Published in final edited form as:
J Anxiety Disord. 2011 June ; 25(5): 654–660. doi:10.1016/j.janxdis.2011.02.006.

What Happens in Session *Doesn't* Stay in Session: Changes within Exposures Predict Subsequent Improvement and Dropout

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Abstract

Previous exposure therapy research has suggested potential differences in emotional processing at different points in treatment (Hayes, Hope, & Heimberg, 2008). For example, indicators of emotional processing may be more related to outcome during the later exposure sessions than during the initial session. This is consistent with a growing body of psychotherapy research highlighting the importance of timing and change processes across therapy. The current study examined whether the learning-but-not-benefiting hypothesis is observed in a group based intervention for clients with a range of anxiety disorders. It was hypothesized that activation and within session habituation during later, but not the initial exposure session, would be related to outcome, whereas activation and within session habituation during the first session would be related to dropout status. Results revealed that lower activation and less habituation during the first exposure was associated with increased treatment discontinuation. Second, lower peak and, to a lesser extent greater activation and habituation, during exposures were generally associated with better treatment outcomes. These findings highlight the importance of examining the complexities and timing of the exposure process.

Exposure-based therapy, which involves having clients confront fearful situations, sensations, and/or images, has long been considered one of, if not the, most efficacious approaches for treating anxiety disorders (Norton & Price, 2007). Although the exact mechanisms of action (e.g., habituation, Lader & Wing, 1966; counter-conditioning, Bouton, 2002; inhibitory learning, Craske et al., 2008; integration of corrective information, Beck & Emery, 1985; Foa & Kozak, 1986) are not fully clear, several models of fear reduction suggest that decreases in state fear levels within exposure sessions underlie the between-session reduction of fear or anxiety-based disorders (however, please see the review by Craske et al., 2008 for several notable exceptions).

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Research Highlights

- Degree of activation and habituation in exposures signiciantly associated with subsequent between session improvement
- Activation and habituation during the first exposure associate with greater likelihood of discontinuing treatment.
- Activation and habituation during later exposures unrelated to dropout

Perhaps the most accepted and extensively evaluated theoretical model of anxiety change during exposure therapy is Emotional Processing Theory (Foa, Huppert, & Cahill, 2005; Foa & Kozak, 1986). Within this model, fear and anxiety reduction occur when emotional information structures are activated and modified via habituation[1] and the assimilation and accommodation of corrective fear-relevant information. According to Foa and colleagues, fear structure activation through the presentation of relevant stimuli is necessary for modification of the fear structure (Foa et al., 2005; Foa & Kozak, 1986; but see Rachman, 1980). Subsequently, corrective information that is incompatible with some aspect of the fear structure, be it cognitive, physiological, or emotional information, must be presented and incorporated into the fear structure. In describing the application of their model to exposure therapy, Foa and Kozak (1986) identify three indicators of emotional processing: (a) fear activation, (b) habituation, as shown by decreased emotional response during the exposure measured as the difference between the peak response and the final response, and (c) modification of the fear structure as evidenced by decreases in initial emotional reactions from session to session measured by comparing the peak response in one exposure trial to the peak response in the next. Craske et al. (2008) put forth recommendations for measuring indicators of emotional processing, including: continuous measurement of self-reported fear and physiology throughout exposures, exposures that are conducted on at least two separate occasions, and outcome that is measured independently of emotional processing indicators.

A number of empirical studies have evaluated the principles of emotional processing theory, albeit with somewhat conflicting results. Evaluating the first tenet, that fear activation is required before modification can occur, several studies have shown that individuals who benefited most from treatment also reported higher levels of fear activation during exposure exercises (Borkovec & Sides, 1979; Jansson, Öst, & Jerremalm, 1987; Kozak, Foa, & Steketee, 1988; Lang, Melamed, & Hart, 1970) whereas others have reported that high levels of fear activation can obstruct habituation during exposures (e.g., Foa, Grayson, Steketee, Doppelt, Turner, & Latimer, 1983). Lader and Wing (1966) and Foa et al. (2005) have suggested a compromise: that although fear activation is necessary, extreme levels of arousal may impede emotional processing. As such, exposures activating a moderate level of emotion are suggested to maximize within-session fear reduction and treatment tolerability. Further, Hayes et al. (2008) found partial evidence that participants with social phobia who discontinued treatment in a CBT trial showed less habituation during an exposure session than did those who completed treatment.

Other research has investigated the latter components of emotional processing theory—that reductions in fear within exposures will lead to the incorporation of corrective information and result in decreased activation across presentations of the feared stimuli—with similarly mixed results. Several studies have found that within-session habituation (Beck et al., 1997; Foa, & Chambless, 1978; Grayson et al., 1982) and between-session habituation (Kozak et al., 1988) are both related to outcome, whereas others have not demonstrated a relationship between within-session habituation and outcomes (e.g., Foa, Grayson, & Steketee, 1982; Jaycox, Foa, & Morral, 1998; Kozak et al., 1988; van Minnen & Hagenaars, 2002).

Although modifications of emotional processing theory have been offered to account for these discrepancies (Huppert & Foa, 2004), both Craske et al. (2008) and Hayes et al. (2008) have suggested that the discrepant results might be partly a function of methodological issues and inconsistencies. Specifically, Craske and colleagues point out that several of the emotional processing studies have not adequately assessed the indicators of emotional processing. Additionally, previous studies have had a number of methodological differences

[1]We use the term *habituation* in this paper to denote anxiety reduction during exposure, while recognizing that habituation, extinction, and counter-conditioning hypotheses are debated.

(i.e. graduated versus constant exposure, various intervals between exposures, imaginal versus in vivo exposures) making it difficult to compare results across studies. Likewise, Hayes and colleagues proposed that much of the existing literature has focused on static or mean anxiety ratings in the first one or two exposure sessions rather than on individual patterns of fear activation and habituations across the course of therapy (please note that exceptions exist, including van Minnen & Hagenaars, 2002; Jaycox et al., 1998).

Based on clinical experience, Heimberg and Becker (2002) report that clients participating in exposure exercises may have different patterns of fear activation and reduction, and these patterns may result in differential processing of corrective information. This assertion was supported in part by Coles and Heimberg (2000) who, using cluster analysis of data reported during a pre-treatment behavioral approach test among participants with social anxiety, found four distinct patterns of anxiety change that differentially predicted pretreatment anxiety symptoms. Similarly, Jaycox and colleagues (1998) reported three patterns of subjective anxiety change during exposures among victims of sexual assault. Participants showing high levels of initial engagement and gradual habituation across exposure sessions showed greater improvement during treatment than did clients with high or moderate initial engagement and no habituation.

Hayes et al. (2008) employed an individual growth curve approach to model within-session subjective anxiety ratings obtained from multiple sessions of a multi-site trial of individual cognitive behavioral therapy for social anxiety disorder. Data from a subsample of 46 clients who completed at least one exposure session during individual treatment[2] showed changes in subjective anxiety during the second and third exposures, but not the initial exposure session, were related to treatment outcome. Specifically, whereas anxiety during the first exposure was unrelated to outcome, trend-level results during the second exposure and significant results from the third exposure suggested that lower initial anxiety ratings and greater habituation within the exposure predicted greater change in anxiety severity over the course of treatment. Hayes et al. (2008) suggested that the lack of effect from the initial exposure may be a function of the specific treatment protocol, wherein the first exposure is set up to demonstrate exposure procedures to clients (Heimberg & Becker, 2002; Hope, Heimberg, Juster, & Turk, 2000). Therefore, clients may be less engaged in the first exposure, which may result in less of an impact on outcome than later exposures, highlighting the importance of examining multiple exposure sessions in studying therapeutic change. It is also possible that clients may be engaged in the first exposure, but because the therapists choose the first exposure more for demonstration that the selected exposure may be less relevant for the client's particular anxiety. In either case, it seems plausible that the first exposure would function differently than subsequent exposures.

Although the Hayes et al. (2008) study provides important preliminary data supporting the emotional processing theory account of within-session habituation leading to greater between-session anxiety reduction, several study design issues must also be considered. First, as with any study, replication is necessary to ensure that the conclusions are not influenced by sample-specific patterns of covariance. Second, given that results were obtained from an evaluation of a single specific treatment protocol (Hope et al., 2000) for a specific diagnostic group, the extent to which the results are generalizable across different populations and CBT protocols is unclear.

[2]According to Hayes et al. (2008), 47 additional participants received group CBT for social anxiety disorder, but did not complete post-treatment assessments. Therefore, results pertaining to treatment outcome were only relevant for the individual treatment subsample.

Therefore, the purpose of the present study was to attempt to replicate the previous results with a broad sample of individuals with an anxiety disorder diagnosis receiving transdiagnostic group CBT, and to examine the impact of within-session exposure variables on subsequent dropout, while taking into account several of the recommendations put forth by Craske et al. (2008). In this study, we examined multiple exposure sessions that were spaced at least a week apart and we used an outcome measure that was independent of emotional processing. During the exposures, which were graduated, self-reported levels of fear were regularly assessed.[3] It was specifically hypothesized that clients who reported greater activation and more within session habituation during later, but not the initial exposure session, would experience more of a subsequent decrease in anxiety over the remaining sessions of therapy and lower anxiety ratings at the end of therapy. On the other hand, it was hypothesized that clients who reported greater activation and more within session habituation during the first session would be more likely to subsequently drop out of treatment. As suggested by Becker, Zayfert, and Anderson (2004), there is a belief among clinicians that exposure increases pre-mature dropout. Although it has been shown that clients in exposure-based therapy for PTSD are not more likely to drop out compared to clients in other forms of cognitive behavioral therapy (Hembree et al., 2003), it is possible that clients who experience higher anxiety or experience less of a decrease in their anxiety during exposure are more likely to drop out because the benefit of placing themselves in anxiety-provoking situations may not be apparent.

Methods

Participants

Data were obtained from 106 (58.5% women) consecutive outpatient clients attending group CBT services at the University of Houston Anxiety Disorder Clinic. Clients were participating in outcome trials of a transdiagnostic group CBT protocol (Norton & Hope, unpublished) that has previously demonstrated efficacy in similar populations (Norton, 2008, in press; Norton & Hope, 2005). More specifically, 48 of 65 treatment initiators were drawn from the Norton (2008) open trial sample, whereas 58 clients of 72 treatment initiators randomized to the CBT condition were drawn from the Norton (in press) trial comparing transdiagnostic CBT and relaxation training. Data from these 106 participants were utilized for the current study because they had completed at least one exposure session. The remaining 31 dropped out before their first exposure session and therefore are not included here. Both studies used identical inclusion and exclusion criteria, and assessment and treatment procedures. The following criteria were established for inclusion in the treatment studies: (a) age 18 or older, (b) principal DSM-IV diagnosis of any anxiety disorder, (c) adequate proficiency in English, (d) no evidence of dementia or other neurocognitive conditions that would impair ability to provide informed consent or participate in treatment, and (e) absence of serious suicidality, substance abuse, or other conditions that would require immediate intervention.

Participants ranged in age from 18 to 71 (M = 32.70, SD = 10.21) and self-identified as White/European American (59.4%), Hispanic/Latino(a) (21.7%), Black/African American (7.5%), Asian (4.7%), and Other or Mixed (5.7%), with one participant not providing this information. Most participants were single (52.8%), married (30.2%), or divorced (8.5%), and the vast majority (80.1%) had at least some college education. In this sample, clients

[3]While, as Craske et al (2008) recommend, collecting physiological indicators of emotional processing is the ideal method for assessing emotional processing, data from this study were collected during clinical trials of a group-based intervention. Obtaining accurate physiological recordings was not feasible because (a) differences in exposures (e.g., a social phobic having a small-talk conversation vs. a panicker running on the spot) would differentially impact physiological recordings, and (b) we felt that being connected to recording equipment would take away from the realism and generalizability of the exposures.

had primary diagnoses of social phobia (*n* = 47), panic disorder with or without agoraphobia (*n* = 33), generalized anxiety disorder (*n* = 14), agoraphobia without panic (*n* = 2), specific phobia (*n* = 2), anxiety disorder NOS (*n* = 5), or obsessive-compulsive disorder (*n* = 3). Nearly a half (46.2%) of the sample was given one or more comorbid diagnoses, including generalized anxiety disorder (*n* = 20); major depressive disorder (*n* = 13); social phobia (*n* = 10); specific phobia (*n* = 10); dysthymic disorder (*n* = 7); panic disorder (*n* = 9); obsessive-compulsive disorder (*n* = 3); body dysmorphic disorder, adjustment disorder, and substance abuse (*n* = 2 each); and attention-deficit/hyperactivity disorder (*n* = 1).

Measures

All participants received a structured diagnostic assessment, which included the Anxiety Disorder Interview Schedule for DSM-IV (Brown, Di Nardo, & Barlow, 1994), at intake and completed the State-Trait Anxiety Inventory – state version (STAI-S; Spielberger, 1983) immediately prior to the beginning of each session.

State-Trait Anxiety Inventory – State Version—The state form of the State-Trait Anxiety Inventory (STAI-S; Spielberger, Gorsuch, Luschene, Vagg, & Jacobs, 1993) is a 20-item measure designed to assess state anxiety. STAI-S items are scored on 1 (Not at all) to 4 (Very much so) scales of how much each statement indicates how the participant feels at that moment, with a total score ranging from 20 to 80. The psychometric properties of the STAI-S are strong across multiple populations (Spielberger et al., 1993), with anxiety disorder sample means ranging from 44 to 61 (see Antony, Orsillo, & Roemer, 2001), and the measure has demonstrated sensitivity to treatment effects (e.g., Fischer & Durham, 1999). At the initial time-point (Session 1), the STAI-S was highly internally consistent in this sample (α = .95). The STAI-S was administered immediately prior to each treatment session. Among treatment completers who also attended a post-treatment assessment, the estimated session 12 STAI scores were significantly associated with post-treatment clinician-rated Global Assessment of Functioning scores, $r = -.43$, $p = .006$[4].

Dropout—Clients were coded as treatment discontinuers if they stopped attending sessions before the final (12th) session, with minor exceptions. For clients who stopped attending at the 10th or subsequent sessions, the therapists and the client's clinic file were consulted to determine the nature of the missed sessions. In eight cases, it was determined that the client did not dropout of treatment; rather, the missed sessions were better characterized as expected or unexpected client cancellations (e.g., missed sessions due to illness or work-related travel) near the end of the treatment protocol. Of the total sample, 30 participants (26.5%) discontinued treatment. Reasons for attrition were not provided by most participants.

Exposures and Subjective Units of Distress—Exposure exercises conducted in session were individually tailored to each client based on their presenting complaints and a Fear Hierarchy developed during the first treatment session. Initial exposure exercises are selected based on the hierarchy to ideally achieve moderate but not extreme activation, and subsequent exposures are designed to increase the expected level of activation in a graduated fashion. Exposures included interoceptive exercises, role-played interactions, *in vivo* exercises, or imaginal exposures depending on the client fears.

During all exposures, participants rated their anxiety at multiple time-points using Wolpe and Lazarus's (1967) Subjective Units of Distress scale (SUDS). Given the varied nature of

[4]Based on data from the Norton (in press) outcomes trial, which also included pre-post self-report assessments, effect size from the session-by-session STAI slope ($d = 1.43$) was similar to the pre-post clinician-rated diagnostic severity effect size ($d = 1.68$)

the specific client fears, and consequently the differing types and lengths of exposures conducted, a fixed SUDS assessment schedule was not feasible. In most cases, ratings were made verbally on a 0 (no anxiety) to 100 (extreme anxiety) scale every 30 to 60 seconds, typically yielding six to ten SUDS ratings. In situations that precluded verbal responding, such as during an interoceptive straw breathing exposure, alternate reporting methods were developed (e.g., show of fingers from 0 to 5) and the data were subsequently transformed to their equivalent on a 0 to 100 scale (i.e., 2 of 5 fingers was coded as 40 out of 100). Similarly, in some exposures where a therapist could not be with the client (e.g., the therapist would be a safety signal when traveling on an elevator with an agoraphobic client), the client was instructed to record their initial, peak, and end SUDS.

Based on recommendations by Craske et al. (2008), we assessed activation as the increase from baseline to peak SUDS (rise SUDS; possible scores range from 0 to 100 with higher scores suggesting greater activation), maximum anxiety (peak SUDS; 0 to 100 with higher scores suggesting higher peak anxiety) which was computed as the highest rating given during the exposure, and habituation (change SUDS; 0 to -100 with more negative scores suggesting greater habituation) which represented the difference between the SUDS rating given at the end of the exposure and the peak SUDS rating.

Anxiety Disorders Interview Schedule for DSM-IV—The Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown, Di Nardo, & Barlow, 1994) is a semi-structured diagnostic interview designed to assess the presence, nature, and severity of DSM-IV anxiety, mood, and somatoform disorders, as well as previous mental health history. All ADIS-IV interviewers, advanced doctoral students, were trained to reliability standards by observing an interview conducted by an experienced interviewer then conducting at least three interviews under observation. All diagnostic interviewers also estimated DSM-IV Axis V Global Assessment of Functioning scores. The ADIS-IV includes a Clinician Severity Rating (CSR) based on the extent to which the anxiety interferes with daily functioning. CSRs range from 0 (not at all severe) to 8 (extremely severe/distressing) with a CSR of 4 (moderate impairment) or more being considered a clinically significant disorder (Heimberg et al., 1990).

Procedure

Assessment and treatment were conducted at the University of Houston Anxiety Disorder Clinic. All methods and procedures were reviewed by the Institutional Review Board of the University of Houston. All potential participants underwent a brief telephone screen to provide initial evidence of suitability for the study. Potential participants who appeared to be eligible for participation were scheduled for the structured diagnostic evaluation. Following the evaluation, participants eligible for participation were enrolled in a cognitive behavioral transdiagnostic group for anxiety. Informed consent was obtained from all participants.

Treatment consisted of 12 weekly two-hour sessions following a manualized treatment protocol (Norton & Hope, unpublished). The first nine treatment sessions include three core ingredients of CBT: (1) psychoeducation and self-monitoring (1.5 sessions), (2) cognitive restructuring (1.5 sessions), and (3) exposure to feared stimuli (6 sessions). Although the group composition differs from diagnosis-specific CBT, and the protocol typically adopts a more individualized case formulation stance, the hypothesized mechanisms of action are similar to those of diagnosis-specific CBT protocols. During the final sessions, the focus shifts from the client's specific presenting fear to the underlying perceptions of uncontrollability, unpredictability, and threat (2 sessions). During this phase cognitive techniques are utilized to identify and challenge core beliefs of threat, negativity, and personal control over events. Although this phase of treatment is similar to the earlier

cognitive restructuring, the emphasis is not on the immediate and most salient fears but rather the application of cognitive restructuring skills to a general negative affective style. Finally, treatment concludes with discussion on termination and relapse prevention (1 session). Clients attended an average of 7.02 sessions (*SD* = 3.33), with a median of 7.00 and the modal number of sessions being 11. The number of sessions attended was not significantly related to severity of primary diagnosis, as rated by an independent assessor who conducted the initial pre-treatment ADIS-IV (r = -.12, p = .37).

The therapists and independent assessors were senior graduate students in a clinical psychology program who were supervised by the first author during weekly supervision sessions. All diagnostic assessments were conducted by graduate therapists. A recent randomized clinical trial (Norton, 2009) from which a subset of these data were obtained (i.e., those clients completing at least one exposure in the clinical trial) reported excellent treatment fidelity (average rating of 4.81 out of 5.00 [SD=0.23]) and diagnostic reliability (86% agreement on primary and comorbid diagnoses).

Analytic Plan

Using a hierarchical linear modeling approach, the data were configured to estimate the linear growth trajectory for each individual participant using STAI-S scores reported at the beginning of each session in this study. Linear models can be conceptualized as an extension of linear regression, but with the incorporation of individual-level effects in addition to group-level effects. In essence, individual regression lines are modeled for each participant, such that their severity and change can be expressed as a combination of individual intercept and slope parameters, thereby providing estimates of both the intercept and slope of the sample as well as estimates of the average deviations of individual participants from these intercepts and slopes (Francis, Fletcher, Steubing, Davidson, & Thompson, 1991; Hedeker, 2004). As the individual regression lines are fitted to the available longitudinal data, assuming at least two time points are available, missing data are less problematic than in other data analytic approaches (for an accessible introduction see Hedeker, 2004). In these analyses, slopes were fitted only for sessions after the exposure of interest to minimize the effect of prior improvement on outcome. For example, when examining an exposure in session four, the slope was modeled from session five to twelve. Additionally, individual estimated intercepts were modeled at the final (12^{th}) session to estimate each participant's anxiety at the end of treatment. Within-session activation (rise SUDS), maximum anxiety (peak SUDS) and habituation (change SUDS) were regressed together as level 2 predictors of the level 1 slope and intercept (session 12 STAI-S score) after controlling for pre-treatment severity based on independent assessor severity ratings of the primary diagnosis during the ADIS-IV assessment. Furthermore, within-session rise SUDS, peak SUDS, and change in SUDS were also separately regressed onto a dichotomous variable representing subsequent dropout status after controlling for pre-treatment severity. All tests of significance used a two-tailed test with a critical value of $p < .05$.

For secondary analyses to examine if the relationships between within-session exposure variables on slopes, session 12 intercepts, and dropout status, analyses were conducted using multi-group growth models with the parameters being freely estimated for each diagnostic group (Muthén & Muthén, 1997). Assuming convergence, the models were re-run constraining the loadings of the within-session parameters on the relevant outcomes (e.g., slope, dropout status, etc.) to be invariant across diagnostic groups. Comparison of model fit was determined by the model's Bayesian Information Criterion (BIC).

Results

Preliminary Analyses

This study is based on 93 clients who completed at least one in-session exposure during a transdiagnostic cognitive-behavioral group therapy for anxiety disorders. Including treatment discontinuers, clients in this sample completed an average of 3.23 (*SD* = 1.48, Range: 1 to 6, Skew = .015) exposures throughout treatment. Across the sample, participants reported an average SUDS of 55.37 (*sd* = 26.67) for initial rating, 69.73 (*sd* = 22.94) for the peak rating, and 46.09 (*sd* = 25.63) for the end rating during the first exposure. Similar average SUDS ratings were observed for the second [initial: 49.91 (*sd* = 27.55), peak: 63.22 (*sd* = 22.56), end: 36.60 (*sd* = 23.61)] and third exposures [initial: 48.77 (*sd* = 22.26), peak: 63.05 (*sd* = 19.97), end: 36.35 (*sd* = 21.52)]. In the first exposure, the initial SUDS were on average higher for those clients who subsequently dropped out of treatment compared to those who completed treatment (see Table 1).

Analyses of E1 to E3 Exposures

The results of the regression analyses appear in Table 2.The first exposure's (E1) peak SUDS ($Z = 2.09$, $p = .03$, $\beta = .306$), but not change in SUDS ($Z = 0.84$, $p = .40$) or rise SUDS ($Z = -0.44$, $p = .66$), was significantly related to subsequent post-treatment outcome. Although E1 was not hypothesized to impact outcome based on the results of Hayes et al. (2008), the nature of the relationship was such that lower peak SUDS was associated with lower STAI-S scores at the end of treatment after controlling for pre-treatment severity. Neither E1 rise SUDS, peak SUDS, nor change in SUDS (rise: $Z = 1.02$, $p = .31$; peak: $Z = -1.24$, $p = .22$, change: $Z = -0.98$, $p = .33$) was related to subsequent linear slope. However, E1 rise ($Z = -1.97$, $p = .05$, $\beta = -.195$) and E1 change ($Z = 2.39$, $p = .02$, $\beta = .208$) but not peak ($Z = 1.21$, $p = .23$), were significantly associated with subsequent dropout. The nature of the relationships was that lower activation and less decrease in SUDS would be associated with a greater likelihood of discontinuing treatment subsequently. Of those dropping out after E1, 63.3% did not attend any sessions after E1 whereas an additional 20.0% attended only one additional session.

E2 rise SUDS ($Z = -2.85$, $p = .004$, $\beta = -.333$) and peak SUDS ($Z = 3.17$, $p = .002$, $\beta = .564$) were strongly related to outcome, and rise SUDS was also related to subsequent change ($Z = -2.37$, $p = .02$, $\beta = -.473$) such that, as hypothesized, greater activation and lower peak SUDS were associated with lower end-of-treatment STAI-S scores and greater activation was associated with greater decrease in STAI-S subsequent to E2 after controlling for initial severity. E2 rise ($Z = -0.99$, $p = .32$), peak ($Z = 0.91$, $p = .36$), and change ($Z = -0.97$, $p = .33$) were not significantly related to subsequent dropout.

Finally, E3 peak SUDS ($Z = 2.50$, $p = .01$, $\beta = .361$) and change in SUDS ($Z = 2.20$, $p = .03$, $\beta = .388$), but not rise SUDS ($Z = -1.55$, $p = .12$) were related to outcome. The relationship was such that lower peak anxiety and greater decrease in SUDS during E3 was associated with lower end-of-treatment STAI-S scores. E3 rise ($Z = -0.54$, $p = .59$), peak ($Z = 0.88$, $p = .38$), and change ($Z = 0.80$, $p = .42$) were similarly not significantly related to subsequent dropout.

Comparison by Primary Diagnosis

Given the Hayes et al. (2008) study exclusively examined individuals with primary diagnoses of social anxiety disorder, we sought to examine the extent to which within-session effects on outcomes and dropout held invariant across social anxiety disorder and panic disorder. Other diagnoses were excluded as there were too few cases to establish stable individual slope and intercept parameters. For E1, the model holding the relationships

between peak SUDS and change in SUDS on slopes and intercepts invariant across diagnoses (E1 BIC = 4323.79) was superior to the same models allowing the parameters to be freely estimated across diagnoses (E1 BIC = 4346.07) indicating that the relationship between the exposure parameters and outcome were similar for individuals with social phobia and individuals with panic disorder. Given the reduced sample sizes and observations for each diagnostic group at E2 and E3, the models failed to converge. When examining dropout status, E1 (BIC = 22.53.13), E2 (BIC = 1877.10), and E3 (BIC = 1573.30) all showed superior fit when the relationships between peak and change in SUDS were held invariant than when freely estimated (E1 BIC = 2255.80; E2 BIC = 1888.87; E3 BIC = 1585.13).

Discussion

The results of this set of analyses generally provide evidence converging on two conclusions. First, activation and habituation during the first, but not the second or third, exposure was associated with subsequent dropout from treatment. More specifically, clients showing increases or less positive decreases in subjective anxiety during the first exposure were significantly more likely to subsequently discontinue treatment, and those showing less initial activation were also more likely to discontinue. These findings are consistent with the hypothesis that clients who do not experience a decrease in their anxiety during the exposure are more likely to dropout since it is likely that the high and consistent anxiety across the exposure could be perceived as unchanging. Interestingly, less of an initial rise in anxiety was associated with a greater likelihood of dropping out of treatment. However, less of an initial rise simply indicates that their level of anxiety was consistent from the beginning of the exposure to the peak point in the exposure, it is not clear from this analyses whether the anxiety was consistently high or consistently low. However, looking at the data, clients who subsequently dropped out of treatment reported fairly high initial anxiety, indicating that these clients were experiencing substantial anxiety. From the perspective of emotional processing theory, the failure to habituate would be seen as evidence of an unsuccessful initial exposure and as such it could potential lead to subsequent discontinuation of the treatment if the client were to interpret this lack of success as an indication that their anxiety is unchanging. However, the mechanisms for the discrepancy between the first and subsequent exposures is unclear, although it may simply be that those who experience an unsuccessful first exposure and have no prior positive experience with exposure, may derive assumptions of treatment being unbearable or beyond their coping ability and thus discontinue. Further, analyses suggested that this effect held invariant across individuals with primary diagnoses of panic disorder and social anxiety disorder.

Second, the results also indicate that lower peak SUDS during all exposures were associated with better end-of-treatment outcomes. However, increased activation was associated with better outcomes during E2, whereas greater habituation was associated with better outcomes during E3. Although not statistically significant, it is worth noting that the relationship between activation and outcome in E3 and between habituation and outcome in E2 are in the hypothesized direction. Furthermore, these relationships at E1 were found to be invariant across individuals with primary diagnoses of panic disorder and social anxiety disorder. Given the limited data, data from individuals with other primary anxiety disorder diagnoses and observations based on E2 and E3 could not be examined for invariance.

These results are only partially consistent with emotional processing theory. According to EPT, greater activation and a greater reduction in SUDS during exposures should be related to outcome. However, in this study activation was only related to outcomes for E2 whereas habituation was related to outcomes during E3. Likewise, EPT would suggest that elevated SUDS are necessary for activation of the fear network. However, in this study, it was lower,

not higher, level of peak SUDS that was most predictive of lower anxiety at the end of treatment. Although seemingly at odds with EPT, the current results may not be discrepant with the existing literature. In this study, the peak SUDS ratings were, on average, fairly high across the three exposures (means from 63.05 to 69.73), suggesting that it may not necessarily be that low levels of activation are more associated with positive outcome. Rather, the current results may suggest that less extreme levels could be associated with better outcome because the higher levels of anxiety may inhibit the incorporation of disconfirming evidence. This is consistent with Foa and colleagues (2005) and Lader and Wing (1966), who reported that it is unclear how much activation is optimal. It is possible that a lower level of activation better enables an individual to incorporate disconfirming evidence, whereas high levels may impede this process; however, this should be more directly assessed in future research.

Taken together, these results show that understanding the role of emotional processing in exposure therapy may be more complicated than simply looking at the proposed indicators. For example, differences may occur depending on which exposure is looked at (first vs. third), what outcome is being considered (symptom change vs. dropout status), and what type of study is being conducted (clinical vs. experimental). For example, some of the discrepancies in the EPT literature may have to do with how exposures were examined: whether only the first exposure is considered, whether all exposures are lumped together, or whether each exposure in a series is examined separately. Particularly in clinical studies, when there are many other factors involved, including clients' motivation to engage in therapy, homework compliance, and group cohesion, it may be especially important to examine a series of exposure sessions.

Examination of the habituation processes in exposure sessions may also extend to the research on individuals who drop out of treatment. The large body of research on this topic focuses mainly on the inherent qualities of the individual and has revealed mostly contradictory findings. Results from several meta-analyses point to a wide variety of reasons that individuals stop treatment, including socioeconomic status, gender, social stability, gender, and personality variables, all of which were found to account for some of the variance in treatment dropout (Baekeland & Lundwall, 1975; Garfield, 1994). Because previous research has not diverged onto a common predictor among individual characteristics, future research could benefit by examining dynamic processes over time as the individual undergoes treatment. Since noncompleters appear to be a heterogeneous group, examining session variables may be more beneficial in helping to determine how to maximize the positive impact of exposure and lessen the degree that an unsuccessful outcome is obtained.

The present study has a number of limitations that should be borne to mind when considering these results. First, despite the data being derived from a transdiagnostic treatment sample, the sample showed limited diagnostic coverage. Second, due to treatment discontinuation and missed sessions, there were not enough within-session data points to examine pattern of SUDS across exposures beyond the third. Third, both the SUDS ratings and STAI scores were based on self-report (verbal and questionnaire, respectively) which increases the possibility that the observed associations were amplified by shared method variance. Likewise, a weekly measure of symptoms over the past week or improvement since the beginning of therapy would likely provide a better indication of treatment response rather than the state anxiety measure that was available for this study. Although the use of physiological assessments during exposures in a group treatment setting is difficult, future experimental studies of activation and habituation during exposure should endeavor to combine measures of physiological activation alongside self-report and behavioral indices. Finally, we did not examine between session habituation in this study. Although between

session habituation is a major component of emotional processing theory, the naturalistic design of this study made it difficult to capture this variable since this treatment was designed so that each exposure should be more intense than the previous one.

Taken together, this study highlights the importance of the first exposure in terms of promoting improvement as well as minimizing dropout and the value of examining multiple exposure sessions. Consistent with the concerns raised by clinicians in the Becker et al. (2004) survey, a lack of activation or habituation during the first exposure may indeed increase the likelihood of treatment discontinuation. Therefore, in the first exposure session specific care should be taken to ensure that the client experiences a reduction in their anxiety. However, it should be noted that this is speculation at this point as it is also possible that it is the clients who are feeling less engaged in therapy and are considering dropping out for other reasons that are then less able to engage in the exposure experience in a way that enables them to experience activation or habituation. It is possible that the role of the first exposure is to promote improvement as well as demonstrate the purpose of exposure and demonstrate how it could be helpful, whereas it is the exposure experience in subsequent exposures that continue to promote ongoing improvement. As such, these data reaffirm the importance of prudently planning exposure activities in order to maximize treatment retention and outcomes.

Acknowledgments

The project described was supported by Grant Number K01MH073920 from the National Institute of Mental Health awarded to PJN. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

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Table 1

Mean SUDS ratings for those who did and did not complete treatment

	Dropouts			Completers			Total Sample		
	M	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**
E1 Rise	12.59	15.77	27	18.46	20.75	65	16.74	19.52	92
Peak	72.32	23.51		68.62	22.79		69.73	22.94	
Change	-19.44	19.18		-25.92	21.63		-24.02	21.05	
E2 Rise	9.62	22.03	13	14.06	17.95	64	13.31	18.61	77
Peak	71.92	28.40		61.45	21.01		63.22	22.56	
Change	-35.77	26.21		-24.77	20.79		-26.62	22.00	
E3 Rise	8.75	11.82	4	13.07	17.13	57	12.79	16.80	61
Peak	75.00	20.00		62.03	19.81		63.05	19.97	
Change	-21.00	20.43		-27.24	19.94		-26.75	19.88	

Table 2

Intercept and slope predicting outcome and discontinuation the first three exposures

	Intercept			Linear Change			Dropout		
	Est.	**S.E.**	**Z**	**Est.**	**S.E.**	**Z**	**Est.**	**S.E.**	**Z**
E1 Rise	-.023	.054	-0.44	0.11	.011	1.02	-.005	.002	-1.97*
Peak	.106	.051	2.09*	-.011	.009	-1.24	.003	.003	1.21
Change	.044	.052	0.84	-.007	.007	-0.98	.005	.002	2.39*
E2 Rise	-.141	.050	-2.85*	-.026	.011	-2.37*	-.003	.003	-0.99
Peak	.197	.062	3.17*	.013	.016	0.85	.003	.003	0.91
Change	.133	.085	1.57	.009	.016	0.54	-.003	.003	-0.97
E3 Rise	-.122	.079	-1.55	.009	.019	0.45	-.002	.004	-0.05
Peak	.159	.064	2.50*	-.004	.028	-0.14	.006	.006	0.88
Change	.172	.078	2.20*	-.012	.026	-0.45	.004	.005	0.80

Notes: Intercept = estimated STAI-S score at session 12. Est.=Parameter Estimate; S.E.=Standard Error; Z=standardized z-score. Two-tailed Z > 1.96 is significant at p < .05.

* $p < 05$. All analyses controlled for initial severity of primary diagnosis.