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Psychophysiological Predictors of Working Alliance Among Treatment-Seeking Women With Complex Trauma Exposure

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Research has established that trauma-related symptoms may impede the formation of a strong working alliance (i.e., interpersonal connection, trust, and shared goals between therapist and client). As the alliance is critical in trauma-focused therapy, we studied how clients' pretherapy factors, including symptoms and psychophysiological arousal, predict treatment alliance. We examined symptoms and physiological responses in 27 women who had exposure to extreme interpersonal violence; all of whom were enrolled in therapy. All had symptoms consistent with a diagnosis of posttraumatic stress disorder. Clients completed measures of working alliance and were assessed before and after treatment on measures of symptoms and autonomic arousal. Autonomic assessment included measures of skin conductance and respiratory sinus arrhythmia (RSA), taken during baseline, while viewing positive and then trauma-related slides, and during recovery. Higher alliance ratings were predicted by lower pretherapy skin conductance during trauma slides ($r = -.41$, $p = .049$) and recovery ($r = -.44$, $p = .047$) and higher RSA during baseline ($r = .47$, $p = .027$) and positive slides ($r = .43$, $p = .044$). Findings remained significant even after partialling pretherapy symptoms. These data on a high-need but understudied population suggest that sympathetic and parasympathetic arousal may help traumatized clients effectively engage in therapy, further supporting the role of parasympathetic activity in social engagement.

The working alliance, broadly defined as the cooperative relationship between a client and therapist, has consistently demonstrated a moderate but robust positive relationship with therapy outcome across client characteristics and treatment modalities (Martin, Garske, & Davis, 2000). Because of the many benefits of the working alliance and its consistent influence on therapeutic outcomes, fostering and maintaining the working alliance is viewed as a crucial aspect of the therapy. Research has begun to examine the individual factors that predict alliance strength, such as a client's willingness to seek help (Calsyn, Morse, & Lemming, 2006) and the therapist's perceived credibility (Wei & Heppner, 2005). Given the well-documented relationship between the working alliance and therapy outcome, individuals who experience difficulty forming or maintaining a working alliance may be at a considerable disadvantage in therapy. Our goal here was to provide insight into client characteristics that may facilitate the development of alliance.

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Individuals who have a history of complex trauma, broadly defined as the cumulative effect of chronic incidents of interpersonal abuse (Courtois, 2008), may be at a particular disadvantage, as complex trauma impacts the victim in several ways pertinent to the working alliance. For example, Eltz, Shirk, and Sarlin (1995) found that exposure to and severity of maltreatment impeded the development of working alliance in adolescents. Individuals with a history of complex trauma may be mistrustful of others, holding negative beliefs and expectations about social relationships (Keller, Zoellner, & Feeny, 2010). Trauma survivors are also known to display generalized impairments in interpersonal functioning, independent from diagnosis (Briere, 1988; DiLillo, 2001; Roth, Newman, Pelcovitz, van der Kolk, & Mandel, 1997). Some trauma survivors also demonstrate heightened autonomic reactivity to emotionally threatening situations (Pole, 2007), and experience difficulty in regulating their emotions (Ford, Courtois, Steele, Hart, & Nijenhuis, 2005). Such difficulties would likely impact a client's ability to form a trusting emotional relationship with their therapist (Ford et al., 2005). This could be particularly detrimental to a trauma survivor because a strong therapeutic alliance has the potential to disprove the client's negative expectations that others will invariably hurt them (Safran, Crocker, McMain, & Murray, 1990).

A strong alliance is also known to be a mediator of key psychotherapy processes and outcomes. Keller et al. (2010) examined the relationship between trauma and working

alliance among individuals with posttraumatic stress disorder (PTSD), and found that the strength of working alliance positively predicted the client's treatment adherence. Similarly, in a sample of women in psychotherapy for PTSD related to childhood abuse, Cloitre, Stovall-McClough, Miranda, and Chemtob (2004) found that strength of working alliance established during the first weeks of treatment was a significant predictor of increased affect regulation and PTSD symptom reduction after therapy.

The mechanisms associated with trauma exposure that may disrupt alliance could benefit from elucidation. One such factor may be autonomic arousal, which indexes factors such as response inhibition, capacity for social engagement, and reactivity to perceived threat. The autonomic nervous system (ANS) consists of two main branches: the sympathetic nervous system (SNS), which mobilizes the body in threatening situations, and the parasympathetic nervous system (PNS), which helps return the body to a resting state of arousal (Berntson, Cacioppo, & Quigley, 1993), and is related to both better social functioning and capacity to inhibit reactions (Thayer & Lane, 2000). Though no single psychophysiological measure perfectly differentiates SNS from PNS activity, skin conductance level (SCL), derived from sweat gland activity, has been used as an approximate index of SNS activity, and respiratory sinus arrhythmia (RSA), derived from fluctuations in heart rate, has been used as an approximate index of PNS activity (Berntson et al., 1993).

Autonomic psychophysiology is relevant to many processes that are of importance to psychotherapy. For instance, both RSA and SCL have been implicated in the quality of social interactions and engagement (Thayer & Lane, 2000). Skin conductance is known to increase in threatening situations (Ohman, 2003), whereas RSA increases in safe social situations and decreases in response to stress (Butler, Wilhelm, & Gross, 2006). RSA is also thought to play a role more broadly in social engagement, with higher RSA predicting more social engagement and more facial expressivity (Porges, 2011). As the working alliance can be thought of as a process of dyadic social engagement, it is plausible that these physiological markers may serve as predictors of which clients are likely (or unlikely) to develop a strong working alliance at the onset of therapy. Trauma-focused therapy tends to evoke reminders of traumatic situations, which makes the client's threat reactivity and ability to engage with the therapist potentially salient. To date, however, the relationships among working alliance, traumatic stress symptoms, and physiological arousal have not been sufficiently studied in the literature.

We investigated the interrelations among trauma history, psychophysiology, and the working alliance. Trauma survivors often experience difficulty in self-reporting their affective experience (Frewen, 2006; van der Kolk, Roth, Pelcovitz, Sunday, & Spinazzola, 2005), which may preclude the reliability and validity of self-report symptom measures in this sample. Thus, physiological measures may further serve as a useful independent measure of the clients' affective state (D'Andrea & Pole, 2012; Ford & Courtois, 2009), particularly in the absence of accurate symptom self-reports. As noted above, physiological measures may capture baseline client characteristics that facilitate or hinder the formation of a working alliance. First, it was hypothesized that baseline symptoms would be correlated with subsequent working alliance. Second, we predicted that pretreatment physiological markers (RSA and SCL) would prospectively predict working alliance. Specifically, high RSA and low SCL, associated with capacity for interpersonal engagement and low threat reactivity, respectively, would be associated with higher working alliance.

Method

Participants and Procedure

In the present study, 27 women seeking therapy for interpersonal trauma were assessed. Recruitment was via community and clinic advertisements. Inclusion criteria were female sex, ages 18 or older, self-identifying as having experienced interpersonal violence, and engagement in or wish for a referral to psychotherapy. Exclusion criteria included current intimate partner violence, active psychosis, and inability to participate in reading tasks.

Participants were assessed once pretreatment (T1) and once following 12 sessions of therapy (T2). Treatment occurred in the community, and therapists provided treatment as usual with no restrictions on their selection of treatment modalities. Approaches were largely eclectic and included psychodynamic approaches, stress management, and prolonged exposure; assessment of therapeutic approach occurred via a modified version of the Psychotherapy Process Q-Set (for items, see D'Andrea & Pole, 2012). Approximately half (40.9%) of the therapists reported a psychodynamic orientation and 45.4% reported a cognitive–behavioral orientation. The remaining 13.6% listed dialectical behavior therapy, supportive therapy, or feminist therapy as their primary orientation. Assessment procedures included questionnaires and a slide-viewing task with concurrent physiological monitoring (described in detail below). Written informed consent was obtained after procedures were explained. The study was approved by the University of Michigan institutional review board. Regarding attrition, two participants did not return for a second physiological assessment, though one of the two did undergo therapy and complete the self-report measures at T2. Reasons for attrition were moving out of state and being diagnosed with a terminal illness.

The mean age of participants was 38.77 years ($SD = 13.34$; range 18–64). The majority of participants were Caucasian (74.0%), and 82.0% reported at least some college education. Slightly less than half ($n = 13$; 48.0%) of the participants reported taking at least one type of psychotropic medication at the time of the study. Medications included fluoxetine, citalopram, escitalopram, clonazepam, alprazolam, and

Adderall. The range of number of medications was from 0–5 ($M = 2.07$, $SD = 1.32$); the majority of participants on any medication were on at least one selective serotonin reuptake inhibitor ($n = 8$; 29.6% of total, 61.5% of patients on medications). The diversity of prescription profiles in the sample precluded analyzing data by use of any particular medication. There was no difference in WAI scores based on medication status, $t(23) = .66$, $p = .514$, nor did medication status significantly impact baseline physiology, RSA: $t(22) = 1.93$, $p = .881$; SCL: $t(22) = 1.39$, $p = .193$. Medication status did differ for symptom severity, with those on medications reporting more severe PTSD symptoms, $t(21) = 3.58$, $p = .002$ and overall distress, $t(23) = 2.49$, $p = .020$, but no difference in interpersonal sensitivity, $t(23) = 1.36$, $p = .191$.

Regarding trauma exposure, as reported in D'Andrea and Pole (2012) all had experienced assault by at least one person known to them; 52.0% had experienced both physical and sexual assaults; 78.0% reported physical assaults; and 67.0% reported sexual assaults. The average number of types of traumas was 11.96 ($SD = 5.77$). The average first reported assault occurred at 6.81 years ($SD = 5.99$) of age; all experienced abuse in childhood, and all but one (who was 18 years old) experienced further assaults in adulthood. The range, duration, and context of trauma exposures reported by this sample is consistent with descriptions of complex trauma in the literature (Ford & Courtois, 2009; Herman, 1997; van der Kolk, 2002).

Psychophysiological measures included respiratory sinus arrhythmia (measured peak-to-trough; Grossman, 1992), and skin conductance level (measured in μS) were recorded for a 2-min baseline period using James Long Company (Caroga Lake, NY) equipment. A 31-channel analog-to-digital converter at 512 samples/s. Input range of −2.5 V to +2.5 V and resolution was 12 bits. RSA was deduced from the electrocardiogram via electrodes placed on the forearms, and from respiration data obtained from bellows placed around the torso. SCL was measured from 8 mm (sensor diameter) Ag/AgCL electrodes that transmitted a voltage of 0.5 VRMS/30 Hz voltage attached to the index and middle fingers of the nondominant hand. Measures were continually recorded during the slide task, in which participants viewed two blocks of slides containing first 10 positive images, then 10 trauma-related images, presented for 5 s each. Slide images were drawn from the International Affective Picture System (IAPS; Lang, Bradley, & Cacioppo, 1995). Positive images were of mixed content: flowers, animals, and positive family scenes. Trauma-related images were all interpersonal in content, and included suggestions of violence, such as a man with an angry face looming over a woman. The trauma images have successfully elicited stress in trauma samples (Elsesser, Sartory, & Tackenberg, 2004). There was a 30-s break between the block of positive slides and the block of trauma-related slides. Physiological data were also collected for 2 min following the slide presentation to assess recovery from the slide stressor.

Measures

The Brief Symptom Inventory (BSI; Derogatis, 1993) is a 53-item self-report measure that assesses psychiatric symptoms occurring within the past week, with higher scores reflective of increased symptomatology. The BSI yields summary scales, including the Global Symptom Index (GSI), which provides a measure of overall psychiatric distress. The present study focused on the GSI and the interpersonal sensitivity (IPS) scale, which assesses distress in social interactions. Internal consistency for the subscales range from acceptable to high, α = .71 to .85, and the measure has demonstrated construct validity and utility in prior research (Derogatis & Melisaratos, 1983; Derogatis & Spencer, 1982). In this study, internal consistency for the GSI and IPS subscales were high (α = .94 and .75, respectively).

PTSD symptoms were assessed using the PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993), a tool used for screening and assessing self-reported symptom severity. The PCL assesses the 17 PTSD symptoms within the three symptom clusters described in *the Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev., *DSM-IV-TR*; American Psychiatric Association, 2000), rating the severity of symptoms within the past month. The PCL has yielded excellent internal consistency (α = .94) and good construct validity and utility in prior research (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). In this study, Cronbach's α = .89. To determine whether participants had symptom severity consistent with a PTSD diagnosis, we modified the PCL to be consistent with the gold standard diagnostic instrument, the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995), and inquired about both frequency and intensity of symptoms. The clinical threshold for a symptom was met if the symptom occurred at moderate severity on a monthly basis, and the symptom level was considered clinically significant if one intrusion, three avoidance, and two hyperarousal symptoms were present. The unmodified PCL scores, however, were used for all analyses. Dissociation severity was assessed using the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986).

Working alliance was assessed once after 12 sessions of therapy using the 12-item client-report version of the Working Alliance Inventory (WAI-S; Tracey & Kokotovic, 1989). Clients rate their agreement with each statement, for example, "[My therapist] and I trust one another" on a 7-point scale ranging from 1 = *Never* to 7 = *Always*. Thus, higher scores indicate a more positive evaluation of the working alliance. Clients were instructed to rate their working alliance generally over the course of treatment. Research suggests that early alliance ratings may be artificially inflated, and that alliance measured later in treatment offers a more realistic and balanced perspective on the relationship (Horvath & Greenberg, 1989; Kivlighan Jr & Shaughnessy, 2000). The WAI-S has high internal consistency, α = .98 (Tracey & Kokotovic, 1989); in this study, α = .89. The WAI-S is also highly correlated with the original, 36-item WAI and the two measures have been found to yield similar

predictive coefficients (Busseri & Tyler, 2003). The validity of the WAI-S has therefore largely been generalized from the large body of validation research on the original scale (Horvath & Greenberg, 1989).

Clients reported on childhood and adulthood trauma exposure using the Trauma History Questionnaire (THQ; Green, 1996). The THQ was modified to include number of times each event occurred and age at which first and last exposure occurred. Trauma variables were reduced to duration of exposure, age at onset, and number of type of different exposures.

Data Analysis

Physiological data (RSA and SCL) were reduced to averages over four epochs: baseline, positive slide, trauma-related slide, and recovery. RSA was calculated in seconds by computing the difference between maximum cardiac interbeat interval during exhalation and minimum cardiac interbeat interval during inhalation. Differences were computed twice each breath cycle, and midpoint values were assigned as RSA (Grossman, 1992). Data were analyzed primarily using bivariate two-tailed correlations, with accompanying confidence intervals. Correlations between pretherapy physiological measures and symptomatology, and posttherapy working alliance were examined. A hierarchical regression was also employed to examine the relative contribution of pretherapy symptoms and pretherapy physiology to alliance. Pretherapy symptoms (PTSD, interpersonal sensitivity, global symptom severity) were entered in the first step; each physiological variable that was significantly associated with the alliance was entered in the second step in separate regression equations. To accommodate the hierarchical procedure with missing data (1–2 cases per measure), the analysis was conducted as both a pairwise regression and using series mean substitution, which are suitable for data missing at random. Because series mean substitution provides standardized beta values within expected ranges, whereas pairwise regression provides standardized beta values outside the expected standardized range, we report the regression with series mean substation. Results were equivalent using both approaches.

Results

Out of the maximum score of 85 on the PCL, the mean score was 51.61 ($SD = 13.56$) which was consistent with thresholds for PTSD. Participants were also relatively high in interpersonal sensitivity, scoring a mean of 2.92 on the BSI ($SD = 0.88$) on a 5-point scale. This is significantly higher than the mean interpersonal sensitivity score of 1.58 found in the outpatient normative sample (Derogatis & Spencer, 1982) and 0.68 found in a recent large-scale study of outpatients (Stewart et al., 2010). GSI scores averaged 2.39 ($SD = 0.63$). Overall, participants rated the strength of their working alliances moderately ($M = 3.99$, $SD = 0.61$, on a scale of 1–7.) DES scores were also elevated ($M = 40.75$, $SD = 18.61$). See Table 1 for physiology means.

Table 1
Descriptive Statistics for Pretherapy Physiological Markers Across Challenge Task Phases

	Physiological parameter			
	RSA		SCL	
Phase	*M*	*SD*	*M*	*SD*
Baseline	.025	.035	4.01	1.78
Positive images	.023	.022	3.75	1.49
Trauma images	.026	.039	3.71	1.36
Recovery	.013	.027	3.68	1.37

Note. $N = 27$. RSA = respiratory sinus arrhythmia (measured in arbitrary units); SCL = skin conductance level (measured in μS).

The first hypothesis, that working alliance would be predicted by pretherapy symptoms, was not confirmed. Working alliance scores were not predicted by pretherapy symptoms, as measured by global symptom severity ($r = -.31$, $p = .146$), interpersonal sensitivity ($r = -.13$, $p = .548$), PTSD symptoms severity ($r = .09$, $p = .690$), or dissociation ($r = -.12$, $p = .275$). Nor was age of onset of trauma exposure ($r = .23$, $p = .126$) or number of types of exposure ($r = -.16$, $p = .212$) related to the alliance. Because clients may rate the alliance as stronger when they have experienced perceived improvement in symptoms, we examined whether working alliance ratings were correlated with symptom change scores for PTSD, interpersonal sensitivity, or overall psychiatric distress. No statistically significant relationship emerged between symptom change and working alliance scores (PTSD, $r = .06$, $p = .800$; IPS, $r = .06$, $p = .795$; GSI, $r = -.11$, $p = .628$).

The second hypothesis, that working alliance would be predicted by pretherapy physiological arousal, was confirmed. Higher RSA at baseline ($r = .47$, $p = .026$), confidence interval (CI) [.16, .72]; and during the positive slides ($r = .43$, $p = .044$), CI [.07, .64], measured before therapy began, predicted higher working alliance 12 sessions later. RSA was uncorrelated with working alliance scores when assessed during ($r = .35$, $p = .126$), CI [.03, .58], or after (recovery, $r = .35$, $p = .114$), CI [.01, .58], the trauma slides. SCL during ($r = -.41$, $p = .049$), CI [−.73, −.06], and after (recovery, $r = -.44$, $p = .047$), CI [−.74, −.03], the trauma slides was negatively correlated with working alliance. SCL was uncorrelated with working alliance before (baseline; $r = -.19$, $p = .387$, CI [−.61, .11]) and during ($r = -.24$, $p = .283$), CI [−.65, .11], the positive slides. We also ran analyses of change scores, in which baseline physiological levels were subtracted from slide-viewing levels. The results using those analyses yielded the same pattern as the raw scores. Because interpretation is simpler with raw scores, we present those values here. We examined whether these relationships remained when accounting for pretherapy symptoms using hierarchical regressions. When accounting for variance contributed by symptoms,

Table 2
Pretherapy Physiology Predicting Working Alliance With Pretherapy Symptoms in the Model

Variable	B	SE B	β	R^2	Δ R^2
Step 1				.22	–
Global symptom severity	−0.62	0.27	−.64*		
Interpersonal sensitivity	−0.01	0.16	−.01		
Posttraumatic stress	0.02	0.01	.52		
Step 2a: Baseline RSA				.37	.15*
Global symptom severity	−0.55	0.25	−.57*		
Interpersonal sensitivity	0.81	0.15	.12		
Posttraumatic stress	0.23	0.01	.50*		
Baseline RSA	7.52	3.32	.42*		
Step 2b: Positive RSA				.32	.10
Global symptom severity	−0.54	0.26	−.56*		
Interpersonal sensitivity	0.04	0.16	.06		
Posttraumatic stress	0.02	0.12	.46		
Positive RSA	9.08	5.18	.33		
Step 2c: Trauma SCL				.37	.15*
Global symptom severity	−0.66	0.25	−.68*		
Interpersonal sensitivity	0.03	0.15	.05		
Posttraumatic stress	0.03	0.01	.53*		
Trauma SCL	−0.18	0.08	−.39*		
Step 2d: Recovery SCL				.39	.17*
Global symptom severity	−0.65	0.24	−0.67*		
Interpersonal sensitivity	0.02	0.15	0.02		
Posttraumatic Stress	0.03	0.01	0.54*		
Recovery SCL	−0.19	0.08	−0.41*		

Note. $N = 27$. RSA = respiratory sinus arrhythmia; SCL = skin conductance level (measured in μS).
*$p < .05$.

pretherapy psychophysiology still accounted for significant variance in working alliance for the majority of measures (see Table 2). Though medication status was not related to the psychophysiological measures, we reran analyses accounting for medication status. The relationships between physiology and alliance were unchanged. No measure of T1 physiology was correlated with change in symptoms—for PTSD, interpersonal sensitivity, or overall distress.

Discussion

Two autonomic measures under specific laboratory conditions predicted working alliance among women with histories of chronic interpersonal violence. Both RSA and SCL predicted the strength of the working alliance, with higher pretherapy RSA and lower SCL predicting a stronger alliance at 12 weeks of therapy. RSA measured during baseline and positive task phases predicted the alliance, whereas SCL measured during trauma slides and recovery inversely predicted it. Relations between physiology and the alliance remained strong, even when statistically accounting for covariance with symptoms. These findings suggest that psychophysiological markers may be a useful objective measure for predicting working alliance, especially in instances when self-report may be unreliable due to demand characteristics, poor insight, and/or a lack of sensitivity in self-report measures for the construct of interest.

There are several potential explanations for the role of autonomic arousal in the working alliance. Previous research has linked high RSA with ability to regulate one's emotional responses (Thayer & Lane, 2000). High RSA has also been linked with increased facial expressivity (Porges, Doussard-Roosevelt, & Maiti, 1994), as well as better self-regulation during stress and improved social engagement (Porges, 2011). Women who have been abused have also been observed to have lower RSA than their nonabused counterparts (Dale et al., 2009), as do individuals with PTSD (Hopper, Spinazzola, Simpson, & van der Kolk, 2006; Sack, Hopper, & Lamprecht, 2004). Our finding that higher baseline RSA predicted a stronger working alliance is consistent with this research, as clients with robust parasympathetic arousal may have more resources for social engagement or self-regulation to draw upon during therapy. For example, an individual with low RSA, low facial expressivity, and poor self-regulation may have difficulty exchanging emotional cues with the therapist, and may also experience difficulty regulating emotions while discussing emotionally threatening or painful topics. This finding mirrors theoretical clinical work by Ogden and Minton (2000), who describe techniques for incorporating awareness of physiological states into therapeutic processes.

Prior research has indicated that skin conductance increases when an individual feels threatened (see Ohman, 2003, for review); individuals with PTSD have a heightened skin conductance response in the presence of trauma cues (Pole, 2007). Skin conductance, however, also increases during emotional suppression (Gross & John, 2003); emotional suppression has been linked to lower social engagement (Gross & John, 2003). Thus, although threat reactivity may play an important role in working alliance, other contributions to physiological dysregulation, such as emotional suppression, may be important to investigate in future studies. Furthermore, it remains unclear whether sympathetic arousal leads to, or changes in response to, feeling threatened. Other physiological data (Thayer et al., 2009) suggests that pharmacologically elevated autonomic arousal leads to misattributions of arousal; arousal may also impair cognitive processing (Lupien, Maheu, Tu, Fiocco, & Schramek, 2007).

If one assumes that physiological reactivity during this study bears a relationship to physiological responses to the therapeutic situation, then there may be discrete effects of physiology during periods of positive discussion versus during trauma-related therapy topics. Working alliance was correlated with RSA during baseline and positive slides, and correlated

with SCL during the trauma slides and recovery. It may be that the working alliance is particularly supported by an individuals' ability to mobilize parasympathetic activity during relatively low-stress times, whereas elevated sympathetic activity during high-stress periods (trauma slides and their aftermath) has a negative impact on arousal. This pattern may offer useful insight for clinicians. It is possible that engaging in tasks which foster parasympathetic activity during relaxing clinical periods and contain sympathetic arousal during stressful clinical encounters may facilitate the working alliance.

Findings from the present study suggest that clients' pretherapy psychophysiological profiles may impact their ability to form a strong working alliance with the therapist before therapy even begins. A physiological profile characterized by high RSA during positive encounters and low SCL during stressful encounters appears to be advantageous in therapy. Future research should consider whether relational or behavioral interventions have the potential to stabilize physiology in a way which supports the development of a working alliance. For clients with histories of chronic interpersonal trauma and physiological dysregulation, physical regulation strategies such as yoga, exercise, or executive function tasks, all of which may elevate parasympathetic activity (Thayer & Lane, 2000; Thayer et al., 2009) and may serve as a useful, stabilizing adjunctive intervention in the early phases of psychotherapy.

Limitations to this work must be noted. This study was based on a relatively small convenience sample of women, all of whom had histories of severe interpersonal trauma and PTSD symptoms. It is possible that findings reflect limitations in using self-report measures. Indeed, our findings may be interpreted as a critique of self-reported psychopathological symptoms, particularly in samples where alexithymia and other affect recognition deficits may be present. True symptom change may be related to the alliance, but difficulties in reporting symptoms, or restricted range in trauma exposure and symptom variables, obscured measurement. Other limitations include physiology measured outside the therapy context and single assessment of the alliance. Although the sample size was small, the physiological findings are of large magnitude, and use of confidence intervals suggests their stability. Furthermore, though there were no differences in physiology or alliance based on medication status, we were unable to analyze whether certain types of medications that impact physiology may in turn impact the alliance. Future analyses may wish to examine the alliance as related to particular types of medication, such as stimulants, which impact arousal. A further limitation concerns the utility of physiological measures in therapy; as technology advances, these methods may become more available to the average clinician. Other work suggests that individuals with abuse histories readily form alliance (Paivio & Patterson, 1999), and that it is personality, not exposure to abuse, that mitigates alliance formation (Paivio & Patterson, 1999); future studies may wish to examine the interplay between trauma, personality, and psychophysiology as related to alliance.

In conclusion, symptoms associated with trauma may be related to treatment resistance, perhaps because of affective and physiological dysregulation associated with trauma. The emotional landscape of therapy is such that positive interactions may serve as a container for intense negative affect, and physiological reactivity may be informative in predicting who is likely to form alliances more or less easily. Although we cannot conclude that physiology alone is responsible for difficulties with the alliance, our findings do suggest that understanding psychophysiology may help therapists understand their clients better, and anticipate difficulties in working alliance formation, thereby leading to more positive clinical outcomes for traumatized individuals.

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