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Abstract

Exposure-based therapies have been considered the most efficacious treatments for social anxiety disorder (i.e., Gould et al., 1997). The majority of the theory behind exposure-based treatments rely on Foa and colleagues's (Foa, Huppert, & Cahill, 2005; Foa & Kozak, 1986) emotional processing theory. However, there has been less research examining the way that emotional processing occurs across actual treatment sessions for clients with social anxiety disorder. This study utilized longitudinal data analytic methods to examine the changes in subjective anxiety during the first three exposure sessions in group and individual cognitive-behavioral therapy for social anxiety disorder. The results of this study provide preliminary evidence that while anxiety generally decreases across each exposure, some individuals experience considerable fluctuations in anxiety during a single exposure. Additionally, early exposures may be experienced differently than later exposures. Overall, this study highlights the importance of more fine-grained analyses to better understand the mechanisms underlying exposure-based therapy.

Exposure therapy was first recognized as a treatment for fears in the 1920s when Mary Cover Jones, a student of John Watson's applied classical conditioning techniques to the successful treatment of a young boy's fear of rabbits (Jones, 1924). Today, exposure-based treatments are widely used and have been shown to be efficacious in reducing fear and anxiety in a variety of anxiety disorders including social anxiety disorder (Craske, 1999). Social anxiety disorder, also referred to as social phobia, is a debilitating disorder characterized by persistent fear and anxiety in social or performance situations (DSM-IV-TR; American Psychiatric Association, 2000). In general, cognitive-behavioral therapy (CBT) has been shown to be efficacious in the treatment of social anxiety disorder (e.g. Fedoroff & Taylor, 2001; Feske & Chambless, 1995; Gould, Buckminster, Pollack, Otto, & Yap, 1997; Taylor, 1996), especially cognitive-behavioral treatments that involve exposure with or without cognitive restructuring (e.g. Feske & Chambless, 1995; Gould et al., 1997). This indicates that exposure is a key component in CBT for social anxiety disorder.

One theory behind the exposure component of therapy is emotional processing theory (Foa, Huppert, & Cahill, 2005; Foa & Kozak, 1986). According to Foa and Kozak's original theory, anxiety occurs when the information structures that signal escape or avoidance are activated. Fear reduction, the goal of emotional processing, results from the modification of

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these fear structures in memory through habituation and cognitive change so that they no longer trigger a desire to escape or avoid. According to Foa and colleagues, for fear reduction to occur, two conditions need to exist. First the fear structure needs to be activated through the presentation of fear-relevant information. Second, information that is incompatible with some aspect of the fear structure needs to be presented and incorporated to form a new memory. Cognitive, emotional, or physiological information can be deemed incompatible when they provide evidence counter to the fear structure. For example, physiological habituation during an exposure provides evidence that physiological arousal can be low even when the feared stimulus is present, which in turn weakens the fear structure and reduces the anxiety. Cognitive restructuring and habituation during the exposure serve to provide incompatible information. Foa and Kozak (1986) describe three responses during exposure-based treatment that are necessary indicators of emotional processing: client self-report of fear activation, which shows that the fear structure has been activated; gradual decrease in the emotional reaction during the exposure, which indicates within-session habituation to the stimuli; and initial emotional reactions that decrease from session to session, which demonstrates that the cognitive structure underlying the disorder has been modified.

One way that emotional processing can be assessed is through ratings of subjective units of discomfort (SUDS; Foa & Kozak, 1986; Wolpe & Lazarus, 1967). These ratings provide a subjective report by the client of the intensity of the anxiety that he or she feels at any given time. It should be noted that physiological arousal could also provide evidence of emotional processing. However, devices used to measure physiological arousal may impede the therapeutic process and/or reduce the reality of the exposure experience. In addition, Marks, Boulougouris, and Marset (1971) found that subjective reports of anxiety better discriminated between phobic and neutral stimuli than did physiological reports.

Previous research has examined various patterns of anxiety during treatment and their relationship to outcome. In terms of fear activation, studies have shown that individuals who benefited most from treatment also reported higher levels of fear activation (Borkovec & Sides, 1979; Jansson, Öst, & Jerremalm, 1987; Kozak, Foa, & Steketee, 1988; Lang, Melamed, & Hart, 1970). On the other hand, a number of other studies have shown that high initial arousal impedes habituation during exposure (e.g. Coles & Heimberg, 2000; Foa et al., 1983). According to Lader and Wing (1966), habituation should be more successful for individuals with moderate levels of arousal because they will habituate more rapidly than those who display strong arousal during the exposure. It has also been suggested that extreme levels of arousal may impede emotional processing (Foa et al., 2005). Other research has focused on within- and between-session habituation. Consistent with the theories on habituation and emotional processing, several studies have found that within-session habituation (Beck, Shipherd, & Zebb, 1997; Foa & Chambless, 1978; Grayson, Foa, & Steketee, 1982) and between-session habituation (Kozak et al., 1988) are both related to outcome. However, recent accounts of emotional processing theory (Huppert & Foa, 2004) have focused on research demonstrating a relationship between outcome and between-session, but not within-session, habituation (e.g. van Minnen & Hagenaars, 2002; Foa, Grayson, & Steketee, 1982; Jaycox et al., 1998; Kozak et al., 1988).

To further understand the complex patterns seen in the emotional processing literature, researchers are moving away from examining only peak or mean SUDS ratings and are instead focusing on the pattern of SUDS. For example, Heimberg and Becker (2002) discuss five different patterns of SUDS during the performance of social situations: the spike, the steady decline, the asymptope, the habituation curve, and the low flat line. In a study on individuals with social anxiety disorder, Coles and Heimberg (2000) examined the patterns of self-reported anxious arousal during behavioral assessment tests (BATs) that were

completed prior to therapy. Results of the cluster analysis of the pattern of SUDS ratings during the BATs revealed a four-cluster solution: “high anxiety,” “increasing/high anxiety,” “moderate anxiety,” and “mild anxiety.” Cluster membership predicted differences in pre-treatment symptoms. However, patterns of anxiety exhibited within actual treatment sessions for social anxiety disorder were not examined. It is possible that patterns of anxiety are different during assessment than treatment.

In a study of rape victims, Jaycox and colleagues (1998) examined patterns of subjective anxiety that predicted improvement during exposure treatment. Using a cluster analysis of the average SUDS ratings, they found a three-cluster solution: high initial engagement and gradual between-session habituation, high initial engagement without habituation, and moderate initial engagement without habituation. Individuals who had a high initial engagement level and gradual habituation between the first and second exposure session showed more improvement than did clients with high initial engagement and no habituation and those with moderate initial engagement and no habituation. However, similar research has not been conducted with individuals with social anxiety disorder.

Previous research has shown that exposure is a key element of CBT for social anxiety disorder and has demonstrated that habituation and emotional processing are important mechanisms of change. However, previous research has commonly used a single measure (i.e. peak or average SUDS) rather than examining longitudinal changes in subjective anxiety. In response to recent calls to examine the shape of change when examining treatment mechanisms (Laurenceau, Hayes, & Feldman, in press), the current study employed growth curve modeling techniques to examine the course of subjective anxiety changes during in-session exposures across treatment. This study utilized a multi-site, multi-modality therapy sample to examine the pattern of anxiety within a course of treatment for social anxiety disorder. Consistent with the results by Coles and Heimberg (2000) and Jaycox and colleagues (1998), it is expected that there will be three distinct patterns of SUDS for the exposures: moderate level of subjective anxiety that increases to a peak before it decreases during the exposure, consistent high anxiety throughout the exposure, and consistent moderate anxiety throughout the exposure. Consistent with Heimberg and Becker’s (2002) habituation curve, it is expected that the largest changes in subjective improvement of symptoms between sessions will follow exposures in which subjective anxiety levels start at a moderate level, increase to a peak, and then decrease.

Growth curve analysis is one method for examining longitudinal data in which the emphasis is on individual differences. Here, latent variables are estimated based on a repeated univariate measure. First, a separate curve is estimated for each individual based on the repeated measure. The curves are allowed to vary between individuals; however, the shape remains constant so that all curves are linear or all are quadratic. These individual curves are then combined, and a number of estimates are calculated. The analysis provides six parameter estimates for the basic linear model: the mean intercept and slope, the variance in intercept and slope, the covariance between the intercept and the slope, and the fit of each person’s observed data points to their idealized linear trajectory. The mean intercept is the average score at a given time point. In this study, the intercept is defined as the initial anxiety rating. The mean slope is the average linear growth rate. In this case, the slope is the average rate of change in anxiety per minute. The two variance parameters estimate how much individual intercepts and slopes vary within the sample. The covariance represents the relationship between one’s initial score and how quickly he or she changes. Because the focus of the analysis is on the individual, it is possible to examine how predictor variables (e.g., pre-treatment severity) influence these parameters and how the parameters relate to distal outcomes (i.e. post-treatment anxiety).

There are a number of advantages of growth curve analysis over more traditional modes of analysis (e.g., trend analysis using analysis of variance) for the study of change in psychotherapy (Francis, Fletcher, Steubing, Davidson, & Thompson, 1991). For example, in growth curve analysis the focus is on individual change, which allows for the correlation of the various parameters and participant characteristics. Also, participants can be included in the analysis even if they have missing data.

Methods

Participants

Participants for this study included a total of 95 clients; 47 clients who participated in Cognitive Behavioral Group Therapy (CBGT) at the University of Nebraska-Lincoln's Anxiety Disorders Clinic (UNL) and 48 clients who received individual CBT at either UNL (n = 26) or at Temple University's Adult Anxiety Clinic (Temple; n = 22). All data were archival. The individual treatment data were collected from the late 1990s to the early 2000s, while the group treatment data were collected in the early 1990s. See Table 1 for the demographic characteristics for the sample. When comparing the individual CBT samples from UNL and Temple, the sample from Temple was younger ($F(1, 46) = 9.34$, $p = .004$), more likely to be single ($\chi^2(1) = 4.78$, $p = .03$), and more ethnically diverse ($\chi^2(1) = 14.93$, $p < .001$) than the UNL sample. Although there were differences between these samples, these differences add to the generalizability of the results. To examine the potential impact that these differences could have on the results, site was added to the models. There were no significant differences when comparing those in individual versus group treatment. Ethnicity was not recorded for those in the group treatment; however, it is assumed that, similar to subsequent samples from this site, this sample was largely European-American. Clients were considered treatment completers if they completed 75% of the total sessions (9 of 12 sessions for group therapy; 12 of 16 sessions for individual therapy). With this definition, 13 (27.6%) clients dropped out of group treatment and 8 (16.7%) clients dropped out of individual treatment.

Participant Selection

Participants were selected for this study if they had a primary diagnosis of social anxiety disorder and had entered individualized or group treatment for social anxiety disorder. Participants were included in this study even if they had comorbid conditions as long as social anxiety was their primary concern. Participants were also included if they were taking psychotropic medications; however, they were asked to remain on stable doses throughout treatment. Participants were excluded if they required immediate attention (i.e. they were at immediate harm to themselves or someone else or they were actively psychotic), or if they were currently receiving therapy from an additional mental health provider. Participants were recruited through newspaper advertisements targeted at people with anxiety in social situations and through referrals from local providers. After an initial phone screening, all potential clients were administered the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown, DiNardo, & Barlow, 1994), the Anxiety Disorders Interview Schedule for DSM-IV Lifetime version (ADIS-IV-L; DiNardo, Brown, & Barlow, 1994), or the Anxiety Disorders Interview Schedule – Revised (ADIS-R; DiNardo & Barlow, 1988). A comparison of the diagnostic criteria for social anxiety disorder from the ADIS-IV, ADIS-IV-L, and the ADIS-R indicates that diagnoses should not differ as a result of the specific interview administered. The ADIS-IV and the ADIS-R both include a Clinician Severity Rating (CSR) based on the extent to which the anxiety interferes with daily functioning. A client was included in this study if his or her primary diagnosis on the ADIS-IV/ADIS-IV-L/ADIS-R was social anxiety disorder, with a CSR of at least four on this 0 to 8 scale. CSRs range from 0 (not at all severe) to 8 (extremely severe/distressing). A CSR of 4 (moderate

impairment) is generally considered the cut-off for a disorder of clinical significance (Heimberg et al., 1990). In addition, participants must have received individual cognitive-behavioral treatment for social anxiety using the Hope, Heimberg, Juster, and Turk (2000) protocol or Cognitive Behavioral Group Therapy (CBGT; Heimberg, 1991; Heimberg & Becker, 2002).

Diagnostic interviews were conducted by advanced graduate students in clinical psychology or doctoral-level psychologists who had undergone the rigorous training regimen suggested by the developers of the ADIS-IV. Training consisted of watching three interviews conducted by an experienced interviewer, then conducting at least three interviews under observation. Trainees from the UNL must match the experienced interviewer on at least four out of five of these interviews. Trainees from Temple must match on three consecutive interviews. A match indicates that the trainee and the experienced interviewer agreed on the CSR for the primary diagnosis and the presence of all secondary diagnoses. A subset of the recorded interviewers from the UNL site were independently rated by a second trained rater and yielded a Kappa of .87. Diagnoses were reviewed at weekly staff meetings. In no case did it become apparent during treatment that a diagnosis other than social anxiety disorder would have been a more appropriate principal diagnosis.

Measures

Subjective Units of Discomfort—In this study, the extent of emotional processing was determined by the client's ratings of subjective units of discomfort (SUDS) during each exposure. SUDS ratings range from 0 indicating "No anxiety, calm, relaxed" to 100 indicating "Very severe anxiety, the worst ever encountered" (Hope et al., 2000; Wolpe & Lazarus, 1967) and were elicited approximately every minute during the exposure. It should be noted that SUDS ratings were used throughout therapy to rate the difficulty of exposure situations and as a way for the therapists to gauge how anxious the clients were during the exposure. Clients were introduced to SUDS ratings during their initial ADIS interview in which the interviewer helped the client determine anchors for SUDS ratings of 0, 25, 50, 75, and 100. Clients were reminded of these anchors during treatment. In addition, clients used SUDS ratings throughout treatment to monitor daily anxiety and to form a fear and avoidance hierarchy. By the first exposure, clients had repeatedly practiced using the SUDS scale. SUDS ratings were recorded by the therapist during sessions.

Social Anxiety Session Change Index—The Social Anxiety Session Change Index (SASCI; Hayes, Miller, Hope, Heimberg, & Juster, 2006) is a 4-item self-report measure filled out before each therapy session to assess the progress that the client feels he or she has made since the beginning of therapy. This scale asks respondents to use a 7-point likert-type scale ranging from 1 (Much Less than the Start of Treatment) to 7 (Much More than the Start of Treatment) to answer questions about their anxiety in social/performance situations, their avoidance of social/performance situations, their concern about embarrassing or humiliating themselves, and the amount that their anxiety interferes with social activities. This study used the total SASCI score based on the sum of the four items. This measure is face valid and has a Cronbach's alpha for each session ranging from .84 to 0.94 (M = 0.89). The SASCI measure was completed only by the 48 clients undergoing individual treatment.

Brief Fear of Negative Evaluation Scale—The Brief Fear of Negative Evaluation Scale (BFNE; Leary, 1983) is a 12-item questionnaire that measures the client's fears of being negatively evaluated: the core feature of social anxiety disorder. This scale asks respondents to use a 5-point likert-type scale ranging from 1 (Not at all Characteristic) to 5 (Extremely Characteristic). Four out of the twelve items are reverse keyed. The BFNE is highly correlated (r = .96) with the original Fear of Negative Evaluation scale (FNE; Watson

& Friend, 1969). Cronbach's alphas were .91 for pre-treatment and .89 for post-treatment BFNE scores for a subsample of this population (n = 38 and n = 23, respectively). In a clinical sample of individuals with either social phobia or panic disorder, the BFNE was shown to have excellent reliability and validity (Collins, Westra, Dozois, & Stewart, 2005). In the Collins et al. (2005) study, the BFNE also appeared to be sensitive to pre- to post-treatment change. Other studies have demonstrated convergent and discriminant validity for the BFNE (Rodebaugh et al., 2004; Weeks et al., 2005). While these three studies (Collins et al., 2005; Rodebaugh et al., 2004; Weeks et al., 2005) all used variations of the original BFNE that either only used the eight straightforward items or reworded the reverse keyed items, we chose to use the BFNE in its original form. The BFNE was completed prior to every session for clients in both the individual and the group. The BFNE was also completed pre- and post-treatment for the 48 clients receiving individual therapy.

Clinician Severity Rating—Clinician Severity Ratings (CSRs), which are described above, were determined pre- and post-treatment for clients in the individual treatment group and a portion of the clients in group treatment.

Clinical Global Impressions Scale—The Clinical Global Impressions scale (CGI; NIMH, 1985) measures therapeutic improvement and severity of symptoms. In this study, we examined only the improvement item, which was completed by the ADIS interviewer or an independent assessor. Improvement is measured on a 7-point likert-type scale ranging from a score of 1 (Markedly Improved) to 7 (Markedly Worse). A modified version of the CGI which used specific definitions for each anchor point has been shown to be positively related to both self-report and clinician-administered measures of social anxiety, depression, impairment, and quality of life (Zaider, Heimberg, Fresco, Schneier, & Liebowitz, 2003). In this study, this modified version of the CGI was completed for 25 clients who completed individual therapy.

Procedures

The data for this study were taken from clients who underwent 12 weeks of group CBT for social anxiety at the Anxiety Disorders Clinic at the University of Nebraska-Lincoln or 16 weeks of individual CBT for social anxiety disorder at either the Anxiety Disorders Clinic of the University of Nebraska-Lincoln or at the Adult Anxiety Disorders Clinic of Temple University. The majority of participants (n = 26) in the individual treatment condition were part of a multicenter individual social anxiety treatment study. The remaining 20 participants from the individual modality consists of clients seen as training cases for the larger study, clients who did not meet the rigid inclusion criteria set forth in the larger study, or clients who attended the clinics after the larger study was completed. As part of the CBT protocol used, clients participated in a series of in-session exposures after completing segments on psychoeducation and cognitive-restructuring. During each exposure, the client was asked to provide a SUDS rating approximately every minute. In addition, clients were asked to complete a subjective measure of their improvement (SASCI) and a social anxiety measure (BFNE) prior to every session. Assessment batteries completed pre- and post-treatment included an ADIS interview, which includes a Clinician's Severity Rating (CSR) and a Clinical Global Impressions (CGI) measure post-treatment, and a packet of questionnaires containing a measure of social anxiety (BFNE).

Treatment Overview

The group treatment was based on the CBGT protocol (Heimberg, 1991; Heimberg & Becker, 2002). This treatment is administered over 12 weeks and involves segments on psychoeducation, cognitive restructuring, and role-played and *in vivo* exposures. The individual treatment followed the Hope et al. (2000) manual, which is a client workbook

adapted from the procedures of Heimberg's CBGT protocol for use with individual treatment. This treatment is administered over 16 weeks and involves the same segments as the group treatment. Additionally, the individual treatment formalized advanced cognitive restructuring and relapse prevention segments that were consistently done in the group treatment though not a formal part of the protocol. CBGT has been shown to be more efficacious than a wait-list control group (Hope et al., 1995) and an attention placebo control group (Heimberg et al., 1990) and equally as efficacious as phenelzine (Heimberg et al., 1998). It also appears that CBGT can be adapted to an individual treatment format with equal success (Zaider, Heimberg, Roth, Hope & Turk, 2003).

Therapists

Therapists in this study were doctoral-level clinical psychologists or advanced graduate students supervised by a licensed clinical psychologist. Therapists received supervision on a weekly basis either in groups or individually. For the group treatment, adherence was maintained through a weekly review of all therapy tapes by licensed psychologist well-trained in the CBGT procedures (DAH). For the individual treatment, measures of treatment adherence from a larger treatment study indicate that therapists were within protocol. Tapes from each phase of treatment (i.e. psychoeducation, cognitive restructuring, exposure, advanced cognitive restructuring, and termination) were reliably assessed for adherence to the treatment protocol by two independent raters who coded a random sample of 20 sessions (interrater reliability r_i = .78 with intraclass correlation). Ratings were made using a therapist fidelity measure (Hope, 2001) designed for the larger study consisting of 39 specific elements of the treatment protocol such as: "Therapist initiates an appropriately difficult in-session exposure and does not allow avoidance or escape, including: working out the details of the exposure, setting an achievable behavioral goal, and obtaining SUDS ratings." A rating of 4 (reasonably effective) or 5 (extremely effective) was considered within protocol. The mean overall rating for the 155 rated items was 4.47 (*SD* = 0.69), indicating good adherence.

Data Analysis

This study employed growth mixture modeling, a structural equation modeling (SEM) approach to growth curve analysis, to model the pattern of subjective anxiety during exposures throughout the treatment of social anxiety. Growth mixture modeling allows for the examination of more than one discrete class of individuals with the goal of identifying the optimal group membership for each individual (Muthén et al., 2002; Muthén & Muthén, 2000). Class membership becomes a categorical latent variable that can be related to covariates or distal outcomes. In growth mixture modeling, model parameters are allowed to vary across groups allowing the groups to differ in terms of shape and trajectory of the curves. In other words, while traditional growth modeling assumes a common trajectory shape for the entire population (i.e., linear growth), growth mixture modeling allows for qualitatively different growth patterns. One class may be characterized as having linear growth, while a second class may be best described by quadratic growth. Additionally, class membership can also serve as both an outcome and a predictor of future events.

All growth curve models were run using Mplus 3.01 (Muthén & Muthén, 2004), a structural equation modeling software package. For all analyses, clients in group therapy were nested in their therapy group. Because clients were nested within groups, the maximum likelihood (ML) estimator was used to correct parameter standard errors for nonindependence of observations. All predictors and distal outcome variables were centered so that the parameters represent the estimates for the average individual in the sample. The intercept is the initial SUDS level.

To determine the number of classes, or distinct number of developmental trajectories, growth mixture models were constructed for each of the first three exposures. Since it was believed that there would be a curvilinear decrease in SUDS scores, initially models included parameters estimating the initial SUDS level (or intercept) and linear and quadratic change in SUDS across the exposure. The quadratic parameters were not significant and were dropped from the models. For each exposure, one, two, and three class models were estimated. The final number of classes was determined by inspection of the results, changes in the sample-size adjusted Bayesian Information Criterion (BIC), and the Lo-Mendell-Rubin Adjusted Likilihood Ratio Test (LRT; Lo, Mendell, & Rubin, 2001). The BIC is a goodness-of-fit index based on the log likelihood statistic that takes into account the number of parameters and sample size. The lower the BIC value, the better the fit of the model. The LRT is a significance test of whether or not the *k*-class solution provided a better fit than the *k*-1 class solution. The multiple class solutions also provide a measure of entropy or the classification quality of the model. Entropy values range from zero to one, with values closer to one indicating better precision in classification quality.

Initial unconditional models, models without any predictor variables, were run to determine the number of classes. Then variables were added to the model to control for treatment modality, site, pre-treatment severity, gender, and length of exposure episode. The continuous variables (pre-treatment severity and length of exposure episode) were centered. In these analyses Temple, individual treatment, and men were coded as 0, while UNL, group treatment, and women were coded as 1. These predictor variables were first added to the one-class models simultaneously to examine their overall relationship with the model parameters. Then, these variables were added simultaneously to the two-class models. This produced logistic regression coefficients which represent the increase in log-odds of being a member in the second class relative to the first class for a one-unit increase on the respective variables.

To examine the effect of the intercepts and slopes on outcome, outcome measures were added as distal outcomes in the unconditional one-class growth models. Two models were run; one for immediate outcome variables (change from exposure to post-exposure SASCI and BFNE ratings) and one for intermediate outcome (CGI and pre- to post-treatment change on the CSR and BFNE). To examine the effect of class membership on outcome, a series of analyses of variance was conducted with class membership as the independent variable and the immediate and intermediate outcome variables as the dependent variables.

Results

Preliminary Data Analyses

There were no site or modality differences on any of the measures of psychopathology or treatment outcome collected at pre- and post-treatment (i.e., CSR, BFNE, or CGI). Overall, clients began treatment with average social anxiety severity ratings (CSRs) in the moderate to severe range ($M = 5.60$; $SD = 0.94$) which decreased significantly by post-treatment [$M = 3.59$; $SD = 1.765$; $F(1, 26) = 56.40$, $p < .001$] to below the cutoff for clinical significance. Likewise, post-treatment CGI scores were on average in the “much improved” range ($M = 2.00$; $SD = 0.82$). Clients also improved significantly on the BFNE from pre-treatment ($M = 49.66$; $SD = 7.81$) to post-treatment ($M = 38.35$; $SD = 7.26$; $F(1, 25) = 84.57$, $p < .001$).

On average, clients completed 11.74 ($SD = 4.09$) sessions. As would be expected given the difference in treatment lengths (12 vs. 16 sessions), clients in individual treatment completed more sessions ($M = 14.57$; $SD = 2.91$) than clients in group treatment ($M = 8.91$; $SD = 2.99$; $F(1, 93) = 86.44$, $p < .001$). However, clients at Temple ($M = 15.50$; $SD = 1.74$) completed more sessions than clients at UNL ($M = 13.76$; $SD = 3.48$; $F(1, 46) = 4.50$, $p = .$

04). Clients completed an average of 4.32 (*SD* = 2.06) exposures. Those in individual treatment (*M* = 4.85; *SD* = 2.21) completed more exposures than those in group treatment (*M* = 3.77; *SD* = 1.75; *F*(1, 89) = 6.50, *p* = .01) and those at Temple (*M* = 5.62; *SD* = 1.80) completed more exposures than those at UNL (*M* = 4.20; *SD* = 2.34; *F*(1, 45) = 5.13, *p* = .03). Due to the decreasing number of clients who completed more than three exposures, we only had sufficient power to examine the first three exposures in this study.

Table 2 presents the number of clients completing each exposure, along with the mean session number and length of exposure for each session. The total number of exposures completed was not significantly correlated with any of the outcome variables: CGI *r*(23) = −.26, *p* = .21; change in CSR *r*(25) = .13, *p* = .52; or change in BFNE *r*(24) = −.00, *p* = .99.

One-class Models for the First Three Exposures

Table 3 presents the average initial anxiety rating and the change in anxiety across the exposure for each of the first three exposures. In all three exposures, clients' SUDS ratings began at a moderate rating (initial mean SUDS ranged from 50.06 to 55.86) which on average decreased significantly across the exposure (SUDS decrease ranged from 1.73 to 2.81 points per minute). The variance of both the initial SUDS ratings and the change in SUDS were significant indicating that there were individual differences on these two parameters.

Table 4 provides estimates of the impact that site, modality, gender, pre-treatment severity (CSR), and length of exposure had on initial SUDS and linear change in SUDS in the one-class models. In general, pre-treatment severity, length of exposure, gender, and modality were significant predictors of initial SUDS levels. Pre-treatment severity was a significant predictor of initial SUDS in the first exposure and there was a trend in the second and third exposures. For every one point increase in pre-treatment severity, clients began the exposure with average SUDS ratings that were 3.60–5.90 points higher, while holding all other variables constant. Exposure length was a significant predictor of initial SUDS in the second exposure, and there was a trend in the third exposure. For every one minute increase in exposure length, the average initial SUDS ratings were decreased by 1.61–2.70 points, while holding all other variables constant. There was also a trend in the ability of length of exposure to predict the linear change in SUDS so that, in the first and second exposures, SUDS scores decreased at a rate that was 0.38–0.54 points per minute slower for every minute that the exposure was longer, while holding all other variables constant. Gender was a significant predictor of initial anxiety in the second exposure; women reported initial anxiety levels that were 9.00 points higher on average than men, while holding all other variables constant. In the third exposure, treatment modality was a significant predictor of initial anxiety. Clients in group treatment reported, on average, initial anxiety scores that were 17.95 points higher than clients in individual treatment, while holding all other variables constant.

Outcome—The overall effect of initial SUDS and change in SUDS on outcome was examined for each of the first three exposures. As seen in Table 5, only in the third exposure do initial SUDS and change in SUDS significantly predict immediate outcome. In the third exposure, there was a 0.03 point increase in the amount of change on the SASCI for every point increase in initial SUDS. In other words, going from a 40 to a 70 on initial SUDS would correspond to approximately a one point improvement on the SASCI. On average, client's experienced a 0.51 point improvement on the BFNE for every one unit increase in the linear slope. In other words, as the linear slope becomes flatter, clients improved more based on the BFNE session ratings. In the third exposure, initial SUDS and change in SUDS

captured a larger percent of the variance in the SASCI and BFNE change scores (14.5% and 13.8% respectively) than in the previous exposures (0% to 8.2%).

When examining the relationship between intercept and slope and intermediate outcome, the pattern appears to be different as clients move from the first to the third exposures. As clients move through the exposures, initial SUDS and change in SUDS become more strongly related to outcome, becoming statistically significant in the third exposure. In the third exposure, there was a 0.02 point decrease on the CGI for every one point decrease in initial SUDS and a 0.16 point decrease on the CGI for every one unit decrease in the linear slope. Lower scores on the CGI correspond with greater improvement. Together, initial SUDS and change in SUDS accounted for 31.8% of the variance in CGI scores. For change on the CSR, there was a 0.03 point decrease on the CSR for every one point increase in initial SUDS and a 0.16 point decrease on the CSR for every one unit decrease in the linear slope. Here, larger changes in CSR indicate more improvement. Initial SUDS and change in SUDS together accounted for 11.5% (third exposure) of the variance in CSR scores.

Mixture Models for the First Three Exposures

In the models of the first three exposures, the quadratic growth component was not significant ($b = 0.01 – 0.11$); therefore, the quadratic component was dropped and these models were rerun as linear models. The Bayesian Information Criterion (BIC), entropy index, and Lo-Mendell-Rubin Adjusted Likelihood Ratio Test (LRT) for one-, two-, and three-class models for the first three exposures are presented in Table 6.

For the first exposure, different solutions were obtained when using several sets of random starting values indicating that there is no clear evidence to favor one model over the next. These different solutions coupled with the BIC and entropy values indicate that the one-class linear model appears to be the best fit to the data for the first exposure. For the second and third exposures, the BIC, entropy, and LRT values point to a two-class model providing the best fit to the data. When rerunning these models with multiple starting values, the same solutions were achieved, speaking to the robustness of the solution.

The means and variances for the intercepts and slopes from the selected models for the first three exposures are presented in Table 7. The means and variances of both initial SUDS and change in SUDS were significant. Overall, clients reported moderate levels of initial anxiety on average for each class (initial average anxiety for each class ranged from 45.60 to 58.92). On average, the anxiety decreased significantly across the exposure from 1.42 to 3.93 points per minute depending on the class. When examining the two classes for the second and third exposures, the first class began at a slightly higher initial anxiety and had anxiety scores decrease more rapidly than the second class.

Figures 1 through 3 present the observed data points and the average fitted growth trajectory for each exposure. As can be seen in the figures, the classes in the second and third exposures also appear to be divided based on the amount of variability in the linear slope components. The linear slope variance component was considerably larger in the first class (13.06 or 41.97) compared to the second classes (0.63 or 5.99) for the second and third exposures, respectively. In fact, one-way analyses of variance with the individual mean variability as the dependent variable revealed significant differences between the two classes in both the second ($F(1, 64) = 28.81$, $p < .001$) and the third ($F(1, 57) = 98.93$, $p < .001$) exposures. Here, the individual mean variability was calculated by taking the difference between the actual SUDS score and the score estimated by the individual regression line at each time point for each individual. From these score differences, a mean variability score was calculated for each client. Because of the differences in variability, the classes were termed “High Variability” for the first class and “Low Variability” for the second. In the

Low Variability class, individuals' SUDS scores remained relatively static across the exposure, as seen by the flat linear trajectories. Individuals in this class experienced little fluctuation around their idealized linear growth trajectory. On the other hand, those in the High Variability class reported substantial fluctuations in their SUDS scores across the exposure, so that at any given measurement point, the actual SUDS rating may have been far from the smoothed regression line for that individual. Clients in this class experienced increases and decreases in their SUDS ratings throughout the exposure.

The relationship between modality, site, pre-treatment severity, gender, exposure length and class membership was examined for the second and third exposures (see Table 8). Only length of exposure was related to class membership in the second exposure. An increase in exposure length made it more likely for clients to be in the High Variability class so that a one minute increase in exposure length was associated with a 0.59 decrease in the log-odds of belonging to the High Variability versus the Low Variability class. This implies that the odds of being in the High Variability class from clients at a given exposure length was 0.55 times the odds of the clients with exposure lengths one minute shorter, while holding all other variables constant. No variables were significantly related to class membership in the third exposure.

High and Low Variability Classes and Outcome

To examine how class membership related to outcome, separate analyses of variance were conducted in which class membership was the independent variable for the second and third exposure and the outcome measures were dependent variables (Table 9). Class membership for the second and third exposures was not significantly related to any of the outcome measures (session change in SASCI or BFNE; pre- to post-treatment change on BFNE, CSR, or CGI) and the effect sizes were generally small (from 0.02 to 0.34). However, when visually inspecting the means, some interesting patterns emerge. In the second exposure, the High Variability class improved by twice as many points on the session BFNE rating than did the Low Variability class. Likewise in the third exposure, the High Variability class had a mean that was considerably larger (3.27) than the Low Variability class (0.62) for change on the BFNE. The same pattern was present for change on the SASCI for the third exposure (1.50 for High Variability; 0.19 for Low Variability). However, across all of these measures, the standard deviations are larger than the means indicating that there is considerable individual variability in these relationships.

Discussion

To further our understanding of the role that emotional processing plays in exposure-based therapy, this study utilized growth mixture modeling to examine how the patterns of subjective anxiety during in-session exposures and their relationship to immediate and intermediate outcome change over the course of individual or group therapy for social anxiety disorder. To the best of our knowledge, this is the first study to examine the pattern of anxiety across multiple exposure sessions within a course of treatment for social anxiety disorder. In addition, the use of different modalities and different treatment sites within this sample provide a rich diversity of client experiences that aid in the generalizability of the findings. Overall, clients improved over the course of therapy. The number of exposures completed was not significantly related to outcome.

Therapists were instructed by the treatment manuals to select first exposures that would produce moderate levels of anxiety based on individually constructed fear and avoidance hierarchies. As expected, across the first three exposures, clients consistently began the exposures at a moderate level of subjective anxiety that decreased over the course of the exposure. The pattern of moderate initial anxiety that decreased over time was present in

each of the first three exposures. This pattern is consistent with Foa and Kozak's (1986) original statement of the emotional processing theory of fear reduction, that a fear structure needs to be activated and within-session habituation should occur for a fear to be reduced. However, it is worth noting that more recent conceptualizations of emotional processing theory state that the within-session habituation component is not necessary for improvement (Foa et al., 2005).

In terms of intermediate outcome, there were no significant relationships with initial anxiety or change in anxiety in the first exposure. However, as clients progressed in treatment, the relationship between the exposure experience and outcome became stronger, becoming statistically significant in the third exposure. In the second and third exposures, models that included only initial anxiety and change in anxiety account for a large percentage of the variance in clinician-rated pre- to post-treatment change (30.4% and 31.8%) and in change on clinician severity ratings (11.2% and 11.5%). These percentages seem fairly large when one considers all the other factors that can contribute to change over treatment (i.e., cognitive restructuring, having a supportive therapist, completing homework, and changes outside of therapy). Interestingly, it appeared that clients with lower levels of initial anxiety made more improvement. The previous literature is mixed regarding the relationship between initial fear activation and outcome. In this study, the connection between lower initial anxiety in the later sessions and outcome may be an indicator of between-session habituation. It may be that the clients who are improving are those who habituate between sessions and thus have lower initial anxiety regardless of the possible increase in difficulty of the exposure. One could argue that having lower initial anxiety in the later exposures indicates that the client has improved over treatment; thus the exposure is not eliciting substantial anxiety.

To examine potential effects of pre-treatment characteristics on the exposure curves, a number of variables were added to the one-class models. In general, pre-treatment severity of social anxiety was related to initial levels of subjective anxiety during the first three exposures. Those with more severe social anxiety began exposures with higher levels of anxiety. However, those with more severe social anxiety also tended to experience a more rapid decrease in anxiety, albeit not significantly more. What is interesting is not that they began at higher levels of anxiety, but that their decrease was more rapid so that in the end, they finished the exposure at levels similar to those with lower severity. Therefore, it is possible that while initial subjective anxiety is influenced by pre-treatment severity, the result of the exposure is similar across severity levels.

Longer exposures were related to lower initial anxiety levels and more gradual decreases. In this study, therapists determined the length of each exposure. According to the treatment manuals, therapists are to continue the exposure until the client has reported a decrease in anxiety or a plateau has been reached and it appears that additional decreases are not forthcoming. Therefore, if the client does not experience a decrease in anxiety, the therapist is more likely to continue the exposure. There were also differences in initial anxiety based on gender. Although not consistently significant, women expressed more initial anxiety then men. Previous research suggests that women report greater levels of social anxiety (Turk et al., 1998) than men. Previous research has found that women have stronger psychological responses to anxiety-provoking situations (Grossman, Wilhelm, Kawachi, & Sparrow, 2001) than men, which may explain why the women in this study reported higher levels of anxiety during the exposure. Other research has provided preliminary evidence that men underreport fears (Pierce & Kirkpatrick, 1992), possibly in an effort to conform to male stereotypes. It is also possible that men in this study were trying to conform to gender stereotypes and therefore reported lower levels of anxiety. In the third exposure, those in the group treatment began the exposure with considerably higher levels of subjective anxiety than those in the

individual treatment. It is possible that the therapists pushed the clients in the group treatment harder than those in the individual treatment because those in the group treatment were nearing the end of treatment. It is also possible that those in individual treatment responded to treatment faster because they received more individualized attention; thus by the third exposure their fear structures may have been activated less compared to those in the group treatment.

Theoretical pieces (e.g. Heimberg & Becker, 2002) and previous studies (e.g. Coles & Heimberg, 2000; Jaycox et al., 1998) have pointed to various classes of the exposure experience. Based on these previous studies, it was expected that there would be three distinct patterns of SUDS during the exposures: a habituation curve, consistent high anxiety, and consistent moderate anxiety. However, in this study, growth mixture modeling revealed one class for the first exposure and two classes for the second and third exposures. In the two-class solutions for the second and third exposures, one class began at a higher initial anxiety which decreased more rapidly than the second class; however, the initial anxiety and the rate of change were relatively similar. When examining individuals' SUDS ratings in each class, it became apparent that class membership was based on the variability in the growth rate as well as initial anxiety and slope. For example, the range of initial anxiety scores in Figures 1 and 2 was somewhat similar across both groups (20–100 versus 10–75 for the second exposure; 25–100 versus 10–100 for the third exposure). What appears to be the biggest difference is that individuals' anxiety levels in the Low Variability group stay consistent across the exposures, while the scores of those in the High Variability group deviate from their average growth rate. While this high variability pattern has traditionally been viewed as a representation of the interaction between automatic thoughts and rational responses (see Heimberg & Becker's, 2002 description of "the spike" pattern), dynamic systems theory may also provide an explanation of this pattern.

Although class differences based on variability were not hypothesized in this study, the focus on variability is consistent with dynamic systems theory (DST). DST has been used in developmental psychology (Thelen & Smith, 1994) and, more recently, clinical psychology (Hayes & Strauss, 1998). According to DST, a system consists of a number of components that interact and change over time. Some forces act to stabilize the system, while others act to change, or perturb, the system. As the perturbations increase, there will be a point where a phase shift occurs, which may lead to a new state. A period of variability has been shown to precede this shift in states (Kelso, Ding, & Schöner, 1993). If change in psychotherapy is viewed as a dynamic shift in states, than according to DST, it is likely that this phase shift would be preceded by a period of variability (For more information on the application of DST to the study of change in psychotherapy, please see Hayes & Strauss, 1998). One primary purpose of the exposure is to fully activate a fear structure and then receive disconfirming evidence. It is possible that clients who remain static across the exposure are not sufficiently engaging the situation or receiving disconfirming evidence. Using DST language, their system is not being perturbed in a way that would allow change to occur. On the other hand, those in the High Variability group are experiencing fluctuations in their experience of anxiety across the exposure. These fluctuations may indicate that individuals are interacting with the experience. In the language of DST, they are experiencing a perturbation of the system that gives them the opportunity to change. Whether they change or return to their previous state may further depend on how the perturbation is resolved. Therefore, it may be useful for future research to examine how the client processes the exposure experience.

How do DST and variability fit with emotional processing theory? Emotional processing theory is based on the idea that a fear structure needs to be activated and then disconfirming evidence needs to be introduced. The argument could be made that if clients are

experiencing fluctuations in their anxiety, then their fear structures have been activated and the fluctuations are evidence that they are receiving information that is modifying the structure. Previous research on emotional processing that has focused on initial anxiety and change in anxiety across an exposure has produced mixed results. In fact, Foa and colleagues have modified emotional processing theory to indicate that within-session habituation is not necessary for change (Huppert & Foa, 2004). However, the results of this study indicate that abandoning the focus on within-session anxiety pattern may be premature. It is possible that these mixed results indicate difficulties in the way emotional processing has been measured. Any time the focus is on group means, whether in terms of initial activation or differences in peak and final anxiety, variability is ignored. Using methodology that examines the course of anxiety at the individual level may help us to understand the role of anxiety fluctuations during the exposure and emotional processing more generally.

We hypothesized that, based on emotional processing theory, clients who experienced initial anxiety which decreased across the exposure would exhibit the most change. Change between the exposure and the post-exposure session (immediate change) and pre- to post-treatment (intermediate change) were considered. Although not statistically significant, it appears that those in the High Variability class experienced slightly more change in social anxiety symptoms between the exposure and post-exposure session than did those in the Low Variability class following the second and third exposure. The standard deviations of the outcome measures were considerably larger than the means which may contribute to the non-significant finding. Overall, class membership was not related to post-treatment outcome. This focus on variability in anxiety is intriguing and in need of further evaluation; however, a word of caution is warranted due to the small sample size, the fact that these class distinctions were not hypothesized, and the lack of statistically significant differences on the outcome measures. When examining the unconditional one-class models presented above, there appears to be differences between the first versus second and third exposures. One difference between the first and subsequent exposures becomes apparent when examining intermediate outcome. As stated above, the parameters from the second and third exposure account for a larger amount of change from pre- to post- treatment on both clinician-rated measures than the parameters from the first exposure.

The first exposure is often set up for the client to acclimate to the exposure procedures since these procedures themselves are likely to elicit anxiety for many clients. If the first exposure focuses more on the procedures and the subsequent exposures more on the situations, it makes sense that the first exposure would be experienced differently. This may explain why there was only one class of individuals in the first exposure, but two classes in the subsequent exposures. Between-session habituation may also contribute to the differences between the first and subsequent exposures. The experience of subsequent exposures depends on a number of factors including the experience of the previous exposures. As clients separate themselves based on previous exposure experiences, differences on subsequent exposures are likely to emerge. The finding that there are differences based on exposure number becomes especially relevant because the majority of previous studies on emotional processing focus on an initial one or two exposures. To fully understand exposure mechanisms, it will be important to understand these differences between initial and subsequent exposures.

This exploratory study of the pattern of subjective anxiety during in-session exposures raises a number of future questions. In this study, there appeared to be two classes during the second and third exposure based on individual variability in anxiety. More research with larger samples is needed both to replicate these findings and to determine whether there are additional classes embedded within these two groups. A larger sample would also allow for

the examination of later exposures. This study focused on the first three exposures; however, it is possible that later exposures have a unique relationship to outcome. The anxiety and the immediate outcome ratings also relied on self-report. Although therapists were asked to obtain a SUDS rating every minute, in practice, the dynamics of the exposure, especially if the therapist is serving as a role player, mean that there may be up to two minutes between ratings in some situations.

This study highlights some important methodological considerations when examining mechanisms of change in in-session exposures. As stated by Laurenceau, Hayes, and Feldman (in press), it is important to examine the trajectory of change over multiple time points. By using growth modeling, it is possible to examine the average growth rates for the sample and by using growth mixture modeling, it is possible to compare multiple trajectory classes. Even though growth mixture modeling examines individual trajectories and individual differences, the focus is still on a regression line for each individual. This focus on a linear trajectory, ignores the variability within each individual's reporting measure. These models provide a parameter estimate of the variability, but not a way to understand this variability on an individual level or how variability was directly related to outcome.

Recent revisions of emotional processing theory (i.e. Huppert & Foa, 2004) have deemphasized the within-session habituation component. However, given the findings of this study, it may be premature to stop examining the within-session pattern. Although the results of this study are far from being definitive, they do suggest that the fluctuations in anxiety during the exposure warrants further attention. Research that specifically addresses how dynamic systems theory applies to our understanding of the fluctuations in anxiety during an exposure may improve our understanding of emotional processing theory and the mechanisms behind exposure-based therapy.

This study showed differences in the exposure experience as clients moved through a series of exposures. Our treatment manuals instruct therapists to present the first exposure to clients as a chance to "get through" the exposure procedures while later exposures focus more on emotional engagement during the situation. This emotional engagement during the exposure may be visible through fluctuation in the exposure as suggested by dynamic systems theory rather than the linear decrease that therapists often expect. These fluctuations may occur naturally if the client is fully engaged in the exposure and if he or she is not using safety behaviors to "get through" the exposure. If these fluctuations are shown to be related to outcome, it is also possible that therapists could be trained to modify elements of the exposure to induce these fluctuations in anxiety, which may in turn increase the potency of in-session exposures in therapy. The first exposure is also different from the others in that neither the client nor the therapist knows how realistic or appropriate the exposure situation will be before it begins. The information gathered in the first exposure helps target the later exposures more appropriately. Therapists may try one exposure with a client and decide that exposure techniques are not useful for that client because that first exposure did not produce change. However, the data from this study suggest that an adequate trial of cognitive-behavioral therapy for social anxiety disorder requires multiple in-session exposures.

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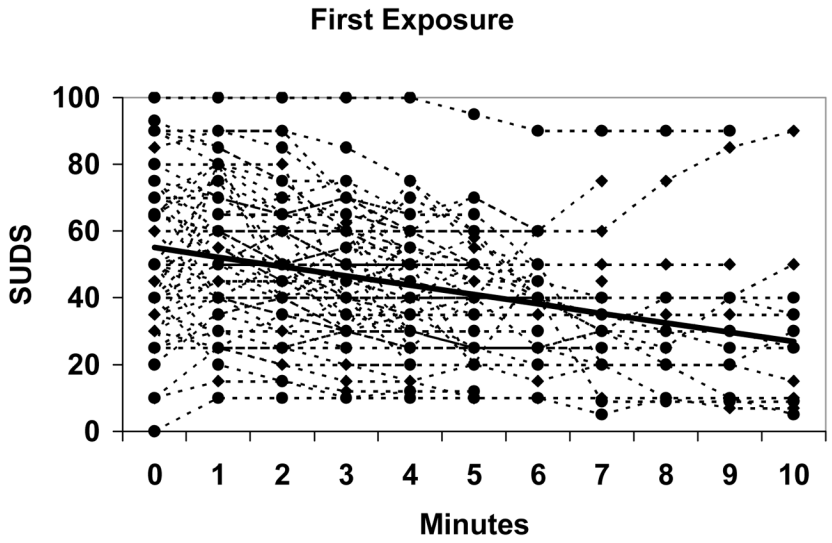

Figure 1.
First Exposure Observed Data and Average Fitted Growth Trajectory

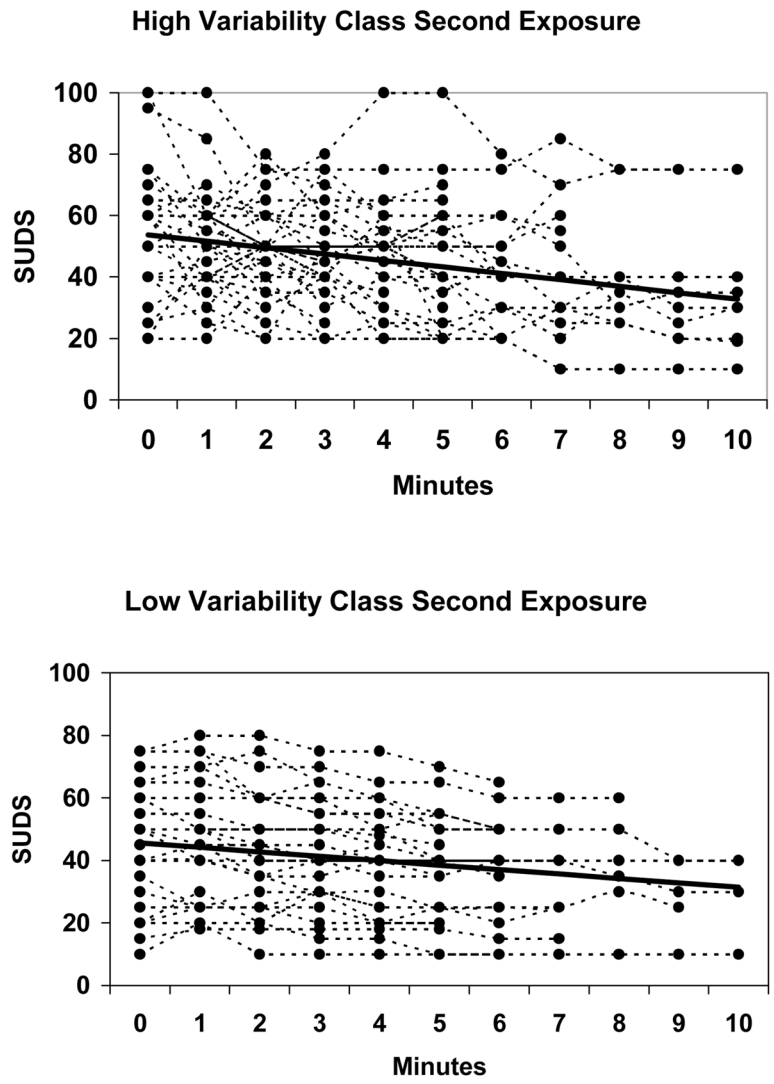

Figure 2.
Second Exposure Observed Data and Average Fitted Growth Trajectory for Each Class

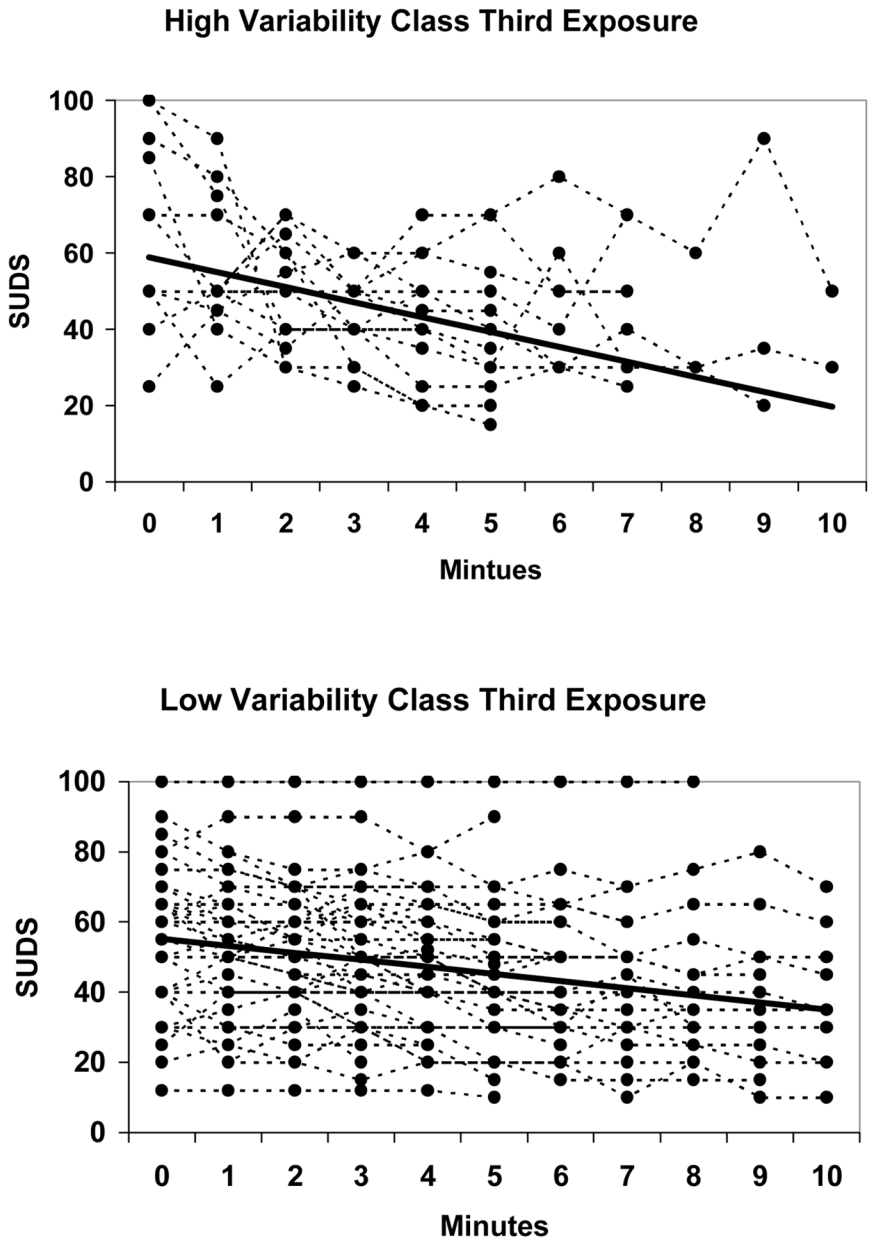

Figure 3.
Third Exposure Observed Data and Average Fitted Growth Trajectory for Each Class

Table 1

Demographic Characteristics of the Participants

	Individual UNL (*n* = 26)	Individual Temple (*n* = 22)	Total Individual (*n* = 48)	CBGT (*n* = 47)	Total Sample (*N* = 95)
Gender (Males/females)	14/12	10/12	24/24	18/29	42/53
Mean Age[a] (*SD*)	41.19 (10.45)	30.05 (12.14)	36.21 (13.51)	38.30 (9.76)	37.25 (10.34)
% Single[a]	34.6%	66.7%	48.9%	50.0%	49.5%
% Completed College	61.5%	44.4%	54.5%	50.0%	52.2%
Ethnicity[a]					
European-American	26	12	38	--	--
African-American	--	4	4	--	--
Asian-American	--	1	1	--	--
Hispanic	--	1	1	--	--
Mixed Race/Other	--	4	4	--	--

Note. CBGT = Cognitive-behavioral Group Therapy; Ethnicity was not collected for the CBGT group although, based on other samples from this site, it is assumed that the population is largely European-American.

[a]Significant difference between UNL and Temple.

Table 2

Number of Clients, Mean Session Number, and Mean Length of Exposure for Each Exposure Session

	Exposure Number								
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Number of Clients[a]	71	65	58	52	37	23	11	3	1
Group	29	25	20	16	10	2	--	--	--
Individual	42	40	38	36	27	21	11	3	1
Mean Session Number[b] (*SD*)	5.65 (2.12)	7.39 (1.78)	9.01 (1.87)	10.45 (1.93)	11.54 (1.42)	12.96 (1.68)	14.00 (1.28)	15.00 (1.00)	15.00 (n/a)
Group	3.77 (0.81)	5.92 (1.10)	7.88 (1.70)	9.18 (1.56)	10.56 (1.10)	10.83 (1.17)	--	--	--
Individual	7.53 (1.08)	8.68 (1.15)	10.00 (1.39)	11.44 (1.59)	12.18 (1.25)	13.57 (1.25)	14.00 (1.28)	15.00 (1.00)	15.00 (n/a)
Mean Length of Exposure[c] (*SD*)	6.24 (2.22)*	6.26 (2.24)	6.75 (2.23)	6.67 (2.26)	6.78 (2.48)	6.74 (2.36)	7.00 (2.19)	8.00 (3.46)	10.00 (n/a)
Group	5.44 (1.27)	5.76 (1.74)	6.15 (1.78)	6.38 (1.67)	7.20 (1.93)	6.00 (0.00)	--	--	--
Individual	6.78 (2.56)	6.58 (2.47)	7.08 (2.40)	6.80 (2.49)	6.63 (2.68)	6.81 (2.46)	7.00 (2.19)	8.00 (3.46)	10.00 (n/a)

Note.

[a] Number of clients with usable data for each exposure.

[b] Not all clients completed an exposure during the same session. Therefore, the timing of the exposures is different for each client. This table presents the mean session number that each exposure occurred during.

[c] Length of exposure is measured in minutes. Group treatment is 12 sessions long; individual treatment is 16 sessions long.

* $p < .05$.

Table 3

Parameter Estimates for the One-class Models

	Latent Growth Parameters			
	Initial SUDS		Linear Change	
	Mean	Variance	Mean	Variance
First Exposure	55.00*	460.80*	−2.81*	10.74*
Second Exposure	50.06*	273.30*	−1.73*	5.26*
Third Exposure	55.86*	335.58*	−2.47*	13.31*

Note. The repeated measure variable is Subjective Units of Discomfort (SUDS). Significant differences indicate that these parameters are significantly different from zero.

* $p < .05$.

Table 4

Influence of Site, Modality, Gender, Severity, and Length of Exposure on the One-Class Models for the First Three Exposures

	Intercept			Linear Change		
	Est.	**S.E.**	**Z**	**Est.**	**S.E.**	**Z**
1st Exposure						
Site	−6.23	8.09	−0.77	−0.55	1.25	−0.44
Modality	8.01	9.78	0.82	−0.08	1.56	−0.05
Gender	4.72	5.28	0.90	−0.75	0.90	−0.83
Pre-CSR	5.90	3.01	1.96*	−0.43	0.48	−0.89
Length	−2.70	1.93	−1.40	0.54	0.28	1.91
2nd Exposure						
Site	−3.18	5.33	−0.60	−0.07	0.94	−0.08
Modality	3.81	6.11	0.62	0.47	0.94	0.50
Gender	9.00	4.04	2.22*	−0.35	0.65	−0.54
Pre-CSR	3.60	1.91	1.88	−0.60	0.38	−1.56
Length	−2.04	0.93	−2.19*	0.38	0.20	1.94
3rd Exposure						
Site	−5.83	6.23	−0.94	−1.30	1.16	−1.12
Modality	17.95	4.44	4.04*	−1.37	1.61	−0.85
Gender	5.48	5.00	1.10	0.95	1.00	0.95
Pre-CSR	5.32	2.88	1.85	−0.78	0.63	−1.24
Length	−1.61	0.88	−1.83	0.23	0.23	1.02

Note. Est. = Parameter Estimate; S.E. = Standard Error; Z = standardized z-score. CSR = Clinician's Severity Rating. UNL, Group Treatment, and Women are the higher coded groups; Higher scores on pre-CSR indicate greater severity; Length of exposure is measured in minutes.

$Z > 1.96$ is significant at $p < .05$.

Table 5

Intercept and Slope Predicting Outcome for the One-class Models for the First Three Exposures

		Intercept			Linear Change		
	R^2	Est.	S.E.	Z	Est.	S.E.	Z
1st Exposure							
Session SASCI	8.2%	−0.03	0.03	−1.26	−0.11	0.17	−0.62
Session BFNE	3.1%	−0.03	0.04	−0.72	−0.36	0.26	−1.39
CGI	7.7%	< 0.01	0.01	0.41	−0.05	0.10	−0.47
Pre-Post CSR	6.2%	< 0.01	0.02	0.07	0.14	0.19	0.72
Pre-Post BFNE	21.6%	−0.01	0.07	−0.18	1.18	1.61	0.73
2nd Exposure							
Session SASCI	0%	< −0.01	0.02	−0.33	−0.04	0.18	−0.24
Session BFNE	2.6%	−0.05	0.06	−0.84	−0.28	0.44	−0.64
CGI	30.4%	0.02	0.01	1.40	0.23	0.12	1.82
Pre-Post CSR	11.2%	−0.02	0.02	−1.44	−0.25	0.20	−1.26
Pre-Post BFNE	0.3%	0.03	0. 06	0.47	0.15	0.75	0.20
3rd Exposure							
Session SASCI	14.5%	0.03	0.01	2.36*	< −0.01	0.08	−0.01
Session BFNE	13.8%	0.04	0.03	1.42	0.51	0.16	3.09*
CGI	31.8%	0.02	0.01	1.99*	0.16	0.05	2.90*
Pre-Post CSR	11.5%	−0.03	0.02	−1.92*	−0.16	0.09	−1.75
Pre-Post BFNE	1.7%	0.06	0.07	0.83	−0.03	0.38	−0.09

Note. R^2 = percent of variance in each outcome variable accounted for by intercept and slope. Est. = Parameter Estimate; S.E. = Standard Error; Z = standardized z-score. CSR = Clinician's Severity Rating; SASCI = Social Anxiety Session Change Index; BFNE = Brief Fear of Negative Evaluations; CGI = Clinical Global Impressions scale. Session SASCI and BFNE represent differences on these measures between the exposure and post-exposure sessions. For Session SASCI, Session BFNE, pre- to post-treatment CSR change, and pre- to post-treatment BFNE change more positive values indicate more improvement. For CGI lower numbers indicate more improvement. $Z > 1.96$ is significant at $p < .05$.

*$p < .05$.

Table 6

Bayesian Information Criterion (BIC), Entropy Index, and Lo-Mendell-Rubin Adjusted Likelihood Ration Test (LRT) Values for One-Three-Class Models for the First Three Exposures

Model	BIC	Entropy	LRT
First Exposure			
One-Class	3815.16	--	--
Two-Class	3753.45	.780	104.86
Three-Class	3732.74	.705	27.58
Second Exposure*			
One-Class	3384.79	--	--
Two-Class	3306.39	.820	115.34
Three-Class	3296.00	.786	16.99
Third Exposure			
One-Class	3252.54	--	--
Two-Class	3180.30	.828	128.29
Three-Class	3160.85	.717	25.00

*Due to the scarcity of data from the 10th minute, the analyses for the second exposure included SUDS ratings for the first nine minutes only.

Table 7

Means and Variances for Latent Growth Parameters for the Mixture Models from the First Three Exposures

	Latent Growth Parameters			
	Initial SUDS		Linear Change	
Class (%)	Mean	Variance	Mean	Variance
First Exposure				
1 (100%)	55.00*	460.80*	−2.81*	10.74*
Second Exposure				
1 (57%)	53.72*	224.50*	−2.09*	13.06*
2 (43%)	45.60*	344.79*	−1.42*	0.63*
Third Exposure				
1 (26%)	58.92*	242.76*	−3.93*	41.97*
2 (74%)	55.24*	389.26*	−2.02*	5.99*

Note. The repeated measure variable is Subjective Units of Discomfort (SUDS). Class 1 is the High Variability class; class 2 is the Low Variability class.

* $p < .05$.

Table 8

Logit Coefficients and Odds Ratios for Site, Modality, Gender, Severity, and Exposure Length in the Two-class Models of the Second and Third Exposures

	Second Exposure		Third Exposure	
	Logit Coefficient	**Odds Ratio**	**Logit Coefficient**	**Odds Ratio**
Site	−1.32	0.27	−0.65	0.52
Modality	0.71	2.03	−1.52	0.22
Gender	0.49	1.63	0.13	1.14
Pre-CSR	−0.27	0.76	0.07	1.07
Length	−0.59*	0.55	−0.34	0.71

Note. CSR = Clinician's Severity Rating. Higher values were assigned to the High Variability class, UNL, group treatment, and females; Higher scores on pre-CSR indicate higher severity; Length is exposure length in minutes.

* $p<.05$.

Table 9

Mean Differences in Outcome for the High and Low Variability Classes

	Second Exposure			Third Exposure		
	High Variability	**Low Variability**		**High Variability**	**Low Variability**	
	Mean (SD)	***Mean (SD)***	***d***	***Mean (SD)***	***Mean (SD)***	***d***
Session SASCI	0.60 (2.52)	0.56 (1.97)	0.02	1.50 (2.91)	0.19 (1.79)	0.34
Session BFNE	1.29 (5.32)	0.62 (5.49)	0.12	3.27 (6.91)	0.62 (4.79)	0.09
CGI	1.89 (0.78)	2.07 (1.01)	0.22	2.14 (0.69)	2.00 (0.89)	0.16
Pre-Post CSR	2.36 (1.69)	2.21 (1.58)	0.09	2.00 (1.73)	2.50 (1.46)	0.31
Pre-Post BFNE	16.09 (6.76)	14.57 (10.12)	0.17	15.38 (7.67)	15.81 (9.24)	0.05

Note. *d* = Cohen's *d*.; CSR = Clinician's Severity Rating; SASCI = Social Anxiety Session Change Index; BFNE = Brief Fear of Negative Evaluations; CGI = Clinical Global Impressions scale. Session SASCI and BFNE represent differences on these measures between the exposure and post-exposure sessions. For Session SASCI, Session BFNE, pre- to post-treatment CSR change, and pre- to post-treatment BFNE change more positive values indicate more improvement. For CGI lower numbers indicate more improvement.