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Challenges to the traditional exposure paradigm: Variability in exposure therapy for contamination fears

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ABSTRACT

Background and objectives: Traditional models and methods of exposure therapy utilize a fear hierarchy, whereby patients complete sets of exposures in a graduated manner, with the goal of fear habituation within and between sessions. In the current experiment, we examined whether this typical exposure paradigm was necessary to achieve clinical improvement.
Method: Fifty undergraduate participants scoring in the top quartile of a self-report measure of contamination fears were randomly assigned to one of two groups: blocked and constant exposure (BC Group) and random and variable exposure (RV Group). Both groups completed three weekly sessions of exposure treatment, with subjective and psychophysiological indices of fear recorded throughout. Subjective, behavioral, and psychophysiological dependent measures were evaluated by an independent assessor at pre-treatment (PRE), post-treatment (POST), and two-week follow-up (2WFU).
Results: Both the BC Group and RV Group exhibited decreases in subjective fear from PRE to POST and 2WFU, with no significant differences between groups. Partialing group, greater variability in subjective fear during exposure predicted lower subjective fear at 2WFU.
Limitations: Despite significant findings for subjective fear, behavioral and psychophysiological findings were limited. Follow-up studies should investigate questions regarding traditional exposure within a clinical group.
Conclusions: These results support the notion that traditional exposure is sufficient, but not necessary, to produce clinical improvement in contamination-related fears. There may be benefits to variability in fear level during exposure, and evaluation of emotion variability during exposure therapy for other anxiety disorders is warranted.

1. Introduction

1.1. Traditional exposure therapy

Traditional exposure therapy involves a gradual progression from one feared item to the next across a hierarchy, although within each item, the exposure practice is generally unvaried. Clinicians have been guided by the premises of emotion processing theory (Foa & Kozak, 1986; Foa & McNally, 1996), in which initial fear activation (IFA), within session habituation (WSH), and between session habituation (BSH) of fear are seen as critical indices of corrective learning throughout exposure therapy. The application of this theory is to repeat exposure to a phobic stimulus the number of times and the length of time necessary for fear to subside. That is, exposure practice should proceed in a blocked and constant manner, while fear should gradually habituate, over the course of exposure therapy. However, the available evidence provides mixed evidence for IFA and limited to no evidence for WSH or BSH as predictors of treatment outcome (Baker et al., 2010; reviewed in Craske et al., 2008), albeit often based on studies with significant methodological weaknesses. Moreover, we have argued that whereas fear reduction typically occurs, it represents performance in the moment rather than learning that influences responding over the long-term (Craske et al., 2008), and that pure habituation is a poor model of real-world experiences with feared stimuli.

In the present experiment, we directly investigated whether these traditional concepts of exposure were necessary to achieve clinical improvement. First, we compared a blocked and constant exposure group to a group involving random and variable exposure

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(i.e., stimulus variability). Second, we examined exposure process measures of IFA, WSH, BSH, as well as variability in indices of fear (i.e., emotion variability) in relation to treatment outcome.

1.2. Drawing on theory from learning and memory

Evidence from the basic learning and memory literature suggests that the typical exposure paradigm – blocked and constant exposure along with fear habituation – may be less effective than variable exposure and variability in affect during exposure. First, the assumption that performance during "instruction" (i.e., expression of fear during exposure therapy) is a reliable index of learning (i.e., fear at follow-up testing) is not supported by memory research (Bjork & Bjork, 2006). That is, latent learning experiments in animals and motor learning experiments in humans show that learning happens over intervals in which there are no changes in performance, and that little or no learning can happen across intervals in which there are substantial changes in performance (Adams & Reynolds, 1954; Christina & Bjork, 1991; Schmidt & Bjork, 1992; Tolman & Honzik, 1930; see Bjork & Bjork, 2006). Furthermore, in the context of emotional learning, there is evidence for discordance at the neurobiological level between the expression of emotion versus learning and memory. For example, the amygdala is central to learning and memory of emotionally arousing stimuli, but is not critical to the expression of emotion (Canli, Zhao, Brewer, Gabrieli, & Cahill, 2000). Finally, within fear extinction learning (the original model for exposure therapy; see Eelen & Vervliet, 2006), behavioral and/or physiological fear during extinction training in rodent samples is not representative of learning at the process level and does not predict performance upon re-test, when the strength of new learning is assessed (e.g., Bouton, Garcia-Gutierrez, Zilski, & Moody, 2006; Plendl & Wotjak, 2010; Rescorla, 2006).

Second, basic research indicates that retention of learned non-emotional material is enhanced by random and variable practice (Magill & Hall, 1990). Even though variation increases difficulty throughout learning, Bjork and Bjork (1992, 2006) proposed that variation enhances long-term outcome. According to their model, variation increases the storage strength of information to be learned by making retrieval of past learning easier via the availability of cues that were present during prior learning. In addition, drawing from stimulus fluctuation theory (Estes, 1955), variation results in pairing the information to be learned with more retrieval cues, thus enhancing retrievability because the cues associated with new learning are more likely to be present in a situation where retrieval is required (Bjork, 1988). Furthermore, variation is posited to result in generation and application of a rule that captures the invariance among tasks. That is, despite dissimilarities, the basic principles are the same across tasks and can be applied regardless of situational differences. In other words, variation leads to generalization. The benefit of varying the to-be-learned material has been demonstrated with motor and verbal learning tasks (Schmidt & Bjork, 1992).

1.3. Previous exposure therapy research

To date only two studies have compared the traditional exposure approach to a more variable exposure approach. One study revealed that exposure to varied phobic stimuli (i.e., multiple spiders) led to better maintenance of treatment gains at follow-up than did exposure to a constant stimulus (i.e., a single spider) (Rowe & Craske, 1998). In addition, we found some benefits to random and variable, compared to blocked and constant, exposure for height phobias (Lang & Craske, 2000). In the random/variable condition, participants practiced exposure to heights in random order, such as 8th floor, 2nd floor, 10th floor, and 3rd floor balconies in more than one situation (e.g., inside versus outside stairwell) and approached the precipice in different ways (e.g., looking out versus down). This was compared to blocked exposure to the same balconies repeatedly before moving to the next floor, with the same manner of approaching the height during each exposure trial. The random/variable practice resulted in lower self-reported general anxiety, although not specific fear of heights, one month later despite higher peak levels of fear, including heart rate, throughout exposure. The role of variability in fear itself during exposure has not been explored. Enhanced learning achieved through emotion variability would be most appropriately assessed at follow-up, as the prefrontal brain structures involved in the exposure process are central to long-term retrievability of learning (Maren & Quirk, 2004; Sotres-Bayon, Cain, & LeDoux, 2006). Clearly, the topics of stimulus and emotion variability in exposure need further investigation.

1.4. Study aims and hypotheses

This study aimed to build upon previous clinical, empirical, and theoretical literature by examining whether the concepts of traditional exposure were necessary to achieve clinical improvement in contamination-related fears. First, we hypothesized that a random and variable exposure group would show greater fear reduction than a blocked and constant exposure group across dependent measures at post-treatment (POST) and two-week follow-up (2WFU). Second, to measure idiosyncratic exposure processes, we partialed experimental group and hypothesized that IFA, WSH, and BSH would not reliably predict clinical improvement, whereas greater variability in fear during exposure would predict greater fear reduction at 2WFU.

2. Materials and methods

2.1. Design

The study was a 2 (Group) × 3 (Occasion) mixed design, comparing blocked and constant exposure (BC Group) to random and variable exposure (RV Group). Each participant (P) was randomized to one of the two groups and completed three weekly sessions of exposure treatment. Dependent measures were evaluated by an independent assessor at pre-treatment (PRE), post-treatment (POST), and two-week follow-up (2WFU).

2.2. Participants

Fifty Ps (25 per group) enrolled in an Introduction to Psychology course at the University of California, Los Angeles, were included in the analyses. Sample demographics were 72% female, and 14% Caucasian, 56% Asian/Asian–American, 6% Latino/Hispanic, 2% African–American, 4% Indian, 8% Bi-racial, and 10% Other. Mean age of Ps was 19.64 years ($SD = 2.46$).

Ps were recruited on the basis of scoring in the top quartile on the Padua Inventory of obsessive compulsive disorder symptoms – Washington State University Revision Contamination Obsessions and Washing Compulsions Subscale (Burns, Keortge, Formea, & Sternberger, 1996). The 10-item subscale was used as a screening method for contamination fears when confronted with various types of items (e.g., dirt, garbage), and possesses good psychometric properties in college samples (Sternberger & Burns, 1990). Ps rated their level of disturbance on a 5-point Likert scale for 10 different instances of potential contact with a contaminated object or situation. Ps' mean score on the subscale was 24.64 ($SD = 5.79$) at the time of recruitment, which is above the mean scores found in previous OCD samples (e.g., Burns et al., 1996; Williams, Turkheimer, Schmidt, & Oltmanns, 2005).

To meet further eligibility requirements, Ps did not endorse any of the following: heart, respiratory, or neurological condition;