mechanisms of PTSD symptom reduction (i.e., exposure).

That we failed to reject several hypotheses demonstrates the limitations of current knowledge of the constructs under study and how they present in patients with PTSD, especially with respect to constructs that are not traditionally assessed in PTSD trials (e.g., self-compassion, valued living). It is important to note that the adjunctive approaches to treatment used in the program (e.g., ACT, DBT) under study are rooted in mindful, non-judgmental awareness, suggesting the potential importance of integrating a formal mindfulness component to intensive PTSD treatment. A fruitful direction for evidence-based trauma treatment may be to expand its definition to include a focus on cultivating self-compassion, psychological flexibility, interpersonal courage, and valued living.

Limitations and Future Directions

While the rich data analyzed in this study was obtained within a community-based clinical treatment program, the study's design prevented the inclusion of a control group. Additionally, because the results were pooled across several treatment sites operating in different locations (albeit with the same supervisor and training program), it is likely that treatment approaches varied slightly across clinicians and sites. This limited the ability to make causal inferences about the impact of various

treatment elements (e.g., PE vs. DBT vs. ACT) and to formally assess treatment fidelity or consistency across program sites. With respect to generalizability, the results were obtained from multiple PTSD partial hospitalization programs with largely White and female patients who indicated severe levels of symptom severity and comorbidity. As such, results may not be generalizable to PTSD treatment delivered in a weekly outpatient format, trauma-exposed samples with less severe symptomatology, or more demographically diverse samples.

The final strengths and limitations of this study have to do with its approach to data analysis. While a key advantage of this study was its use of longitudinal analysis with multiple timepoints, because data were drawn from a clinical sample, treatment duration varied between patients. Ideally, all measures would be assessed at the same timepoints to assess growth over equivalent amount of time. Additionally, the combination of the spline models calculated for weekly measures and the single linear models calculated for the non-weekly measures may have resulted in a loss of specificity in analysis. While this did not prevent the ability to draw inferences from these data, future studies would likely benefit from confirming these results using both controlled studies and symmetrical data points for each growth curve.

References

Au, T. M., Sauer-Zavala, S., King, M. W., Petrocchi, N., Barlow, D. H., & Litz, B. T. (2017). Compassion-based therapy for trauma-related shame and posttraumatic stress: Initial evaluation using a multiple baseline design. *Behavior Therapy, 48*(2), 207–221. https://0-doi-org.libus.csd.mu.edu/10.1016/j.beth.2016.11.012

Barlow, D. H. (2014). *Clinical handbook of psychological disorders: A step-by-step treatment manual*. Guilford.

Beauducel, A., & Wittmann, W. W. (2005). Simulation study on fit indexes in CFA based on data with slightly distorted simple structure. *Structural Equation Modeling, 12*, 41–75. https://0-doi-org.libus.csd.mu.edu/10.1207/s15328007sem1201_3

Benjet, C., Bromet, E., Karam, E. G., Kessler, R. C., McLaughlin, K. A., Ruscio, A. M., Shahly, V., Stein, D. J., Petukhova, M., Alonso, J., & Alonso, J. (2016). The epidemiology of traumatic event exposure worldwide: Results from the World Mental Health Survey Consortium. *Psychological Medicine, 46*(2), 327–343.

Blevins, C. A., Weathers, F. W., Davis, M. T., Witte, T. K., & Domino, J. L. (2015). The Posttraumatic Stress Disorder Checklist for *DSM-5* (PCL-5): Development and initial psychometric evaluation. *Journal of Traumatic Stress, 28*, 489–498. https://0-doi-org.libus.csd.mu.edu/10.1002/jts.22059

Bluett, E. J. (2018). Effectiveness of acceptance and commitment therapy as a treatment for posttraumatic stress disorder and moral injury. In *Dissertation Abstracts International: Section B: The Sciences and Engineering* (Vol. 78, Issue 9-B(E)).

Boals, A., & Murrell, A. R. (2016). I am > trauma: Experimentally reducing event centrality and PTSD symptoms in a clinical trial. *Journal of Loss and Trauma, 21*(6), 471–483. https://0-doi-org.libus.csd.mu.edu/10.1080/15325024.2015.1117930

Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., Waltz, T., & Zettle, R. D. (2011). Preliminary psychometric properties of the Acceptance and Action Questionnaire-II: A revised measure of psychological inflexibility and experiential avoidance. *Behavior Therapy, 42*(4), 676–688. https://0-doi-org.libus.csd.mu.edu/10.1016/j.beth.2011.03.007

Boyd, J. E., Lanius, R. A., & McKinnon, M. C. (2018). Mindfulness-based treatments for posttraumatic stress disorder: A review of the treatment literature and neurobiological evidence. *Journal of Psychiatry & Neuroscience: JPN, 43*(1), 7–25. https://0-doi-org.libus.csd.mu.edu/10.1503/jpn.170021

Brown, G. S., Burlingame, G. M., Lambert, M. J., Jones, E., & Vaccaro, J. (2001). Pushing the quality envelope: A new outcomes management system. *Psychiatric Services, 52*(7), 925–934. https://0-doi-org.libus.csd.mu.edu/10.1176/appi.ps.52.7.925

Castilho, P., Pinto-Gouveia, J., & Duarte, J. (2015). Evaluating the multifactor structure of the long and short versions of the self-compassion scale in a clinical sample. *Journal of Clinical Psychology, 71*(9), 856–870. https://0-doi-org.libus.csd.mu.edu/10.1002/jclp.22187

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9*, 233–255. https://0-doi-org.libus.csd.mu.edu/10.1207/S15328007SEM0902_5

Cloitre, M. (2015). The "one size fits all" approach to trauma treatment: Should we be satisfied? *European Journal of Psychotraumatology, 6*(1), 27344. https://0-doi-org.libus.csd.mu.edu/10.3402/ejpt.v6.27344

Cloitre, M., Miranda, R., Stovall-McClough, K. C., & Han, H. (2005). Beyond PTSD: Emotion regulation and interpersonal problems as predictors of functional impairment in survivors of childhood abuse. *Behavior Therapy, 36*(2), 119–124. https://0-doi-org.libus.csd.mu.edu/10.1016/S0005-7894(05)80060-7

Cusack, K., Jonas, D. E., Forneris, C. A., Wines, C., Sonis, J., Middleton, J. C., Feltner, C., Brownley, K. A., Olmsted, K. R., Greenblatt, A., & Weil, A. (2016). Psychological treatments for adults with posttraumatic stress disorder: A systematic review and meta-analysis. *Clinical Psychology Review, 43*, 128–141. https://0-doi-org.libus.csd.mu.edu/10.1016/j.cpr.2015.10.003

Dahm, K. A., Meyer, E. C., Neff, K. D., Kimbrel, N. A., Gulliver, S. B., & Morissette, S. B. (2015). Mindfulness, self-compassion, posttraumatic stress disorder symptoms, and functional disability in U.S. Iraq and Afghanistan war veterans: Self-compassion and mindfulness in U.S. war veterans. *Journal of Traumatic Stress*, *28*(5), 460–464. https://0-doi-org.libus.csd.mu.edu/10.1002/jts.22045

DeCou, C. R., Mahoney, C. T., Kaplan, S. P., & Lynch, S. M. (2019). Coping self-efficacy and trauma-related shame mediate the association between negative social reactions to sexual assault and PTSD symptoms. *Psychological Trauma: Theory, Research, Practice, and Policy, 11*(1), 51.

Doane, L. S., Feeny, N. C., & Zoellner, L. A. (2010). A preliminary investigation of sudden gains in exposure therapy for PTSD. *Behaviour Research and Therapy, 48*(6), 555–560.

Donahue, J. J., Huggins, J., & Marrow, T. (2017). Posttraumatic stress symptom severity and functional impairment in a trauma-exposed sample: A preliminary examination into the moderating role of valued living. *Journal of Contextual Behavioral Science, 6*(1), 13–20.

Earley, M. D., Chesney, M. A., Frye, J., Greene, P. A., Berman, B., & Kimbrough, E. (2014). Mindfulness intervention for child abuse survivors: A 2.5-year follow-up. *Journal of Clinical Psychology*, *70*(10), 933–941.

Ehlers, A., Bisson, J., Clark, D. M., Creamer, M., Pilling, S., Richards, D., Schnurr, P. P., Turner, S., & Yule, W. (2010). Do all psychological treatments really work the same in posttraumatic stress disorder? *Clinical Psychology Review, 30*(2), 269–276. https://0-doi-org.libus.csd.mu.edu/10.1016/j.cpr.2009.12.001

Enders, C. K. (2010). *Applied missing data analysis*. Guilford Press.

Endicott, J., Nee, J., Harrison, W., & Blumenthal, R. (1993). Quality of Life Enjoyment and Satisfaction Questionnaire: A new measure. *Psychopharmacology Bulletin., 29*(2), 321–326.

Fan, X., & Sivo, S. A. (2007). Sensitivity of fit indices to model misspecification and model types. *Multivariate Behavioral Research, 42*(3), 509–529.

Follette, V., Palm, K. M., & Pearson, A. N. (2006). Mindfulness and trauma: Implications for treatment. *Journal of Rational-Emotive and Cognitive-Behavior Therapy, 24*(1), 45–61.

Fortney, J. C., Unützer, J., Wrenn, G., Pyne, J. M., Smith, G. R., Schoenbaum, M., & Harbin, H. T. (2017). A tipping point for measurement-based care. *Psychiatric Services, 68*(2), 179–188. https://0-doi-org.libus.csd.mu.edu/10.1176/appi.ps.201500439

Frank, D. W., Dewitt, M., Hudgens-Haney, M., Schaeffer, D. J., Ball, B. H., Schwarz, N. F., Hussein, A. A., Smart, L. M., & Sabatinelli, D. (2014). Emotion regulation: Quantitative meta-analysis of functional activation and deactivation. *Neuroscience & Biobehavioral Reviews, 45*, 202–211. https://0-doi-org.libus.csd.mu.edu/10.1016/j.neubiorev.2014.06.010

Garnier-Villarreal, M., & Jorgensen, T. D. (2020). Adapting fit indices for Bayesian structural equation modeling: Comparison to maximum likelihood. *Psychological Methods*, *25*(1), 46–70. https://0-doi-org.libus.csd.mu.edu/10.1037/met0000224

Gilbert, P. (2010). *The compassionate mind: A new approach to life's challenges*. New Harbinger Publications.

Gloster, A. T., Klotsche, J., Chaker, S., Hummel, K. V., & Hoyer, J. (2011). Assessing psychological flexibility: What does it add above and beyond existing constructs? *Psychological Assessment, 23*(4), 970–982. https://0-doi-org.libus.csd.mu.edu/10.1037/a0024135

Gratz, K. L., & Tull, M. T. (2010). Emotion regulation as a mechanism of change in acceptance-and mindfulness-based treatments. *Assessing mindfulness and acceptance processes in clients: Illuminating the theory and practice of change*, 107–133.

Grimm, K. J., Ram, N., & Estabrook, R. (2016). *Growth modeling: Structural equation and multilevel modeling approaches*. Guilford Publications.

Gu, J., Strauss, C., Bond, R., & Cavanagh, K. (2015). How do mindfulness-based cognitive therapy and mindfulness-based stress reduction improve mental health and wellbeing? A systematic review and meta-analysis of mediation studies. *Clinical Psychology Review, 37*, 1–12. https://0-doi-org.libus.csd.mu.edu/10.1016/j.cpr.2015.01.006

Hayes, S. C. (2019). Acceptance and commitment therapy: Towards a unified model of behavior change. *World Psychiatry, 18*(2), 226.

Hayes, S. C., & Hofmann, S. G. (2018). *Process-based CBT: The science and core clinical competencies of Cognitive Behavioral Therapy*. New Harbinger Publications.

Hiraoka, R., Meyer, E. C., Kimbrel, N. A., DeBeer, B. B., Gulliver, S. B., & Morissette, S. B. (2015). Self-compassion as a prospective predictor of PTSD symptom severity among trauma-exposed U.S. Iraq and Afghanistan war veterans: Self-compassion and PTSD symptoms. *Journal of Traumatic Stress, 28*(2), 127–133. https://0-doi-org.libus.csd.mu.edu/10.1002/jts.21995

Hoffart, A., Øktedalen, T., & Langkaas, T. F. (2015). Self-compassion influences PTSD symptoms in the process of change in trauma-focused cognitive-behavioral therapies: A study of within-person processes. *Frontiers in Psychology*, *6*. https://0-doi-org.libus.csd.mu.edu/10.3389/fpsyg.2015.01273

Hofmann, S. G., & Barlow, D. H. (2014). Evidence-based psychological interventions and the common factors approach: The beginnings of a rapprochement? *Psychotherapy, 51*(4), 510–513. https://0-doi-org.libus.csd.mu.edu/10.1037/a0037045

Jordan, J. V. (1990). *Courage in connection: Conflict, compassion, creativity*. Stone Center for Developmental Services and Studies, Wellesley College.

Kearney, D. J., McDermott, K., Malte, C., Martinez, M., & Simpson, T. L. (2012). Association of participation in a mindfulness program with measures of PTSD, depression and quality of life in a veteran sample. *Journal of Clinical Psychology, 68*(1), 101–116.

Kelly, A. C., Carter, J. C., & Borairi, S. (2014). Are improvements in shame and self-compassion early in eating disorders treatment associated with better patient outcomes? *International Journal of Eating Disorders, 47*(1), 54–64. https://0-doi-org.libus.csd.mu.edu/10.1002/eat.22196

Kohlenberg, R. J., Tsai, M., Kuczynski, A. M., Rae, J. R., Lagbas, E., Lo, J., & Kanter, J. W. (2015). A brief, interpersonally oriented mindfulness intervention incorporating Functional Analytic Psychotherapy' s model of awareness, courage and love. *Journal of Contextual Behavioral Science, 4*(2), 107–111.

Kuczynski, A., Kanter, J., Wetterneck, C. T., Olaz, F., Singh, R. S., Lee, E. B., Stowe, T. J., Mazzucchelli, T. G., Mier-Chairez, J., Maitland, D. W., Manbeck, K. E., & Corey, M. (2020). Measuring intimacy as a contextual behavioral process: Psychometric Development and Evaluation of the Awareness, Courage, and Responsiveness Scale. *Journal of Contextual Behavioral Science, 16*, 199–208. https://0-doi-org.libus.csd.mu.edu/10.1016/j.jcbs.2019.02.004

Lee, D. A., Scragg, P., & Turner, S. (2001). The role of shame and guilt in traumatic events: A clinical model of shame-based and guilt-based PTSD. *British Journal of Medical Psychology; Leicester*, *74*, 451–466.

Levin, M. E., Hildebrandt, M. J., Lillis, J., & Hayes, S. C. (2012). The impact of treatment components suggested by the psychological flexibility model: A meta-analysis of laboratory-based component studies. *Behavior Therapy, 43*(4), 741–756.

Little, T. D. (2013). *Longitudinal structural equation modeling*. Guilford press.

Mak, W. W., & Cheung, R. Y. (2010). Self-stigma among concealable minorities in Hong Kong: Conceptualization and unified measurement. *American Journal of Orthopsychiatry, 80*(2), 267.

Mak, W. W., Chio, F. H., Chong, K. S., & Law, R. W. (2021). From mindfulness to personal recovery: The mediating roles of self-warmth, psychological flexibility, and valued living. *Mindfulness, 12*(4), 994–1001.

Markowitz, J. C., Petkova, E., Neria, Y., Van Meter, P. E., Zhao, Y., Hembree, E., Lovell, K., Biyanova, T., & Marshall, R. D. (2015). Is exposure necessary? A randomized clinical trial of interpersonal psychotherapy for PTSD. *American Journal of Psychiatry, 172*(5), 430–440.

Marsh, H. W., Hau, K., & Wen. . (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling, 11*(3), 320–341.

McGuigan, H. A. (2013). *PTSD And depression in military members and recommendations for program evaluation of evidence-based practice (Doctoral dissertation)*. The University of Arizona.

Najavits, L. M., & Hien, D. (2013). Helping vulnerable populations: A comprehensive review of the treatment outcome literature on substance use disorder and PTSD: Review of treatments. *Journal of Clinical Psychology, 69*(5), 433–479. https://0-doi-org.libus.csd.mu.edu/10.1002/jclp.21980

Neff, K. (2003). Self-Compassion: An alternative conceptualization of a healthy attitude toward oneself. *Self and Identity, 2*(2), 85–101. https://0-doi-org.libus.csd.mu.edu/10.1080/15298860309032

Neff, K. D., & Dahm, K. A. (2015). Self-compassion: What it is, what it does, and how it relates to mindfulness. In B. D. Ostafin, M. D. Robinson, & B. P. Meier (Eds.), *Handbook of mindfulness and self-regulation* (pp. 121–137). New York: Springer.

Øktedalen, T., Hagtvet, K. A., Hoffart, A., Langkaas, T. F., & Smucker, M. (2014). The Trauma-related Shame Inventory: Measuring trauma-related shame among patients with PTSD. *Journal of Psychopathology and Behavioral Assessment, 36*, 600–615. https://0-doi-org.libus.csd.mu.edu/10.1007/s10862-014-9422-5

Peters, G. J. Y. (2014). The alpha and the omega of scale reliability and validity: Why and how to abandon Cronbach's alpha and the route towards more comprehensive assessment of scale quality. *European Health Psychologist, 16*, 56–69.

Prescott, D. S., Maeschalck, C. L., & Miller, S. D. (2017). *Feedback-informed treatment in clinical practice: Reaching for excellence*. American Psychological Association.

Raes, F., Pommier, E., Neff, K. D., & Van Gucht, D. (2011). Construction and factorial validation of a short form of the Self-Compassion Scale. *Clinical Psychology & Psychotherapy, 18*(3), 250–255. https://doi.org/10.1002/cpp.702

Richardson, J. D., Contractor, A. A., Armour, C., Cyr, K. S., Elhai, J. D., & Sareen, J. (2014). Predictors of long-term treatment outcome in combat and peacekeeping veterans with military-related PTSD. *The Journal of Clinical Psychiatry, 75*(11), 1299–1305.

Riendeau, R. P., Sullivan, J. L., Meterko, M., Stolzmann, K., Williamson, A. K., Miller, C. J., Kim, B., & Bauer, M. S. (2018). Factor structure of the Q-LES-Q short form in an enrolled mental health clinic population. *Quality of Life Research, 27*(11), 2953–2964.

Rhodes, A., Spinazzola, J., & van der Kolk, B. (2016). Yoga for adult women with chronic PTSD: A long-term follow-up study. *The Journal of Alternative and Complementary Medicine, 22*(3), 189–196.

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, *48*(2), 1–36. http://www.jstatsoft.org/v48/i02/.

Roush, J. F., Cukrowicz, K. C., Mitchell, S. M., Brown, S. L., & Seymour, N. E. (2018). Valued living, life fulfillment, and suicide ideation among psychiatric inpatients: The mediating role of thwarted interpersonal needs. *Journal of Contextual Behavioral Science, 7*, 8–14.

Schoenleber, M., & Gratz, K. L. (2018). Self-acceptance group therapy: A transdiagnostic, cognitive-behavioral treatment for shame. *Cognitive and Behavioral Practice, 25*(1), 75–86.

Schnurr, P. P., & Lunney, C. A. (2016). Symptom benchmarks of improved quality of life in PTSD. *Depression and Anxiety, 33*(3), 247–255.

Seligowski, A. V., Miron, L. R., & Orcutt, H. K. (2015). Relations among self-compassion, PTSD symptoms, and psychological health in a trauma-exposed sample. *Mindfulness, 6*(5), 1033–1041. https://0-doi-org.libus.csd.mu.edu/10.1007/s12671-014-0351-x

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62*(3), 373–386.

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., Hergueta, T., Baker, R., & Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (MINI): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry, 59*(20), 22–33.

Sijtsma, K. (2009). On the use, the misuse, and the very limited usefulness of Cronbach's alpha. *Psychometrika, 74*(1), 107.

Slade, E. P., Gottlieb, J. D., Lu, W., Yanos, P. T., Rosenberg, S., Silverstein, S. M., Minsky, S. K., & Mueser, K. T. (2017). Cost-effectiveness of a PTSD intervention tailored for individuals with severe mental illness. *Psychiatric Services, 68*(12), 1225–1231.

Spinazzola, J., Blaustein, M., & van der Kolk, B. A. (2005). Posttraumatic stress disorder treatment outcome research: The study of unrepresentative samples? *Journal of Traumatic Stress, 18*(5), 425–436. https://0-doi-org.libus.csd.mu.edu/10.1002/jts.20050

Steenkamp, M. M., & Litz, B. T. (2013). Psychotherapy for military-related posttraumatic stress disorder: Review of the evidence. *Clinical Psychology Review, 33*(1), 45–53. https://0-doi-org.libus.csd.mu.edu/10.1016/j.cpr.2012.10.002

van der Kolk, B. (2000). Posttraumatic stress disorder and the nature of trauma. *Dialogues in Clinical Neuroscience, 2*(1), 7.

Wampold, B. E., Imel, Z. E., Laska, K. M., Benish, S., Miller, S. D., Flűckiger, C., Del Re, A. C., Baardseth, T. P., & Budge, S. (2010). Determining what works in the treatment of PTSD. *Clinical Psychology Review, 30*(8), 923–933. https://0-doi-org.libus.csd.mu.edu/10.1016/j.cpr.2010.06.005

Weathers, F.W., Blake, D.D., Schnurr, P.P., Kaloupek, D.G., Marx, B.P., & Keane, T.M. (2013). *The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5)*. [Assessment] Available from www.ptsd.va.gov.

Weathers, F. W., Blake, D. D., Schnurr, P. P., Kaloupek, D. G., Marx, B. P., & Keane, T. M. (2013). *The Life Events Checklist for DSM-5 (LEC-5)*. Instrument available from the National Center for PTSD at www.ptsd.va.gov

Weathers, F. W., Litz, B. T., Keane, T. M., Palmieri, P. A., Marx, B. P., & Schnurr, P. P. (2013). The PTSD Checklist for *DSM-5* (PCL-5). Scale available from the National Center for PTSD at www.ptsd.va.gov.

Wilson, K. G., Sandoz, E. K., Kitchens, J., & Roberts, M. E. (2010). The Valued Living Questionnaire: Defining and measuring valued action within a behavioral framework. *The Psychological Record, 60*, 249–272.

Yehuda, R., Hoge, C. W., McFarlane, A. C., Vermetten, E., Lanius, R. A., Nievergelt, C. M., Hobfoll, S. E., Koenen, K. C., Neylan, T. C., & Hyman, S. E. (2015). Post-traumatic stress disorder. *Nature Reviews Disease Primers*, 15057. https://0-doi-org.libus.csd.mu.edu/10.1038/nrdp.2015.57

Zalta, A. K., Held, P., Smith, D. L., Klassen, B. J., Lofgreen, A. M., Normand, P. S., Brenna, M. B., Rydberg, T. S., Boley, R. A., Pollack, M. H., & Karnik, N. S. (2018). Evaluating patterns and predictors of symptom change during a three-week intensive outpatient treatment for veterans with PTSD. *BMC Psychiatry, 18*(1), 1–15.

Contributions

PPG: designed and executed the study, conducted the data analyses, and wrote the paper. TPM: collaborated with the design and writing of the study. MGV: assisted with data analysis and wrote part of the results. LKF: collaborated in the writing and editing of the final manuscript.

CTW: collaborated with study design, execution, and paper editing.

Ethics Statement

This study was approved by the Marquette University and Rogers Behavioral Health Institutional Review Boards (IRBs). All aspects of the study adhered to the approved IRB protocols.

Informed Consent

All participants in this study signed an informed consent waiver for their data to be used for research purposes.

Conflict of Interest

The authors declare no competing interests.