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Exposing Clinicians to Exposure: A Randomized Controlled Dissemination Trial of Exposure Therapy for Anxiety Disorders

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Abstract

Objective—The present study evaluated three technology-based methods of training mental health providers in exposure therapy (ET) for anxiety disorders. Training methods were designed to address common barriers to the dissemination of ET, including limited access to training, negative clinician attitudes toward ET, and lack of support during and following training.

Method—Clinicians naïve to ET ($N=181$, $M_{age} = 37.4$, 71.3% female, 72.1% Caucasian) were randomly assigned to: 1) an interactive, multimedia online training (OLT), 2) OLT plus a brief, computerized motivational enhancement intervention (OLT+ME), or 3) OLT + ME plus a web-based learning community (OLT+ME+LC). Assessments were completed at baseline, post-training, and 6 and 12 weeks following training. Outcomes include satisfaction, knowledge, self-efficacy, attitudes, self-reported clinical use, and observer-rated clinical proficiency.

Results—All three training methods led to large and comparable improvements in self-efficacy and clinical use of ET, indicating that OLT alone was sufficient for improving these outcomes. The addition of the ME intervention did not significantly improve outcomes in comparison to OLT alone. Supplementing the OLT with both the ME intervention and the LC significantly improved attitudes and clinical proficiency in comparison to OLT alone. The OLT+ME+LC condition was superior to both other conditions in increasing knowledge of ET.

Conclusions—Multi-component trainings that address multiple potential barriers to dissemination appear to be most effective in improving clinician outcomes. Technology-based training methods offer a satisfactory, effective, and scalable way to train mental health providers in evidence-based treatments such as ET.

Keywords

Dissemination; Online Training; Exposure Therapy; Anxiety Disorders

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Exposure therapy (ET) is among the most efficacious psychological treatments currently available, with extensive research documenting large treatment effects for each of the anxiety disorders (Norton & Prince, 2007). ET involves systematically confronting feared but non-dangerous stimuli so that erroneous beliefs about danger are disconfirmed and fear is reduced. Given that anxiety disorders are the most common class of psychological disorders, affecting 29% of the U.S. population over a lifetime (Kessler, Chiu, Demler, & Walters, 2005), the widespread use of ET in clinical practice could have a profound impact on public health. However, few mental health providers report using ET in their clinical practice (7–38%; Becker, Zayfert, & Anderson, 2004; Freiheit, Vye, Swan, & Cady, 2004; Rosen et al., 2004) and few individuals with anxiety disorders report receiving ET (7–21%; Goisman, Warshaw, & Keller, 1999; Marcks, Weisberg, & Keller, 2009). Thus, ET remains largely inaccessible to those who could benefit from it.

Barriers to the Dissemination and Implementation of ET

As with other evidence-based treatments (EBTs), a primary barrier to the widespread dissemination of ET is a shortage of trained clinicians. A survey of U.S. psychologists found that 27–28% had received training in imaginal or in vivo exposure for PTSD, whereas only 12% had received training in exposure for other anxiety disorders (Becker et al., 2004). Moreover, the rate of adoption among clinicians trained in ET is quite low. For example, among psychologists trained in imaginal exposure for PTSD, 46% never use the treatment and 25% use the treatment with less than half of their PTSD patients (Becker et al., 2004). Similarly, among practicing psychotherapists who had nearly all received training in cognitive-behavioral therapy for anxiety disorders, one-third or less reported using therapist-assisted in vivo exposure or interoceptive exposure to treat obsessive compulsive disorder, social phobia, panic disorder, and/or PTSD (Hipol & Deacon, 2013). This suggests that providing clinicians with training in ET is a necessary, but insufficient step toward increasing the use of ET in routine clinical practice.

A second barrier to the adoption of ET is negative beliefs about exposure. ET has been described as having a “public relations problem” (Richard & Gloster, 2007) and common clinical lore suggests that ET is insensitive, contraindicated for many clients, potentially damaging, and perhaps even unethical (Olatunji, Deacon, & Abramowitz, 2009). Concerns about ET typically stem from the fact that these treatments require clinicians to deliberately elicit anxiety by having clients confront the stimuli that make them anxious so that new learning can occur. Despite the fact that common clinician concerns (e.g., that ET will lead to symptom exacerbation or dropout) are not supported by empirical data (Deacon et al., 2013; Foa, Zoellner, Feeny, Hembree, & Alvarez-Conrad, 2002; Hembree et al., 2003; Olatunji et al., 2009), many clinicians remain hesitant or unwilling to use ET. Importantly, clinicians who have received training in ET endorse concerns about ET at rates comparable to those who have not received training (Becker et al., 2004), suggesting that existing training methods may not adequately address these attitudinal barriers.

A third barrier to the dissemination of ET, as well as other EBTs, is the limited availability of ongoing support for clinicians after they have received training. Ongoing support typically involves supervision or consultation with an expert to encourage adoption, provide

feedback, and increase proficiency. For example, a workshop followed by weekly individual consultation with an expert has been used to disseminate Prolonged Exposure (PE) therapy for PTSD in the Veterans Health Administration, with results indicating that expert consultation enhanced clinicians' confidence in their ability to deliver the treatment beyond the effects found for the workshop alone (Karlin et al., 2010). This is consistent with the emerging consensus that training is unlikely to substantially change clinician behavior or impact client outcomes without the addition of ongoing support (Beidas & Kendall, 2010; Herschell, Kolko, Baumann, & Davis, 2010). However, few therapists (37.5%) report having access to experts in cognitive-behavioral treatment for anxiety disorders in their community (Hipol & Deacon, 2013) and, when available, these services are both costly and time-intensive.

Using Technology-Based Training Methods to Enhance the Dissemination of ET

Technology-based training methods are gaining in popularity and may help to address each of these barriers to the dissemination of ET. Online training (OLT) has been proposed as a cost-effective method of making training in EBTs widely accessible and has several potential advantages over traditional training methods (e.g., improved learner engagement, greater opportunities for active practice, and enhanced learner control; Weingardt, 2004). Research has found that OLT generally outperforms treatment manuals and is comparable to or better than workshops in improving clinician knowledge of EBTs (Dimeff et al., 2009; Dimeff et al., 2011; Sholomskas & Carroll, 2006; Sholomskas et al., 2005; Weingardt, Villafranca, & Levin, 2006). In addition, computer-based training and OLT have been found to be effective and efficient methods of increasing knowledge of ET specifically. Two studies found that review of a brief (60–90 minute) computerized self-help program for phobia/panic led to similar improvements in nursing and medical students' knowledge of ET as traditional face-to-face teaching and was more efficient to deliver (Gega, Norman, & Marks, 2007; McDonough & Marks, 2002). A third study found that completing a brief (~2-hour) OLT significantly improved mental health providers' knowledge of ET (Harned, Dimeff, Woodcock, & Skutch, 2011).

In terms of attitudinal barriers, a pilot randomized controlled trial (RCT) found that supplementing an OLT with a brief motivational enhancement (ME) intervention was a promising approach to improving clinician attitudes toward ETs (Harned et al., 2011). However, this ME intervention was time and resource intensive, requiring experts to conduct up to two individual phone calls with each clinician. Instead, the use of technology-based methods to deliver this type of intervention would eliminate the need for expert (and human) involvement. For example, research has shown that using a virtual discharge nurse (i.e., a computer-animated character) to facilitate automated delivery of health care information to patients being discharged from hospitals is highly acceptable, cost-saving, and effective in reducing the rate of re-hospitalization (Bickmore et al., 2010; Jack & Bickmore, 2010/2011). Similarly, a virtual ET consultant may be an effective way to deliver an ME intervention and would greatly increase its scalability and cost-efficiency.

Finally, technology-based methods can be used to make supervision and consultation more accessible and cost-effective. For example, several studies have utilized online platforms to provide group consultation to clinicians learning an EBT (e.g., Beidas, Edmunds, Marcus, & Kendall, 2012; Weingardt, Cucciare, Bellotti, & Lai, 2009). Virtual conferencing platforms have the benefit of allowing clinicians from geographically diverse locations (e.g., rural and underserved communities) to receive consultation from an expert who, in turn, can provide multiple group consultations per day to clinicians around the world. This technology-based method of providing ongoing support is considerably more scalable than traditional methods that rely on face-to-face contact with trainees.

The Present Study

The present study sought to evaluate methods of training clinicians in ET that address these common barriers to dissemination and implementation. Specifically, a RCT examined the comparative efficacy of: (1) an online training course that covered foundational knowledge about ET (OLT), (2) the OLT plus a computerized motivational enhancement intervention designed to address attitudinal barriers to using ET (OLT + ME) and (3) OLT + ME plus a web-based learning community designed to provide support during and after training (OLT + ME + LC). Consistent with the findings of the earlier pilot RCT (Harned et al., 2011), we hypothesized that the three conditions would not differ in terms of knowledge gains and satisfaction, but that the two conditions with the attitudinal intervention (i.e., the ME component) would be superior to OLT in improving clinicians' attitudes toward exposure. Finally, consistent with prior research evaluating methods of providing ongoing support (e.g., Beidas et al., 2012; Beidas & Kendall, 2010; Herschell et al., 2010; Karlin et al., 2010), we hypothesized that OLT + ME + LC would outperform the other conditions in increasing clinicians' self-efficacy and changing clinician behavior (self-reported use of ET and observer-rated clinical proficiency). This large, fully powered RCT expands on the earlier pilot RCT (Harned et al., 2011) by evaluating the final version of the OLT (versus a prototype), utilizing a technology-based method of delivering the ME intervention, and including a novel web-based LC condition.

Method

Procedures

Recruitment and screening—All procedures were approved by the Western Institutional Review Board. Participant enrollment began in November 2011 and the final follow-up assessment occurred in July 2012. Participants were recruited via flyers sent to administrators at mental health agencies, posting emails to several listservs for mental health providers, advertising in our print and electronic organizational newsletter, and contacting individuals who had previously expressed interest in participating in future studies. Interested individuals were directed to complete a secure online screening questionnaire to determine eligibility. To maximize generalizability, we recruited mental health professionals actively treating anxiety disorder patients across a range of disciplines and degrees. Specifically, inclusion criteria were: (1) currently working as a mental health treatment provider or a student in a mental health-related field, (2) currently providing individual therapy to at least three clients with an anxiety disorder, (3) planning to continue providing

individual therapy to clients with anxiety disorders for the duration of the study, (4) has access to the technology required to complete the study training methods, (5) able to commit to the time requirements necessary to complete the study, (6) has a Bachelor's degree or higher, and (7) has no more than minimal prior exposure to ET. More than minimal prior exposure to ET was defined as: (1) clinical experience using ET (i.e., had provided eight or more sessions of an ET or received clinical supervision focused on ET), (2) training specifically focused on ET (i.e., a quarter- or semester-long graduate course, a 12-hour or longer didactic training, or a study/consultation group focused on learning any ET), (3) previously viewed any of the OLT used in this study or two other OLTs of an exposure-based treatment developed by our group, or (4) read more than half of any treatment manual for an ET in the past three years. Overall, 861 individuals completed the online eligibility screen of whom 512 did not meet inclusion criteria (325 had more than minimal prior exposure to ET, 94 were not providing therapy to at least three clients with an anxiety disorder, 69 did not have time for the study during the study period, 22 did not have access to the required technology, and 2 were not mental health treatment providers or a student in training with at least a Bachelor's degree). An additional 73 individuals were found to be eligible but were initially placed on a waitlist and later declined to participate when offered the opportunity.

Randomization—Following the online screening, the remaining eligible participants ($n=276$) were assigned to one of the three study conditions via a randomization minimization procedure (White & Freedman, 1978). Participants were matched on educational degree (1=MD/PhD or doctoral candidate; 2=MA/MS or current graduate student; 3= BA/BS level), student status (1=Yes; 2=No), clinical experience (1=less than 3 years; 2=3–6 years; 3=more than 6 years), number of individual clients on their caseload (1=3–11; 2=12–30; 3=31 or more), and self reported level of technology competence (1=low confidence (1–3); 2=moderate confidence (4–7); 3=high confidence (8–10)).

Informed consent—Randomized participants completed the informed consent process by viewing an online video describing the study procedures, taking an online survey to assess their understanding of the study procedures, reviewing questions with research staff via phone as needed, and then downloading and returning a signed copy of the consent form to research staff.

Experimental procedures—After completing the baseline assessment, participants received an email with information about how to access the OLT. Participants were asked to complete the OLT within a 6-week training phase, but were given access to the OLT for the entire 18 weeks of the study. One week after receiving access to the OLT, and one week prior to the post-training assessment, participants were contacted by research staff (via phone or email) to assess progress through the course and offer technical support as needed. Participants completed outcome assessments at post-training (6 weeks), 6-week follow-up (12 weeks), and 12-week follow-up (18 weeks). Assessments were completed primarily via an online survey with the exception of a performance-based role-play that was conducted via telephone. Participants were paid \$30 for completing the training course (defined as self-reported completion of at least 80% of the online training), \$30 for each outcome

assessment, and a \$40 bonus for completing all 3 outcome assessments for a maximum total payment of \$160. No adverse events occurred.

Subject Flow and Retention

Subject flow from initial screening through the 12-week follow-up assessment is provided in Figure 1. Of the 276 individuals who were randomized to a training condition, 95 did not complete the baseline assessment. The 181 participants who completed the baseline assessment constitute the “intent-to-train” (ITT) sample. There was no association between experimental condition and assessment completion at any outcome point (p 's > .27).

Training Methods

Online Training (OLT; n=60)—The OLT was developed utilizing best practices from product development models, including formative evaluation and iterative design. The final 10-hour course, *Foundations of Exposure Therapies* (behavioraltech.org/ol/details_exp.cfm), was built in Flash and incorporated gaming technology and evidence-based instructional design strategies. To maximize learner control and flexibility, users could choose to review structured didactic materials and/or learn experientially by engaging in simulated clinical scenarios with virtual clients. Didactic information was presented in four interactive, media-rich eBooks (224 pages) that provided learners with the foundational knowledge necessary to complete the simulated clinical scenarios. Specifically, learners were taught a rationale for ET that focused on inhibitory learning (i.e., disconfirmation of negative outcome expectancies), fear toleration, and between-session habituation. In addition, information was included on the rationale and procedures for interoceptive, imaginal, and in vivo exposure, and emphasized the importance of preventing avoidance and safety behaviors during and after exposure tasks. The didactic information was designed to generalize across the anxiety disorders and included examples for each of the anxiety disorder diagnoses. The course included a variety of informational resources (e.g., videos of exposure experts, example treatment forms, and a list of treatment manuals). Experiential learning occurred via 35 simulated clinical scenarios in which learners treated six virtual anxiety disorder patients with different anxiety disorder diagnoses and received feedback on their performance. Consistent with gamification principles (i.e., the use of game thinking and strategies to engage users), the scenarios were organized hierarchically by level of difficulty and assigned based on the individual learner's performance (i.e., “passing” a scenario resulted in assignment of a more difficult scenario, whereas “failing” a scenario led to assignment of a less difficult scenario). To finish the course, learners had to successfully complete the most difficult scenario in each of five core content areas: orienting, constructing exposure hierarchies, planning exposure tasks, conducting exposure, and debriefing exposure/reviewing homework.

Online Training plus Motivational Enhancement (OLT + ME; n=60)—In addition to receiving the OLT, participants in this condition received two brief motivational enhancement (ME) interventions aimed at addressing potential attitudinal barriers to learning and using ET. The first intervention consisted of a brief (5-minute) video that played when participants first accessed the OLT (www.youtube.com/watch?v=JCXitNs_JEc). The video was designed to be similar to a public service announcement,

with the goal of increasing clinician interest in ET, raising awareness about the shortage of trained clinicians, improving attitudes toward ET, and stimulating action. The second intervention occurred immediately upon completing the OLT, when participants were directed to complete an additional online module involving a simulated conversation with a “virtual ET consultant” (i.e., a computer-animated character) that incorporated a variety of strategies derived from Motivational Interviewing (Miller & Rollnick, 1991). The virtual consultant assessed the degree to which participants endorsed five common negative beliefs about ET and provided individually-tailored feedback to address each of these concerns. In addition, the virtual consultant asked participants to identify any other barriers that might interfere with using ET, generate potential solutions, and plan next steps. At the end of the module, participants received a printable personal feedback form that summarized their responses and information that was covered.

Online Training plus Motivational Enhancement plus Learning Community

(OLT + ME + LC; n=61)—In addition to receiving the OLT and ME interventions, participants in this condition were provided with eight one-hour learning community (LC) meetings over 12 weeks. LC meetings occurred via an online conferencing platform (www.webex.com) that allowed participants to call in via telephone or computer and those who used their computer could see the facilitator via a web camera. Each LC included up to eight participants and was facilitated by an experienced ET clinician using a structured curriculum. The time commitment for facilitators was eight hours per LC. The first five meetings occurred weekly during the training phase of the study (weeks 2–6) and targeted knowledge acquisition and practice. Meeting time was equally divided between reviewing and discussing assigned content from the OLT and engaging in role-plays and active practice of core concepts. In addition, participants were given weekly homework assignments that involved completing specific sections of the OLT as well as practice assignments (e.g., describe the rationale for ET to a friend or colleague, construct an exposure hierarchy for one of your own fears). The final three meetings occurred bi-weekly during a post-training implementation phase (weeks 7–12) and targeted increasing use of and clinical proficiency in ET in clinical practice. In these meetings, up to two participants presented a clinical case and received consultation, with the remaining time spent on general consultation issues as well as problem-solving barriers to implementation. Practice assignments were individually tailored to each participant’s needs and stage of implementation (e.g., practice interoceptive exposure with a client, or brainstorm solutions to a specific barrier to implementation). Participants were encouraged (but not required) to attend LC meetings, complete homework assignments, and engage in the discussion/exercises during the meetings.

Measures

Unless otherwise noted, all measures were administered at baseline and each outcome assessment (post-training, 6- and 12-week follow up). Cronbach’s alphas are from the current sample and presented as ranges (reflecting variations in reliability across assessment points).

Satisfaction—An adapted 16-item version of the e-Learner Satisfaction survey (ELS; Wang, 2003) was used to assess satisfaction with the OLT at post-training. Items from the original ELS were modified to refer to the “online training course (OLT)” instead of the “e-learning system” and references to “students” and “teachers” were changed to “colleagues” and “supervisors,” respectively. In addition, one item that referred to a “learning community” was not used as it was not relevant to all participants. The ELS has been shown to have excellent reliability and validity across four domains of e-learner satisfaction: Learner Interface (5 items; e.g., “The OLT is user-friendly”), Content (4 items; e.g., “The OLT provides useful content”), Learning Community (3 items; e.g., “The OLT makes it easy for you to discuss questions with colleagues”), and Personalization (4 items; e.g., “The OLT enables you to control your learning progress”). Items are rated on a 7-point Likert scale ranging from 1 = “Strongly disagree” to 7 = “Strongly agree” and were summed to create a total score (range = 16 – 112; Cronbach’s alpha = 0.95). In addition, 5 items assessed the helpfulness of the various components of the OLT (e.g., eBooks, clinical simulations, videos of experts) using a 5-point Likert scale ranging from 1 = “Not helpful” to 5 = “Significantly helpful.” Satisfaction with the ME intervention was assessed via 9 items at the post-training assessment (e.g., “How helpful was the [pre-course video/post-course interview with the virtual ET consultant] in increasing your motivation to learn and use ET?”). Items were rated on a 5-point Likert scale ranging from 1 = “Not at all” to 5 = “Very” and averaged for analysis (Cronbach’s alpha = 0.91). Satisfaction with the LC intervention was assessed at the post-training and 6-week follow-up assessments via 6 items (e.g., “How enjoyable were the learning community meetings?”). Items were rated on a 5-point Likert scale ranging from 1 = “Not at all” to 5 = “Very” and averaged for analysis (Cronbach’s alphas = 0.90 – 0.93). In addition, 9 items assessed the helpfulness of the various components of the LC meetings (e.g., the ability to ask questions, peer consultation, role-plays) on a 5-point Likert scale ranging from 1 = “Not helpful” to 5 = “Significantly helpful.”

Knowledge—A 49-item multiple choice instrument (with 4–6 response choices per item) was developed to assess knowledge of course content as well as ability to apply knowledge in hypothetical clinical scenarios. All items were developed by study investigators and multiple iterations were piloted to ET-naïve respondents. Items that were answered correctly at a rate greater than chance (50%) were removed from the measure to create the final version used for the research trial. This measure has shown evidence of predictive validity as it significantly predicts observer-rated clinical proficiency in ET (Harned et al., 2013). The score used for analysis was the proportion of items correct.

Attitudes toward ET—The 22-item Attitudes Toward Exposure Therapy scale (ATET; Harned et al., 2011) assessed participants’ beliefs about ET using a mixture of positive (e.g., “Exposure therapy is effective for real-world patients with complex problems”) and negative items (e.g., “Exposure therapy is too emotionally distant or “cold” for my liking”). Items were rated on a 5-point Likert scale ranging from 1 = “Not at all” or “Strongly disagree” to 5 = “Very much so” or “Strongly agree,” recoded such that higher scores represent more negative attitudes, and averaged to create a total score. The ATET has been shown to have

high internal consistency and convergent validity (Harned et al., 2011). Internal consistency was high in the present study (Cronbach's alphas = 0.83 – 0.89).

Self-efficacy—An adapted 27-item version of the self-efficacy subscale of the Behavioral Anticipation and Confidence Questionnaire (BAQ; Dimeff et al., 2009) measured participants' confidence in their ability to use ET. This measure was previously adapted by Harned et al. (2011) to assess confidence in applying ET (the original measure assessed confidence in applying another treatment) and has been shown to demonstrate high internal consistency (Harned et al., 2011) as well as evidence of predictive validity in determining the frequency of self-reported clinical use of ET (Harned et al., 2013). All items began with "I feel confident in my ability to" and an example item is "Conduct imaginal exposure." Items were rated on a 5-point Likert scale ranging from 1 = "Not Confident" to 5 = "Very Confident." The score used for analysis was the mean across items (Cronbach's alphas = 0.95 – 0.96).

Clinical use—The Exposure Therapy Clinical Use survey assessed self-reported use of nine ET procedures. Items were developed for the purposes of this study to reflect the procedures taught in the OLT (e.g., orient to the rationale for exposure therapy, create an exposure hierarchy, conduct in vivo exposure). For each item, participants reported how many times they had used that procedure in the past six weeks. To increase accuracy, participants were provided with a tracking log at the beginning of the study to record any use of ET procedures in their clinical work. Items were summed and then divided by the number of anxiety disorder clients treated in the relevant time period to create a weighted score for analysis (Cronbach's alpha = 0.85 – 0.90). Clinicians who reported that they had not treated any anxiety disorder clients in the relevant time period were excluded from the analysis.

Clinical proficiency—Structured role plays were used to assess participants' proficiency in applying ET in simulated clinical scenarios. Three brief (up to 20-minute) role plays were developed and evaluated for equivalency with feedback from ET experts. Each role play required participants to orient a client actor to the rationale for and goals of ET (~10 minutes), orient to the specific exposure task (~3 minutes), and conduct a brief exposure task (~7 minutes). The exposure tasks included: 1) *in vivo* exposure to watching a brief video of a thunderstorm for a client with astrophobia, 2) imaginal exposure to the memory of a motor vehicle accident for a client with PTSD, and 3) interoceptive exposure to hyperventilation (overbreathing) for a client with panic disorder. These tasks were selected to allow for evaluation of multiple types of exposure with clients with different anxiety disorders while using exposure cues that would be clearly audible (via telephone) to the participant. Research assistants (RAs) who were blind to participants' condition portrayed the fictional clients using semi-structured scripts. Role plays were conducted and digitally recorded via telephone. A coding instrument was developed and iteratively pilot tested using both ET-naïve and expert ET clinicians to determine reliability and construct validity. The final measure includes an Orienting subscale (7 items) and an Exposure subscale (3 items). Orienting subscale items assessed proficiency at orienting to the role of problematic beliefs and avoidance in maintaining fear, obtaining client examples of these maintaining factors,

orienting to the goals of exposure, and providing instructions for the specific exposure task. Exposure subscale items assessed proficiency at assessing the client's level of distress during the exposure task, addressing avoidance/safety behaviors during exposure, and engaging in effective therapist behaviors during exposure (e.g., conducting the exposure for the specified duration and without modifying it to make it easier). A global clinical proficiency score was computed that ranged from 0 (no proficiency) to 5 (excellent proficiency). (A copy of the role play instructions, coding instrument, and scoring guide are available from the first author upon request.) All role-plays were coded by an RA who was trained to reliability (>85% agreement) with an ET expert who helped to develop the instrument and served as the gold standard for coding purposes. The coder was blind to participants' conditions and assessment points. A random sample (10% of all role plays) was coded for reliability with an expert ET clinician (ICC = 0.85).

Analysis Strategy

Longitudinal outcome measures were examined via Generalized Estimating Equations (GEE; Zeger & Liang, 1986) using SPSS 19. GEE was well-suited to these analyses given that it accommodates clustered data (repeated measures nested within participants), includes all ITT participants (even if data are missing at some time points), and allows for the specification of a best fitting covariance structure based on the Quasi Likelihood under Independence Model Criterion (QIC) (for a review of the benefits and limitations of GEE see Ballinger, 2004). A key advantage of GEE over other mixed model analyses is its regression-based approach that allowed for comparison of longitudinal change for each pair of conditions. This approach allowed for direct testing of the study hypotheses, which predicted that some but not all conditions would differ and that these differences would vary by outcome. Predictors in the GEE models included main effects for Condition and Time (where time was treated as a categorical variable) as well as separate Time by Condition interactions to evaluate differences in rates of change from baseline to each outcome point for each condition in comparison to a specified reference condition. To allow for comparisons between each pair of conditions over time, an initial GEE model was constructed that specified OLT as the reference condition and then was re-parameterized to specify OLT+ME+LC as the reference condition. Effect sizes were calculated using Feingold's (2009) formula for growth model analyses: $d_{\text{CHANGE}} = (M_{\text{CHANGE-E}} / SD_{\text{PRE-E}}) - (M_{\text{CHANGE-C}} / SD_{\text{PRE-C}})$. This approach calculates effect sizes using change scores that are derived from the model-estimated means and standard deviations where $M_{\text{CHANGE-E}}$ is the mean of the estimated change scores for the experimental group, $M_{\text{CHANGE-C}}$ is the mean of the estimated change scores for the control group, $SD_{\text{PRE-E}}$ is the baseline estimated SD for the experimental group, and $SD_{\text{PRE-C}}$ is the baseline estimated SD for the control group. Power analyses indicated that 181 participants would be sufficient to detect small to medium effect sizes ($f = 0.19$) for repeated measures between conditions GEE analyses using a two-tailed test ($\alpha = 0.05$) at power = 0.80.

Results

Sample Description

Participants in the ITT sample ($N=181$) did not significantly differ between conditions on any demographic or professional characteristic (see Table 1).

Preliminary Analyses

Baseline between-condition differences—There were no significant baseline between-condition differences on any outcome variable: knowledge (p 's = .61–.80), attitudes (p 's = .32–.89), self-efficacy (p 's = .60–.96), clinical use (p 's = 0.51–0.91), proficiency (p 's = 0.52–0.96).

Engagement in training—At post-training, participants reported spending an average of 14.18 hours ($SD = 11.49$) using the OLT in the past six weeks. The conditions did not significantly differ in the number of hours spent using the OLT (which included the ME module for participants in those conditions), $F(2, 138) = 1.92, p = .15$: OLT ($M = 13.73, SD = 8.22$), OLT + ME ($M = 11.92, SD = 5.58$), and OLT + ME + LC ($M = 14.74, SD = 7.69$). Overall, participants reported completing an average of 93.3% of the OLT ($SD = 16.9$) and 75.7% reported completing the entire course. The conditions also did not significantly differ in the percentage of the OLT completed, $F(2, 141) = 1.48, p = .23$: OLT ($M = 90.0\%, SD = 22.19$), OLT + ME ($M = 95.8\%, SD = 10.72$), OLT + ME + LC ($M = 94.0\%, SD = 16.11$). Among the 35 participants who reported not fully completing the OLT, the most common reasons for not completing were: personal (non-work) schedule conflicts (77.1%), work-related schedule conflicts (74.3%), and fell behind the recommended schedule for course completion (68.6%). The percentage of the OLT completed at post-training significantly predicted greater knowledge of ET at the final follow-up ($F(1, 130) = 14.34, p < .001$), but was unrelated to attitudes, self-efficacy, clinical use, or clinical proficiency (p 's = .09 – .87).

Participants in the OLT + ME + LC condition attended an average of 5.52 ($SD = 2.43$) out of 8 LC meetings. LC participants reported that they were very active in following and/or participating in the discussions during LC meetings ($M = 4.38$ out of 5, $SD = 0.70$) and completed the homework assignments most of the time ($M = 3.79$ out of 5, $SD = 0.92$). Homework completion significantly predicted greater self-efficacy ($F(1, 44) = 4.78, p < .04$) and clinical use ($F(1, 41) = 4.32, p < .05$) at the final follow-up, but was unrelated to other outcomes (p 's = .31 – 1.0). The number of LC meetings attended and the degree of active participation in LC meetings did not significantly predict any outcome (p 's = .08 – .92).

Outcome Analyses

Table 2 presents descriptive information for each longitudinal outcome at each time point by condition. Condition by Time parameter estimates from the GEE models are shown in Table 3 and between-condition Cohen's d effects sizes are shown in Table 4.

Satisfaction—There were no significant differences between conditions at post-training for satisfaction with the OLT as measured by the ELS, $F(2, 142) = 1.10, p = .33$.

Participants in each condition rated the OLT as highly satisfactory: OLT ($M = 84.17$, $SD = 15.23$), OLT + ME ($M = 82.68$, $SD = 17.34$), and OLT + ME + LC ($M = 87.55$, $SD = 17.22$). Each component of the OLT was also rated as very helpful (M s > 4.0) with the most helpful components being the interactive eBooks ($M = 4.49$, $SD = 0.84$) and the simulated clinical scenarios ($M = 4.44$, $SD = 0.79$). Satisfaction with the ME intervention was moderate and significantly higher in OLT + ME + LC ($M = 3.27$, $SD = 0.96$) than OLT + ME ($M = 2.88$, $SD = 0.82$), $t(96) = 2.15$, $p < .05$. Finally, satisfaction with the LC intervention was high and did not change from post-training ($M = 4.01$, $SD = 0.87$) to 6-week follow-up ($M = 4.09$, $SD = 0.87$), $F(1, 93) = 0.20$, $p = .66$. Participants reported that the most helpful components of the LC meetings were consultation from the facilitator ($M = 4.48$, $SD = 0.63$) and being able to ask questions ($M = 4.43$, $SD = 0.73$), whereas the least helpful aspects were sharing strategies on how to complete the OLT on schedule ($M = 3.03$, $SD = 1.24$) and support from fellow members to stay on schedule to complete the OLT ($M = 3.08$, $SD = 1.19$).

Knowledge—As shown in Table 2, all conditions more than doubled their knowledge test scores from baseline to the 12-week follow-up (OLT = 29% vs. 64%, OLT + ME = 28% vs. 64%, OLT + ME + LC = 29% vs. 69%). GEE results indicated a significant effect for Time ($\chi^2(3) = 2178.67$, $p < .0001$), but not for Condition ($\chi^2(2) = 4.02$, $p = .13$). As shown in Table 3, significant Time by Condition interactions indicated that OLT + ME + LC led to greater improvements in knowledge than both other conditions from baseline to each outcome point and corresponding effect sizes ranged from 0.32 – 0.39 (Table 4). OLT and OLT + ME did not significantly differ in the rate of change in knowledge from baseline to any outcome point.

Attitudes toward ET—On average, participants reported neutral (neither negative nor positive) attitudes toward ET at baseline (Table 2). All three conditions generally improved in attitudes toward ET across time ($\chi^2(3) = 117.64$, $p < .001$) and the effect for Condition was not significant ($\chi^2(2) = 3.63$, $p = .16$). Significant Time by Condition interactions indicated that OLT + ME + LC led to significantly greater improvements in attitudes toward ET than OLT from baseline to post-training and 6-week follow-up (Table 3) and corresponding effect sizes were 0.43 (Table 4). No other between-condition differences in rates of change over time were found.

Self-efficacy—A significant effect for Time indicated that the conditions generally improved in self-efficacy ($\chi^2(3) = 913.07$, $p < .001$). The Condition effect was non-significant ($\chi^2(2) = 1.08$, $p = .58$) as were the Time by Condition interactions (Table 3), indicating no between-condition differences in self-efficacy.

Clinical use—At baseline, participants reported minimal use of ET procedures (Table 2). On average, participants reported using less than one ET procedure per anxiety disorder client treated in the prior six weeks ($M = 0.91$, $SD = 1.85$). A significant effect for Time indicated that the conditions generally reported increased use of ET procedures across time ($\chi^2(3) = 102.50$, $p < .001$). At the 12-week follow-up, participants reported using ET procedures an average of 4.10 times ($SD = 5.01$) per anxiety disorder client in the past six

weeks and 87.5% of participants reported at least some use of ET. Both the Condition effect ($\chi^2(2) = 0.19, p = .91$) and the Time by Condition interactions (Table 3) were not significant, indicating no differences between conditions in self-reported use of ET procedures.

Clinical proficiency—At baseline, participants demonstrated minimal clinical proficiency in ET ($M = 1.49, SD = 0.82$). A significant effect for Time indicated that all three conditions generally improved in clinical proficiency across time ($\chi^2(2) = 726.63, p < .001$), with mean scores indicating moderate clinical proficiency at post-training ($M = 3.06, SD = 0.68$) and 12-week follow-up ($M = 3.03, SD = 0.69$). The Condition effect was not significant ($\chi^2(2) = 4.60, p = .10$). A significant Time by Condition interaction indicated that OLT + ME + LC demonstrated greater improvement in clinical proficiency than OLT from baseline to the 12-week follow-up (Table 3) and the corresponding effect size was 0.39 (Table 4). No other between-condition differences were found in the rate of change in clinical proficiency over time.

Discussion

The overarching goal of the present study was to evaluate training methods for overcoming common barriers to disseminating ET for anxiety disorders, including lack of training, negative attitudes toward the treatment, and difficulty accessing support during and following training. To that end, we conducted an RCT examining the efficacy of three technology-based methods of training clinicians in the basic principles and procedures of ET: (1) OLT (an interactive, multimedia online training), (2) OLT + ME (the OLT plus a brief, computerized ME intervention), and (3) OLT + ME + LC (that added a web-based learning community).

Overall, the results support the use of technology-based methods to train clinicians in ET. Kirkpatrick's (1998) model of evaluating training programs highlights the importance of considering learning outcomes across multiple levels, including satisfaction with the learning process (Level 1), improved knowledge and attitudes (Level 2), changes in actual job performance (Level 3), and the effect of the training on the larger organization or environment (Level 4). In the present study, clinicians rated each training component as moderately to highly satisfactory (Level 1), exhibited large and significant improvements in knowledge, attitudes, and self-efficacy (Level 2), and more than tripled their self-reported use of ET in clinical practice while improving from minimal to moderate observer-rated clinical proficiency (Level 3). Finally, although not assessed, these training methods may be both cost-effective and efficient for organizations (Level 4). For example, online training is typically less costly than face-to-face training as it eliminates travel-related expenses and requires less time away from work (Weingardt, 2004).

Within the context of these generally positive findings, several important similarities and differences between the training methods emerged. First, contrary to hypotheses, all three training methods resulted in comparable increases in clinician self-efficacy and self-reported use of ET in clinical practice. This suggests that a relatively brief (~14 hour) online training is sufficient to improve these outcomes, and that providing additional training components

does not lead to further gains. Although this is encouraging in some ways, it also raises some concerns. In particular, prior studies have indicated that clinicians who attend brief training workshops are likely to overestimate their abilities and subsequently implement newly learned procedures in ways that are not associated with improved client outcomes (Miller & Mount, 2001). Indeed, secondary analyses of data from the present trial found that clinician self-efficacy after training predicted increased self-reported use of ET, but not increased observer-rated clinical proficiency (Harned, Dimeff, Woodcock, & Contreras, 2013). This suggests that clinicians' self-report of their ability to implement ET may not accurately reflect their actual proficiency and generally highlights the importance of behavioral observation of clinical skills as a method of quality assurance.

The present study also sought to identify effective methods for addressing attitudinal barriers to learning and using ET given that clinicians frequently report negative beliefs about ET (Becker et al., 2004; Olatunji et al., 2009) that, if not addressed, are likely to lead to suboptimal delivery of ET (Farrell et al., 2013). Contrary to hypotheses, the addition of a brief, computerized ME intervention to the OLT did not significantly improve clinician attitudes in comparison to OLT alone. Instead, only the condition with the ME intervention and the web-based learning community (OLT + ME + LC) led to enhanced clinician attitudes compared to OLT alone. This suggests that the most effective method for improving clinician attitudes may involve providing individually-tailored information to address endorsed negative beliefs (via the computerized ME intervention) and allowing clinicians the opportunity to discuss their concerns and receive feedback from peers and an experienced ET clinician (via the LC). These findings differ from those of a pilot study in which the ME intervention was found to improve attitudes more than OLT alone when it was delivered via one-on-one telephone contact with an experienced ET clinician (Harned et al., 2011). It is possible that computerizing the ME intervention reduced its effectiveness, which is further suggested by the fact that participants rated the computerized ME intervention as only moderately satisfactory. More generally, it may be the case that factors associated with human contact with an experienced ET clinician are critical in changing attitudes, regardless of the specific format or content of this interaction.

Finally, the addition of a web-based LC also enhanced outcomes in several other important areas. Although not hypothesized, the LC was associated with significant improvements in knowledge that exceeded those achieved in both other training conditions. This may be due to the fact that the LC meetings were structured to provide participants with an opportunity to discuss assigned content from the OLT and ask questions, which may be an effective method of strengthening and generalizing knowledge gains. Indeed, participants rated the ability to ask questions as one of the most helpful aspects of the LC meetings. Further, the hypothesis that the addition of ongoing support would lead to greater clinical proficiency was partially supported. Specifically, the condition with the LC demonstrated greater observer-rated clinical proficiency in comparison to the OLT alone at the final follow-up, but did not differ from OLT + ME at any time point. This may be due to the LC's focus on active practice (e.g., role-plays) and consultation on the use of ET with specific clinical cases. In addition, secondary analyses from the present trial indicate that more positive attitudes and greater knowledge after training predicted greater clinical proficiency in ET (Harned et al., 2013), suggesting that the enhanced attitudes and knowledge among LC

participants may also account for their ability to implement the treatment more proficiently. More generally, these findings are consistent with prior research indicating that consultation may be critical in order to substantially increase clinician proficiency following training (Beidas et al., 2012). Future research is needed to evaluate the cost effectiveness of this approach, including whether the incremental gains associated with the LC are large enough to warrant the additional expense required to deliver it.

Although the present study has several strengths, including most notably the use of a randomized controlled design and a large, heterogeneous sample of clinicians, it also possesses some limitations. First, all clinicians volunteered and were compensated for participating in the study; this may have led to enhanced outcomes compared to other clinician populations (e.g., those mandated to learn an EBT who may have more negative attitudes toward the treatment) and may not generalize to training methods for which clinicians must pay. Second, the present study relied on clinician self-report to assess training completion and use of ET in clinical practice, and future research would benefit from utilizing objective measures of both outcomes. Third, several measures were either adapted or developed for the purposes of the present study and, despite demonstrating adequate internal consistency, their broader psychometric qualities are unknown. Fourth, the ability to have human contact was not controlled across conditions, and the added efficacy of the LC condition may be due to the ability to have contact with peers and a facilitator rather than the specific training techniques that were used. Fifth, client characteristics and client-level outcomes were not assessed and future research would benefit from evaluating the impact of different training methods on client improvement among different types of clients. Finally, the study did not include a traditional training method (e.g., workshop) and this could be a useful comparison for future research.

In order to make ET more widely available to the individuals who need it, dissemination efforts will need to address the multiple potential barriers to learning and using ET that exist, including lack of training, negative attitudes toward the treatment, and difficulty accessing support during and after training. The technology-based training methods evaluated in the present study appear to be satisfactory and effective methods of addressing these dissemination barriers. Overall, the results indicate that training methods that include multiple components that are designed to address different barriers may be most effective in disseminating ET into clinical practice.

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Highlights

- We compared 3 technology-based methods of training clinicians in exposure therapy.
- Online training (OLT) was sufficient to improve self-efficacy and clinical use.
- Adding a motivational enhancement (ME) module to the OLT did not improve outcomes.
- Further adding a learning community improved knowledge, attitudes, and proficiency.
- Technology-based methods provide an effective and scalable way to train clinicians.

Figure 1.
Subject flow from screening through the 12-week follow-up assessment.

Table 1

Sample Characteristics

	OLT (n=60)	OLT+ME (n=60)	OLT+ME+LC (n=61)	Full sample (N=181)
<i>Age M (SD)</i>	37.8 (10.5)	36.9 (10.6)	37.7 (9.9)	37.4 (10.3)
<i>Gender</i>				
Female	75.0%	68.3%	70.5%	71.3%
Male	25.0%	31.7%	29.5%	28.7%
<i>Ethnicity</i>				
Caucasian	63.3%	74.6%	78.3%	72.1%
Black/African American	5.0%	8.5%	11.7%	8.4%
Asian/Asian American	8.3%	5.1%	0.0%	4.5%
Hispanic/Latino	10.0%	5.1%	3.3%	6.1%
Multiracial	13.3%	6.8%	6.7%	8.9%
<i>Education</i>				
BA/BS/RN	10.7%	13.0%	11.8%	11.8%
MA/MS	67.9%	64.8%	68.6%	67.1%
Psy.D./Ph.D./M.D./ABD	21.4%	22.2%	19.6%	21.1%
<i>Profession</i>				
Psychiatrist	3.6%	3.5%	3.4%	3.5%
Psychologist	12.5%	14.0%	15.5%	14.0%
Psychiatric nurse	1.8%	1.8%	1.7%	1.8%
Social Worker	30.4%	28.1%	24.1%	27.5%
Master's Level Counselor	25.0%	29.8%	31.0%	28.7%
Bachelor's Level	1.8%	1.8%	1.7%	1.8%
Student	25.0%	21.1%	22.4%	22.8%
<i>Work Setting</i>				
Private practice	18.3%	20.0%	25.0%	21.1%
Outpatient CMHC	36.7%	40.0%	46.7%	41.1%
Day/residential treatment	6.7%	10.0%	5.0%	7.2%
Inpatient Treatment	5.0%	5.0%	3.3%	4.4%
Corrections facility/legal	5.0%	0.0%	1.7%	2.2%
Medical center	3.3%	3.3%	11.7%	6.1%
School/University	10.0%	6.7%	3.3%	6.7%
Other	15.0%	15.0%	3.3%	11.1%
<i>Experience M (SD)</i>				
Years worked as a provider since degree	5.7 (6.4)	4.8 (6.2)	3.8 (4.0)	4.8 (5.7)

Note. No between-group differences were statistically significant. Analyses were conducted using ANOVAs and chi-square tests as appropriate. ABD = all but dissertation. CMHC = community mental health center.

Table 2
Estimated Marginal Means and Standard Errors from GEE Models for Longitudinal Outcomes by Condition and Time-point

	Baseline			Post-Training			6-Week Follow-up			12-Week Follow-up		
	OLT (n=60)	OLT+ME (n=60)	OLT+ME +LC (n=61)	OLT (n=46)	OLT+ME (n=50)	OLT+ME +LC (n=49)	OLT (n=40)	OLT+ME (n=46)	OLT+ME+ LC (n=48)	OLT (n=45)	OLT+ME (n=44)	OLT+ME +LC (n=47)
	M (SE)	M (SE)	M (SE)	M (SE)	M (SE)	M (SE)	M (SE)	M (SE)	M (SE)	M (SE)	M (SE)	M (SE)
Knowledge	0.29 (0.02)	0.28 (0.02)	0.29 (0.02)	0.64 (0.02)	0.62 (0.02)	0.68 (0.02)	0.61 (0.02)	0.59 (0.02)	0.65(0.02)	0.63 (0.02)	0.62 (0.02)	0.68 (0.02)
Attitudes	2.43 (0.06)	2.35 (0.06)	2.44 (0.06)	2.30 (0.06)	2.13 (0.06)	2.12 (0.06)	2.27 (0.06)	2.09 (0.06)	2.09 (0.06)	2.19 (0.06)	2.09 (0.06)	2.07 (0.06)
Self-efficacy	2.20 (0.08)	2.26 (0.08)	2.26 (0.08)	3.38 (0.09)	3.50 (0.09)	3.54 (0.09)	3.60 (0.09)	3.61 (0.09)	3.69 (0.09)	3.71 (0.09)	3.77 (0.09)	3.76 (0.09)
Clinical use	0.86 (0.51)	1.07 (0.52)	0.77 (0.51)	2.81 (0.56)	2.94 (0.54)	2.65 (0.55)	4.29 (0.58)	3.52 (0.57)	4.06 (0.56)	3.33 (0.58)	4.20 (0.59)	4.87 (0.58)
Proficiency	1.45 (0.10)	1.50 (0.10)	1.52 (0.10)	2.94 (0.11)	2.97 (0.11)	3.21 (0.11)	—	—	—	2.80 (0.11)	2.95 (0.11)	3.15 (0.11)

Note. The n 's specified for each condition apply to all measures except the Proficiency task. The number of participants completing the Proficiency task at each time point is: baseline ($n=60$ all conditions), post-training (OLT=47, OLT+ME=42, OLT+ME+LC=49), and 12-week follow-up (OLT=41, OLT+ME=43, OLT+ME+LC=42). OLT = online training, ME = motivational enhancement, LC = learning community. GEE = generalized estimating equations.

Table 3

Time by Condition Parameter Estimates from Longitudinal GEE Models

	Pre – Post- Training		Pre – 6-Week Follow-up		Pre – 12-Week Follow-up	
	χ^2 (1)	<i>p</i>	χ^2 (1)	<i>p</i>	χ^2 (1)	<i>p</i>
Knowledge						
OLT vs. OLT+ME	0.04	.84	0.05	.81	0.00	.98
OLT vs. OLT+ME+LC	6.69	.01	3.92	<.05	4.32	.04
OLT+ME vs. OLT+ME+LC	8.13	.004	5.17	.02	4.43	.03
Attitudes						
OLT vs. OLT+ME	2.31	.13	2.07	.15	0.10	.75
OLT vs. OLT+ME+LC	8.31	.004	7.10	.01	2.90	.09
OLT+ME vs. OLT+ME+LC	1.95	.16	1.56	.21	1.92	.17
Self-efficacy						
OLT vs. OLT+ME	0.20	.66	0.18	.67	0.00	.98
OLT vs. OLT+ME+LC	0.62	.43	0.04	.84	0.00	.96
OLT+ME vs. OLT+ME+LC	0.12	.72	0.43	.51	0.00	.98
Clinical use						
OLT vs. OLT+ME	0.02	.90	1.61	.21	0.44	.51
OLT vs. OLT+ME+LC	0.01	.92	0.03	.86	2.77	.10
OLT+ME vs. OLT+ME+LC	0.00	.98	1.26	.26	0.98	.32
Proficiency: Total						
OLT vs. OLT+ME	0.00	.96	–	–	0.50	.48
OLT vs. OLT+ME+LC	1.16	.28	–	–	4.09	.04
OLT+ME vs. OLT+ME+LC	1.25	.26	–	–	1.79	.18

Note. Significant between-condition differences are bolded. GEE = generalized estimating equations.

Table 4

Effect Sizes (d) of Change Scores Between-Conditions for each Outcome Measure

	OLT vs. OLT + ME			OLT vs. OLT+ME+LC			OLT + ME vs. OLT + ME + LC		
	Pre-Post	Pre-6wk FU	Pre-12wk FU	Pre-Post	Pre-6wk FU	Pre-12wk FU	Pre-Post	Pre-6wk FU	Pre-12wk FU
Knowledge	0.03	0.04	0.00	-0.35 *	-0.32 *	-0.39 *	-0.38 *	-0.35 *	-0.39 *
Attitudes	0.22	0.23	0.05	0.43 *	0.43 *	0.28	0.20	0.20	0.23
Self-efficacy	-0.09	0.10	0.01	-0.16	-0.05	0.01	-0.07	-0.14	0.01
Clinical use	0.03	0.25	-0.16	0.02	0.03	-0.41	-0.01	-0.22	-0.25
Proficiency	0.01	-	-0.13	-0.29	-	-0.39 *	-0.31	-	-0.26

Note. Effect sizes were calculated using estimated means and standard deviations from the GEE models. Effect sizes with an asterisk indicate significant Time × Condition interactions in the GEE analyses.
FU = follow-up.