Published in final edited form as:

Prof Psychol Res Pr. 2010 June ; 41(3): 228–235. doi:10.1037/a0019118.

A Pilot Study of Psychotherapist Trainees' Alpha-Amylase and Cortisol Levels During Treatment of Recently Suicidal Clients With Borderline Traits

Grant D. Miller, Katherine M. Iverson, Markus Kemmelmeier, Chelsea MacLane, Jacqueline Pistorello, Alan E. Fruzzetti, Katrina Y. Crenshaw, Karen M. Erikson, Barrie M. Katrichak, Megan Oser, Larry D. Pruitt, and Melanie M. Watkins

University of Nevada, Reno

Abstract

Psychotherapists often experience stress while providing psychotherapy, in particular when working with difficult presentations such as suicidality. As part of a larger study on the treatment of recently suicidal college students with borderline traits, 6 therapists in training collected their own salivary samples for alpha-amylase (AA) and cortisol (C) analyses immediately before and after sessions with 2 selected clients. On average, samples were collected for the same therapist–patient dyad throughout the year-long study to ensure that data reflected therapist responses across stages of treatment. Therapists also completed a working alliance questionnaire and rated perceived session difficulty immediately after each selected session. Contrary to expectations, therapists demonstrated elevated levels of stress as measured by AA and C at presession relative to postsession levels. Greater session difficulty was related to more pronounced declines in AA, whereas a stronger working alliance was linked to more pronounced reductions in C. Results suggest that physiological stress responses while working with recently suicidal clients with borderline traits occur primarily in terms of session anticipatory anxiety, whereas AA and C changes may be affected differently by factors such as session difficulty and working alliance. This is a pilot study, limited by its sample size, but the design, findings, and inclusion of physiological measures present an initial step in an essential line of research.

Keywords

psychotherapist stress; borderline traits; suicidal clients; salivary alpha-amylase; salivary cortisol

Therapists dedicate their lives to focusing on clients' problems, yet little is known about the impact on the psychotherapist of providing psychotherapy and no research has systematically examined its physiological impact. To date, studies have relied on self-report indices of stress and have generally indicated that therapists report high levels of stress related to conducting psychotherapy (Guy & Liaboe, 1986; Guy, Poelstra, & Stark, 1989; Imai, Nakao, Tsuchiys, Kuroda, & Kanton, 2004; Sprang, Clark, & Whitt-Woosley, 2007). A sense of personal depletion and pressure to maintain the working relationship are two of the top sources of stress reported by therapists (Farber & Heifetz, 1981; Hellman, Morrison, & Abramowitz, 1986).

Studies on therapist stress have focused on three major areas: specific client behaviors, suicidal ideation and self-harm behaviors, and specific client–therapist processes. Regarding

specific client behaviors, therapists report stress related to clients' demonstration of negative affect and anger, client resistance and hypersensitivity, and passive-aggressive behavior (Farber, 1983; Radeke & Mahoney, 2000). More important, working with clients who experience recent suicidal ideation and self-harm behaviors has been associated with higher levels of self-reported stress among mental health professionals (Burnard, Edwards, Fothergrill, Hannigan, & Coyle, 2000; Melchior, Bours, Schmitz, & Wittich, 1997; Perseus, Kaver, Ekdahl, Asberg, & Samuelsson, 2007). Stress is primarily related to increased feelings of tension, anxiety, embarrassment, hopelessness, or fear (Rabin, Feldman, & Kaplan, 1999), as well as a lack of observable progress and an inability to help an acutely distressed client to feel better (Deutsch, 1984).

Clients with borderline personality disorder (BPD) traits often exhibit intense and labile negative emotions, significant interpersonal problems, impulsivity and extreme behavioral dyscontrol, self-harm and recurrent suicidal threats (Lieb, Zanarini, Schmahl, Linehan, & Bohus, 2004). It follows that treating clients with BPD traits is particularly stressful for therapists. Although many therapists are faced with the possibility of a client attempting suicide, therapists who treat individuals with BPD traits are faced with these concerns on a significantly more frequent basis (Black, Blum, Pfohl, & Hale, 2004; Paris, 2002).

Finally, therapist-client factors are also related to therapist stress (Brady, Guy, Poelstra, & Brokaw, 1999; Sprang et al., 2007). Some sessions may be more difficult when the therapist and client focus on more complex issues, such as traumatic experiences, which can affect psychotherapist stress (Pearlman & Maclan, 1995). The working alliance is an important component of many psychotherapy modalities and has been shown to affect the effectiveness of treatments (Lambert & Barley, 2001). The working alliance is essential when working with individuals who experience BPD traits (Linehan, 1993). Thus, a strong working alliance is likely to serve as a buffer against therapist stress. Conversely, a poor working alliance is likely associated with poor treatment outcome and increased therapist stress.

The purpose of this pilot study was to conduct an in vivo naturalistic examination of the pre- and postsession physiological impact on therapists in training who were conducting psychotherapy with recently suicidal clients with significant BPD traits, while also exploring the influence of session difficulty and working alliance.

Therapists manifest stress physiologically with two principle components. One involves the activation of the hypothalamic-pituitary-adrenal axis (HPA) and the release of glucocorticoids such as cortisol (C) into the blood stream. The other involves activation of the locus ceruleus and the sympathetic nervous system component of the autonomic nervous system with the rapid release of catecholamines such as norepinephrine into the blood stream (Chrousos & Gold, 1992). Salivary alpha-amylase (AA), an enzyme produced in the oral mucosa, serves as a reliable marker for sympathetic nervous system activation during stress, similar to increases in plasma catecholamines (Chatterton, Vogelsson, & Hudgens, 1997; Granger, Kivlighan, El-Sheikh, Gordis, & Stroud, 2007; Nater et al., 2005; Takai et al., 2004). Reliable measurement of HPA activation during stress is available through the measurement of salivary C (Kirschbaum & Hellhammer, 1994). The HPA system is particularly sensitive to stressful situations that are perceived as uncontrollable and distressing (Blascovich & Tomaka, 1996; Dickerson & Kemeny, 2004). Both AA and C are released together in response to stress, resulting in physiological changes that contribute to survival at least in the short term and are sensitive to situations that are perceived as stressful (Blascovich & Tomaka, 1996; Dickerson & Kemeny, 2004). Although AA and C are both markers of physiological stress, they are driven by different aspects of physiology. Thus, it

is important to examine whether there are different associations among these stress markers and therapist–client factors.

This study provides the first evaluation of physiological stress associated with providing psychotherapy to a complex client population. Stress associated with therapy sessions was measured using the noninvasive collection of pre- and postsession salivary samples that were analyzed for AA and C concentrations. Because AA and C are elevated *following* both physical and psychological stressful situations (e.g., Chatterton et al., 1997; Frankenhaeuser, 1982), we hypothesized that (a) these physiological indicators of stress would increase from pre- to postsession, (b) increases would be directly related to session difficulty, and (c) increases would be inversely related to greater working alliance.

Method

Participants

Data in this study were collected as part of a larger treatment study conducted at a West Coast university counseling center, comparing dialectical behavior therapy (DBT; Linehan, 1993) with a psychodynamic approach (PT; Chatham, 1985) for the treatment of recently suicidal college clients with BPD traits. The study procedures were approved by the university's Social Behavioral Institutional Review Board, and, in each case, informed consent was obtained from the therapists following a full description of the study prior to data collection. All therapists in the larger treatment study were invited to participate in this study, and all six agreed to participate. The study included four female therapists and two male therapists, all currently in training. Therapists consisted of a psychiatry resident, a postdoctoral-level therapist, one master's-level counseling and educational psychology student, and three advanced clinical psychology trainees. The age range of this sample was 24 to 42 years, with an average age of 31.5 years. Three participants delivered DBT and three delivered PT (note that gender distribution in both groups was identical).

All therapists received an initial intensive training of 30 hr by an expert in each condition with a strong allegiance to the respective approach. Psychologist supervisors provided weekly group supervision at the same setting relying on videotapes of sessions. On average, therapists carried three assigned clients at a time and co-led a group once per week. Treatment consisted typically of weekly individual 50-min therapy sessions and 90-min group therapy. Treatment could last up to 12 months, but clients who were making progress and completed at least 7 months of treatment were considered treatment completers.

To decrease the possibility of therapists, who were trainees hired by the investigators, feeling coerced to participate, the investigators of the larger treatment study were not involved in the recruitment and assessment of therapists, found out which therapists participated at the end of the study, and did not conduct any of the data analyses for this article.

Client Inclusion

Clients in the larger treatment study were male and female college students between the ages of 18 and 25 years with significant BPD traits. All clients met at least three criteria (of nine) for BPD according to the Structured Clinical Interview for *DSM-IV-II* (SCID-II; First, Spitzer, Gibbon, & Williams, 1997) and all individuals had to report at least one lifetime suicide attempt or self-harm behavior (Suicide Attempt Self-Injury Interview; Linehan, Comtois, Brown, Heard, & Wagner, 2006) and endorse current suicidal ideation on the Beck Depression Inventory II (BDI-II; Beck, Steer, & Brown, 1996). Of the 18 clients who were in treatment with the therapists during this study, nine were engaging in current self-harm at the start of the larger treatment study. Three of the clients reported a past suicide attempt,

with the most recent suicide attempt occurring approximately 3 months prior to beginning treatment. The average BDI–II score at pretreatment fell in the severe range ($M = 36.72$, $SD = 8.75$). After completion of pretreatment assessments, clients were randomly assigned to one of the two treatment conditions. Clients assigned to each condition were equally distressed, as evidenced by equivalent independent assessor ratings on the Global Assessment of Functioning (American Psychiatric Association, 2002) and clients' self-reported depression severity on the BDI–II across the two treatment conditions at pretreatment.

Procedure

This study used a cross-sectional design for data collection. Therapists were asked to collect whole unstimulated saliva samples (approximately 1 ml) immediately before and immediately after sessions with two of their clients from a total pool of 18 clients being treated by all therapists. An attempt was made to sample sessions from these two clients throughout the duration of their treatment to ensure that the physiological measures as well as self-reported ratings of working alliance and session difficulty would be representative of all stages of treatment; therefore, assessments were collected at approximately the beginning, middle, and end of therapy. All presession saliva samples were collected approximately 10 min before the therapy session was scheduled to begin and postsession samples were collected within 5 min of the completion of the session. Participants inserted a salivette swab into their mouths and maintained it in place until the swab was saturated with saliva. The therapist then placed the salivette into a plastic cryogenic container and lodged it immediately in a freezer maintained at -20°C . Of the 36 measurements requested of the six therapist subjects (six per participant), 23 were completed, an average of 3.83 per therapist. The majority (57%) of the samples were for designated dyads. On average, the first administration occurred at Session 4 ($SD = 3.05$), the second at Session 17 ($SD = 4.67$), and the third at Session 28 ($SD = 5.10$). Only two therapists completed all six measurements. Considering professional therapists' time pressures and obligations, this was considered satisfactory. As noted, some clients terminated treatment early; therefore, therapists may have been unable to collect saliva samples toward the end of the 12-month period. After a year from the time that the initial samples were obtained and consequently frozen, the samples were sent on dry ice to the Salimetrics Laboratory (State College, PA) for analysis.

Salivary AA and C Assessment

Salivette samples were assayed for AA and C at the Salimetrics Laboratory using kinetic reaction assay procedures described by Granger et al. (2007). Samples were assayed for salivary C by commercially available enzyme immunoassay and salivary AA by kinetic reaction assays without modification to the manufacturer's instructions (Salimetrics). Average intra- and interassay coefficients of variation for both assay protocols were less than 5% and 10%, respectively, and results are computed in $\mu\text{g/dl}$ for C and U/ml for AA.

Therapist Self-Report Measures

Immediately after each session, concurrent with the collection of the postsession saliva samples, participants completed a brief questionnaire regarding the working alliance and rated the perceived difficulty of the session.

The Working Alliance Inventory—Short Form—Therapist Version (adapted from WAI-sh-T; Tracey & Kokotovic, 1989) is a 12-item questionnaire for therapists to complete to examine the therapist's perception of the working alliance with a given client. The WAI-sh-T produces an overall scale score, as well as three subscales: Therapeutic Bond, Agreement Between Client and Therapist on Tasks, and Agreement on Therapy Goals. The overall score was used for the current analyses. The WAI-sh-T was completed by therapists after the

session in which the acute physiological stress samples were collected. The WAI-sh-T has been demonstrated to have good reliability and validity (Busseri & Tyler, 2003).

Session difficulty was an item created for the purposes of the current study. Therapists rated this item for each of the target sessions on a self-report 5-point Likert scale. The response options ranged from “1 (*not at all difficult*)” to “5 (*extremely difficult*).”

Statistical Analysis

We analyzed all data using linear mixed models, which are also termed hierarchical linear models (Raudenbush & Bryk, 2002). The use of a linear mixed model was necessary in this study because of the specific structure of the data in which each therapist provided data for multiple therapy sessions over time. Because two sessions conducted by the same therapist are more likely to be similar to each other than two randomly picked sessions conducted by two therapists, our session data violated the assumption of independence—a critical assumption in all conventional parametric statistical approaches. The use of linear mixed models allowed us to take the structure of the present data into account, where therapy sessions were “nested” within therapists. Furthermore, linear mixed models are very flexible in that they allow the testing of models with varying hierarchies of nesting. Specifically, for our physiological data, we obtained presession and postsession data pertaining to the same therapy session, that is, in the language of linear mixed models, the pre- and postmeasurements (Level 1 data) were nested within the same session. Furthermore, the same therapist provided data pertaining to multiple therapy sessions, meaning that sessions (Level 2 data) were nested within therapists (Level 3 data). Sessions (Level 2) and therapists (Level 3) were modeled as random effects.

Compared with this three-level model used for the analysis of our physiological data, the analysis of our self-report data required only a two-level model because we did not obtain multiple measurements pertaining to the same therapy session. Another important characteristic that distinguishes linear mixed models from more conventional parametric techniques is that they are based on iterative maximum likelihood estimation. This renders linear mixed models rather tolerant of missing data. Although therapists were requested to provide self-report and physiological measures for six therapy sessions, only two therapists fully complied, whereas all other therapists generated data for fewer therapy sessions. Whereas such data may present insurmountable problems for analysis of variance, linear mixed models essentially generate averages pertaining to each therapist regardless of the number of data points provided for each therapist. These averages are then analyzed further.

Results

Ruling Out Potential Treatment Effects

Because the larger study included therapists trained in two different treatment methods, DBT and PT, it was necessary to rule out the possibility that treatment type significantly affected these physiological responses before and after sessions or their relationship to the therapist–client factors being investigated. Although another study investigating changes in cortisol longitudinally on this sample has found some treatment differences in chronic stress responses (Miller et al., 2010), the present study did not focus on stress reactions over the course of treatment, but rather on acute changes in physiological stress responses from before to after specific therapy sessions. Therefore, treatment differences were not expected but had to be ruled out as a potential explanation for any findings.

In an initial round of analyses, we used the multilevel approach described above and tested for the repeated measures effect of time (presession vs. postsession), the between-groups factor of treatment approach (DBT vs. PT), as well as their interaction. For the physiological

measures, there were no reliable differences between therapists in different treatment conditions, nor did the change in AA and C occur at different rates for the two groups of therapists ($F_s < 1$). There were also no treatment differences in terms of postsession self-report measures of working alliance, $F(1, 2.75) = 4.24, p = .14$, and perceived session difficulty, $F(1, 4.00) = 1.35, p = .31$. The mean for postsession self-report of working alliance was 65.00 ($SD = 9.10$) and 2.63 ($SD = 0.96$) for perceived session difficulty. Using a multilevel approach to examine the association between these variables, we found that one was not predicted by the other, for example, working alliance did not predict session difficulty, $b = -0.02, p = .46$, and vice versa. Similarly, none of the relationships between physiological and self-report measures were qualified by treatment approach. Because there was no treatment effect found in these analyses, we combined therapists across both treatment approaches in all subsequent analyses. A similar analysis exploring possible effects of stages of treatment (date collected toward the beginning, the middle, or the end of the therapy) did not produce any significant effects.

Physiological Data

To analyze AA and C, the resulting multilevel model included time of measurement (presession vs. postsession) as the only repeated measures factor. As summarized in Table 1, results showed that, on average, AA levels declined for all therapists between pre- and postsession measurement by 11.82 U/ml, $F(1, 21.75) = 4.91, p = .038$. A similar drop was evident for C levels, namely by 0.11 $\mu\text{g/dl}$, $F(1, 27.86) = 4.40, p = .045$. This pattern of findings suggests that all therapists experienced a marked decrease in stress-related physiological reactivity during the session itself as evidenced by reductions in AA and C from pre- to postsessions.

Relationship Between Physiological Data and Self-Report Data

Next, we used a similar multilevel approach to estimate the relationship between self-report data, working alliance, and perceived session difficulty, and the changes in AA and C. For this purpose, however, we subtracted the postsession from the presession measurement and used the resulting difference score as the dependent variable, with greater values reflecting a greater decline over time. Table 2 summarizes the relevant coefficients in predicting pre-post reductions in AA and C from perceived session difficulty and working alliance. Results indicate that greater perceived session difficulty predicted AA reductions, $b = -17.18, p = .006$, but not C reductions, $b = -0.01, ns$. Conversely, greater strength of the working alliance was associated with greater reductions in C, $b = -0.004, p = .039$, but not in AA, $b = -0.456, ns$.

Discussion

To our knowledge, this pilot study is the first to use physiological markers of stress to measure the impact on trainees of conducting psychotherapy with recently suicidal clients with BPD traits, a widely recognized challenging client population. This study extends previous self-report evidence that conducting psychotherapy with clients with a recent history of suicidal ideation and BPD traits is stressful (Burnard et al., 2000; Linehan, 1993; Melchior et al., 1997; Perseus et al., 2007). Specifically, the findings suggest that, contrary to expectations, therapists experience higher levels of physiological stress prior to therapy sessions relative to postsession stress.

The current findings suggest that therapists in training experience anticipatory anxiety or postsession relief when treating recently suicidal individuals with BPD traits. Presession levels of stress may be higher among therapists treating these clients because there may be more uncertainty regarding what type of problems clients will present, including having to

deal with suicidal or self-harm crises. It is also possible that this pattern is accentuated among therapists in training, who have less experience (and therefore less success) in treating clients with these kinds of problems. Replication with experienced therapists is needed.

It is interesting that the presession stress levels reached by trainees were not excessively high. As noted in Table 1, normative data suggest that therapists' stress levels at presession were significantly elevated relative to postsession, yet still within a normative range according to unpublished ranges provided by Salimetrics (personal communications, August 12, 2009, and November 5, 2009).¹ Other studies have found similar levels of AA and C prior to and following stressful situations that elicit anticipatory anxiety, such as athletic competitions (Kivlighan & Granger, 2006; Kivlighan, Granger, & Booth, 2005). More important is the fact that there were significant absolute reductions from pre- to postsession.

Results did not support the hypotheses that stress would increase from start to finish of a therapy session and that increases would relate to working alliance and perceived session difficulty. In fact, the reverse was true, with both AA and C decreasing from pre- to postsession. It also appears that greater perceived session difficulty was related to stronger declines in AA, whereas a stronger working alliance was linked to more pronounced reductions in C. There are likely multiple processes at work that need consideration in interpreting the results. If a therapist anticipates a difficult session for whatever reason, AA may be elevated at the initiation of the session and C may even be suppressed because of the less reactive nature of C. Following the session, when both working alliance and perceived session difficulty are determined, a high session difficulty score may relate to a large reduction in AA because of session completion relief or satisfaction with the management of the session. A sustained high AA with a lower postsession reduction in AA may be due to sustained stress at completion of the session, as would likely be the case when a client is unable to make a convincing no-suicide commitment until the next session. Considering session difficulty in this situation, the postsession reduction in C may be minimal yet significant, as suggested by the current findings. It is known that AA reactivity is more acute and C is slightly delayed and sustained, which may explain this finding as well (Chrousos & Gold, 1992). Further research comparing physiological stress responses with specific in-session content (e.g., the conduct of suicide risk assessment) and therapist-patient process in that therapeutic hour will help elucidate these relationships.

Accounting for significant postsession C reductions is more difficult to explain. It is important to consider what type of stress studies of this nature are addressing. The stress involved in conducting therapy with this population is more likely interpersonal in nature as opposed to stressors experienced with less interpersonal tasks, such as jumping from an airplane with a parachute (Chatterton et al., 1997). Only a handful of studies have examined the interpersonal stress that was likely to have been experienced by our participants. A study of couples demonstrated that C levels experienced during problem-solving tasks were associated with individual's relationship attachment styles (Powers, Pietromonaco, Gunlicks, & Sayer, 2006). In addition, previous research has suggested that AA changes are more associated to danger and threat, and C changes are more related to affection and caring (Granger et al., 2007). Such research may explain the association between C reductions and working alliance in this study. It is possible that session difficulty and working alliance tap into complex phenomena. More research is needed to determine how these constructs covary and differ from each other, as well as their relationship to therapist stress.

¹Normal ranges are provided on request from Salimetrics at <http://www.salimetrics.com>.

Recently suicidal individuals with BPD traits are known to be notoriously difficult to retain in treatment, engage in numerous therapy-interfering behaviors, and make considerable demands on the emotional resources of therapists (Linehan, 1993). Therefore, it is not surprising that therapists experience a certain level of stress prior to sessions with this client population. Most seasoned psychotherapists already know that it is commonplace to experience subjective anticipatory anxiety before conducting sessions with complex clients. Our results provide the first empirical support, relying on physiological measures, for this clinically observed phenomenon. These data can be used to inform conversations regarding therapist stress between supervisors and trainees. In particular, these findings may help normalize therapists' feelings of presession stress, which may be particularly helpful for those in training. However, it is possible that these effects are due to the fact that these were therapists in training. It will be interesting to observe whether these results are replicated in studies with more experienced clinicians, or to see whether the anticipatory stress in trainees, as marked by higher presession AA and C levels, becomes attenuated over time across individuals as they gain more experience. For example, research has shown that more experienced athletes show lower AA before competition than less experienced athletes (Kivlighan & Granger, 2006).

Although these acute stress responses appeared to occur regardless of treatment condition in this study, our methodology did not allow us to test the hypotheses that over time some treatments might be more effective than others in reducing this physiological response to sessions among therapists. It is possible that the anticipatory apprehension or postsession relief observed here could be differentially observed over time depending on the type of treatment being implemented.

Given to the pilot nature of this study, there are many limitations contributing to limited generalizability from our findings. One of the primary limitations of the current study was the extremely small number of therapist participants. Likewise, therapists were of different sexes and had a broad range of training experiences. Of note, this study was conducted in a college counseling center and therapists volunteered their time to complete the current pilot study. To keep participant burden to a minimum, we asked therapists to provide a limited number of saliva samples and brief questionnaires. Therefore, the number of sessions on which measurements were taken was somewhat irregular and limited in number. In addition, four of six therapists had missing data, resulting in fewer saliva samples than planned. Although our statistical analyses were robust in the presence of missing data, it would be ideal to have a larger number of samples. The study was uncontrolled for time of day when sessions occurred, which may have affected C levels, which tend to stabilize in late afternoon. It would have been ideal to control for these factors with a much larger number of therapists with a more diverse range of therapist–patient dyads, including clients who are not exhibiting BPD traits or recent suicidal ideation. Although all clients reported suicidal ideation at the time they began treatment, it was not possible to ascertain whether suicidality was discussed in the target sessions. Finally, the small sample size precluded an examination of individual differences among therapists, including diversity considerations across therapist–patient dyads.

The limitations of this study identify the need for more physiological research in the area of therapist stress. Future studies should examine physiological and self-reported therapist stress in a much larger and more diverse sample of therapists. In addition, researchers should collect salivary collections during late afternoons to minimize diurnal changes in C. To differentiate salivary elevations in AA and C from other stressful work situations, intermittent weekend testing could be done to establish baseline levels. Future research should also examine additional baseline measures of stress (e.g., 1 hr before the therapy session), immediately before and after sessions, and 1 hr after sessions. An important area of

future research includes measuring whether suicidality and risk assessments were discussed in the target session and include more comprehensive assessments of overall suicide risk to examine its association with acute therapist stress. Administration of self-report measures of stress or anxiety immediately prior to and after sessions could provide multimethod assessments of therapist stress. Finally, future research should also examine clients' perception of working alliance and session difficulty along with physiological measures of C and AA to examine attunement between clients and therapists.

It is also important to note that the current study examined only one aspect of therapist stress associated with treatment delivery to recently suicidal clients with BPD traits. Future research should examine physiological and self-report measures of therapist stress in a longitudinal design with other diagnostic groups to determine whether particular treatment modalities are associated with greater or lesser pre-session stress over time and to gauge the association between these physiological responses to client outcomes. Further studies of this nature may help supervisors be more aware of the stress experienced in therapist trainees working with recently suicidal clients with BPD traits.

In conclusion, this pilot study provides an initial step in the physiological examination of stress in therapists conducting therapy with recently suicidal clients with BPD traits. The current findings obtained through the use of noninvasive physiological biomarkers of stress provide preliminary data that indicate that therapists in training who treat this population tend to experience significant anticipatory anxiety before sessions. Although very preliminary, the current findings highlight the need to better understand therapists' experience of providing therapy, not only with stressful, multiple-problem clients, but in all diagnostic groups in order to inform intervention and prevention efforts aimed at reducing stress among therapists in training.

Acknowledgments

The Project was supported by Grant R34MH071904 from the National Institute of Mental Health. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Mental Health or the National Institutes of Health.

Katherine M. Iverson's contribution to the writing of this article was supported, in part, by National Institute of Mental Health Training Grant T32MH019836 awarded to Terence M. Keane. Our gratitude is extended to Patricia Chatham, who helped support the work conducted on this project through her mentorship and clinical services.

References

- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4. Washington, DC: Author; 2002. text rev
- Beck, AT.; Steer, RA.; Brown, KG. Manual for the Beck Depression Inventory—II. San Antonio, TX: Psychological Corporation; 1996.
- Black DW, Blum N, Pfohl B, Hale N. Suicidal behavior in borderline personality disorder: Prevalence, risk factors, prediction, and prevention. *Journal of Personality Disorders*. 2004; 18:226–239. [PubMed: 15237043]
- Blascovich J, Tomaka J. The biopsychosocial model of arousal regulation. *Advances in Experimental Social Psychology*. 1996; 28:1–51.
- Brady JL, Guy JD, Poelstra PL, Brokaw BF. Vicarious traumatization, spirituality, and the treatment of sexual abuse survivors: A national survey of women psychotherapists. *Professional Psychology: Research and Practice*. 1999; 30:386–393.
- Burnard P, Edwards D, Fothergrill A, Hannigan B, Coyle D. Community health nurses in Wales: Self-reported stressors and coping strategies. *Journal of Psychiatric and Mental Health Nursing*. 2000; 7:523–528. [PubMed: 11933510]

- Busseri MA, Tyler JD. Interchangeability of the Working Alliance Inventory and Working Alliance Inventory, Short Form. *Psychological Assessment*. 2003; 15:193–197. [PubMed: 12847779]
- Chatham, PM. *Treatment of the borderline personality*. New York: Jason Aronson; 1985.
- Chatterton RT, Vogelsson KM, Lu Y, Hudgens GA. Hormonal responses to psychological stress in men preparing for sky-diving. *Journal of Clinical Endocrinology and Metabolism: Clinical and Experimental*. 1997; 82:2503–2509.
- Chrousos GP, Gold PW. The concept of stress and stress system disorders. An overview of physical and behavioral homeostasis. *Journal of the American Medical Association*. 1992; 267:1244–1252. [PubMed: 1538563]
- Deutsch CJ. Self-reported sources of stress among psychotherapists. *Professional Psychology: Research and Practice*. 1984; 15:833–845.
- Dickerson SS, Kemeny ME. Acute stressors and cortisol responses: A theoretical integration and synthesis of laboratory research. *Psychological Bulletin*. 2004; 130:355–359. [PubMed: 15122924]
- Farber, BA. Dysfunctional aspects of the psychotherapeutic role. In: Farber, B., editor. *Stress and burnout in the human service professions*. New York: Pergamon Press; 1983. p. 97–118.
- Farber BA, Heifetz LJ. The satisfactions and stresses of psychotherapeutic work: A factor analytic study. *Professional Psychology*. 1981; 13:293–301.
- First, MB.; Spitzer, RL.; Gibbon, M.; Williams, JBW. *Personality Disorders (SCID-II)*. Washington, DC: American Psychiatric Press; 1997. *Structured Clinical Interview for DSM-IV*.
- Frankenhaeuser M. Challenge– control interaction as reflected in sympathetic–adrenal and pituitary–adrenal activity: Comparison between the sexes. *Scandinavian Journal of Psychology*. 1982; 1:158–164. [PubMed: 7187984]
- Granger DA, Kivlighan KT, El-Sheikh M, Gordis E, Stroud LR. Salivary alpha-amylase in biobehavioral research: Recent developments and applications. *Annals of the New York Academy of Sciences*. 2007; 1098:122–144. [PubMed: 17332070]
- Guy JD, Liaboe G. The impact of conducting psychotherapy on psychotherapists' interpersonal functioning. *Professional Psychology: Research and Practice*. 1986; 17:111–114.
- Guy JD, Poelstra PL, Stark MJ. Personal distress and therapeutic effectiveness: National survey of psychologists practicing psychotherapy. *Professional Psychology: Research and Practice*. 1989; 20:48–50.
- Hellman ID, Morrison TL, Abramowitz SI. The stresses of psychotherapeutic work: A replication and extension. *Journal of Clinical Psychology*. 1986; 42:197–205. [PubMed: 3950007]
- Imai H, Nakao H, Tsuchiya M, Kuroda Y, Kanton T. Burnout and work environments of public health nurses involved in mental health care. *Occupational and Environmental Medicine*. 2004; 61:764–768. [PubMed: 15317917]
- Kirschbaum C, Hellhammer DH. Salivary cortisol in psychoneuroendocrine research: Recent developments and applications. *Psychoneuroendocrinology*. 1994; 19:313–333. [PubMed: 8047637]
- Kivlighan K, Granger DA. Salivary alpha-amylase response to competition: Relation to gender, previous experience, and attitudes. *Psychoneuroendocrinology*. 2006; 31:703–714. [PubMed: 16624493]
- Kivlighan KT, Granger DA, Booth A. Gender differences in testosterone and cortisol response to competition. *Psychoneuroendocrinology*. 2005; 30:58–71. [PubMed: 15358443]
- Lambert MJ, Barley DG. Research summary on the therapeutic relationship and psychotherapy outcome. *Psychotherapy: Theory, Research, Practice, Training*. 2001; 38:357–361.
- Lieb K, Zanarini MC, Schmahl C, Linehan MM, Bohus M. Borderline personality disorder. *Lancet*. 2004; 364:453–461. [PubMed: 15288745]
- Linehan, MM. *Cognitive– behavioral treatment of borderline personality disorder*. New York: Guilford Press; 1993.
- Linehan MM, Comtois KA, Brown MZ, Heard HL, Wagner A. Suicide Attempt Self-Injury Interview (SASI-III): Development, reliability, and validity of a scale to assess suicide attempts and intentional self-injury. *Psychological Assessment*. 2006; 18:303–312. [PubMed: 16953733]

- Melchior MEW, Bours GJJ, Schmitz P, Wittich Y. Burnout in psychiatric nursing: A meta-analysis of related variables. *Journal of Psychiatric and Mental Health Nursing*. 1997; 4:193–201. [PubMed: 9325800]
- Miller GM, Iverson KM, Kemmelmeier M, Maclane CM, Pistorello J, Fruzzetti AE, ...Watkins M. Psychotherapist burnout in dialectical behavior therapy (DBT): Chronic physiological and emotional stress responses in trainees treating suicidal clients with borderline traits. Manuscript submitted for publication. 2010
- Nater UM, Rohleder N, Gaab J, Berger S, Jud A, Kirschbaum C, Ehler U. Human salivary alpha-amylase reactivity in a psychosocial stress paradigm. *International Journal of Psychophysiology*. 2005; 55:333–342. [PubMed: 15708646]
- Paris J. Chronic suicidality among patients with borderline personality disorder. *Psychiatric Services*. 2002; 53:1300–1302.
- Pearlman LA, Maclan PS. Vicarious traumatization: An empirical study of the effects of trauma work on trauma therapists. *Professional Psychology: Research and Practice*. 1995; 26:558–565.
- Perseus KI, Kaver A, Ekdahl S, Asberg M, Samuelsson M. Stress and burnout in psychiatric professionals when starting to do dialectical behavioural therapy in the work with young self-harming women showing borderline personality symptoms. *Journal of Psychiatric and Mental Health Nursing*. 2007; 14:635–643. [PubMed: 17880657]
- Powers SI, Pietromonaco PR, Gunlicks M, Sayer A. Dating couples' attachment styles and patterns of cortisol reactivity and recovery in response to a relationship conflict. *Journal of Personality and Social Psychology*. 2006; 90:613–628. [PubMed: 16649858]
- Rabin S, Feldman D, Kaplan Z. Stress and intervention strategies in mental health professionals. *British Journal of Medical Psychology*. 1999; 72:159–169. [PubMed: 10397421]
- Radeke JT, Mahoney M. Comparing the lives of psychotherapists and research psychologists. *Professional Psychology: Research and Practice*. 2000; 31:82–84.
- Raudenbush, SW.; Bryk, AS. Hierarchical linear models: Applications and data analysis methods. 2. Thousand Oaks, CA: Sage; 2002.
- Sprang G, Clark JJ, Whitt-Woosley A. Compassion fatigue, compassion satisfaction, and burnout: Factors impacting a professional's quality of life. *Journal of Loss and Trauma*. 2007; 12:259–280.
- Takai N, Yamaguchi M, Aragaki T, Eto K, Uchisashi K, Nishikawa Y. Effect of psychological stress on the salivary cortisol and amylase levels in healthy young adults. *Archives of Oral Biology*. 2004; 49:963–968. [PubMed: 15485637]
- Tracey TJ, Kokotovic AM. Factor structure of the Working Alliance Inventory. *Psychological Assessment*. 1989; 1:207–210.

Biographies

Grant D. Miller received his MD from the University of Minnesota School of Medicine and his psychiatric training from Oregon Health Sciences University. He is professor at the Department of Psychiatry and Behavioral Sciences, University of Nevada School of Medicine. He is co-coordinator of resident psychotherapy training and his research interests are medical student professional development, alexithymia in ADHD, and psychiatry resident education, training, and supervision.

Katherine M. Iverson received her PhD in clinical psychology from the University of Nevada, Reno. She is a clinical scientist with a special interest in the conceptual understanding and treatment of interpersonal trauma survivors and innovative approaches to training and dissemination of cognitive– behavioral therapies. She is currently a postdoctoral fellow in the Women's Health Sciences Division of the National Center for Posttraumatic Stress Disorder at the Veterans Administration Boston Healthcare System and Boston University School of Medicine.

Markus Kemmelmeier received his PhD in social psychology from the University of Michigan in 2001. He is currently an associate professor in sociology and social psychology

at the University of Nevada, Reno. His areas of expertise include interpersonal behavior, culture, and advanced statistical methods.

Chelsea Maclane received her PsyD in clinical psychology from Pacific University. She is a postdoctoral fellow at the University of Nevada, Reno, and also maintains an independent practice. Her research interests include prevention of suicidality and mental health problems, as well as mindfulness-based interventions.

Jacqueline Pistorello obtained her PhD in clinical psychology at the University of Nevada, Reno. She is research faculty at Counseling Services and adjunct faculty at the Psychology Department at the University of Nevada, Reno, where she has worked with college students for over a decade. She has been a principal investigator on two grants from the National Institute of Mental Health. She specializes in the application of two mindfulness-based interventions (dialectical behavior therapy and acceptance and commitment therapy) to college students.

Alan E. Fruzzetti received his PhD in clinical psychology from the University of Washington. He is an associate professor of psychology and director of the Dialectical Behavior Therapy and Research Program at the University of Nevada, Reno. His research interests include understanding the relationships between emotion dysregulation and couple and family interactions, developing and evaluating effective treatments for borderline personality and related disorders, depression, and family violence, and effective supervision and training methods.

Katrina Y. Crenshaw received her MA from the University of Nevada, Reno. She is currently a doctoral student in clinical psychology at the Pacific Graduate School of Psychology/Palo Alto University. Her research interests include suicidal ideation and behavior, Axis II disorders, commercially exploited youth, and ethnic minority populations.

Karen M. Erikson received her MA in clinical psychology from the University of Nevada, Reno, where she is currently a doctoral candidate. Her areas of research and practice include applications of acceptance-based approaches, including dialectical behavior therapy, and the etiology and treatment of problems relating to affect regulation.

Barrie M. Katrichak received his PhD in clinical psychology from The Wright Institute in Berkeley, CA. His areas of professional interest are in the areas of assessment, family violence, mental health service delivery and program outcomes, and professional development.

Megan Oser received her PhD in clinical psychology from the University of Nevada, Reno. She is a postdoctoral research fellow at the Center for Health Care Evaluation at Veterans Administration Palo Alto Health Care System and Stanford University School of Medicine. Her professional interests include behavioral medicine, integrated behavioral health care, acceptance and mindfulness-based cognitive-behavioral therapies, and clinician training and supervision.

Larry D. Pruitt is a doctoral candidate at the University of Nevada, Reno. He is currently completing his predoctoral internship at the Veterans Administration Sierra Nevada Healthcare System. His research interests include the development of emotion regulation-based models of the anxiety disorders and transdiagnostic approaches to psychopathology.

Melanie M. Watkins received her MD from Stanford Medical School and completed her residency in psychiatry at the University of Nevada, Reno. She practices general adult

psychiatry on an acute psychiatric unit at Contra Costa County Regional Medical Center in Martinez, CA.

Table 1

Mean Differences in Pre- and Post-Session of Alpha-Amylase and Cortisol

Marker	Measurement				Pairwise significance
	Preession		Postsession		
	M	SD	M	SD	
Alpha-amylase (U/ml)	44.246	47.350	32.427	30.584	$p = .038$
Cortisol (µg/dl)	0.265	0.278	0.157	0.104	$p = .045$

Note. Means are based on the total number of pre-post measurements available. Although on average therapists demonstrated elevated physiological stress at pre-session relative to post-session, the average measurements at pre- and post-sessions were within the normal range of alphaamylase and cortisol among adults (normal ranges provided by Salimetrics, LLC, State College, PA).

Table 2

Predicting Pre–Post Differences in Physiological Stress From Working Alliance and Perceived Session Difficulty

Marker	Predictor variable			
	Working alliance		Session difficulty	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Alpha-amylase (Δ U/ml)	0.456	0.892	17.175**	5.531
Cortisol (Δ μ g/dl)	0.004*	0.002	0.009	0.021

Note. Displayed are unstandardized regression coefficients that were obtained from a linear mixed model, in which pre–post differences on physiological variables were regressed onto self-reported variables. Differences scores (Δ) were computed by subtracting the postmeasurement from the premeasurement. Thus, difference scores indicate the amount of *decrease* on a particular variable between start and end of a therapy session. As a result, for example, the positive coefficient for session difficulty on alpha-amylase (Δ) reflects that the greater the perceived difficulty of a session was associated with a greater decrease in alphaamylase.

*
 $p < .05$.

**
 $p < .01$.