



Review

Inhibitory learning approaches to exposure therapy: A critical review and translation to obsessive-compulsive disorder



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HIGHLIGHTS

- Habituation as an indicator of improvement could have unintended consequences.
- Inhibitory learning theory can be applied to treating OCD and its heterogeneity.
- Introducing “desirable difficulties” into exposure may maximize long-term outcome.
- Research translating inhibitory learning theory to exposure is in its nascent stage.

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ABSTRACT

The majority of treatment research on OCD has focused on pre/post treatment efficacy of exposure-based interventions, with less attention directed towards (a) understanding mechanisms of change, and (b) maximizing long-term effectiveness. Inhibitory learning theory (ILT) provides a novel foundation for understanding how exposure therapy reduces fear. Moreover, ILT is consistent with empirical evidence that raises questions about the more traditional (i.e., habituation) explanation for exposure therapy's efficacy. Yet ILT has yet to be applied to understanding the treatment of OCD and its heterogeneity. The current review is an examination of human experimental research on ILT that seeks to translate laboratory findings on fear extinction to exposure therapy across empirically established OCD symptom dimensions. We provide an up-to-date critical review of the existing evidence for a series of strategies derived from ILT that have been proposed for the treatment of fear, discuss the limitations of existing studies, and provide suggestions for future research within this rapidly accelerating area of study. We also offer conceptual considerations for applying these principles to the treatment of OCD symptom dimensions. A common theme is the idea of introducing “desirable difficulties” into the implementation of exposure in order to foster more durable long-term learning.

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1. Introduction

Exposure and response prevention (ERP) is the most efficacious psychological treatment for obsessive-compulsive disorder (OCD; e.g., [Olatunji, Davis, Powers, & Smits, 2012](#)). This intervention involves helping patients confront stimuli that provoke obsessional fear, but that objectively pose a low risk of harm. Exposure can occur in the form of actual encounters with feared situations or stimuli (situational or in vivo exposure), or in the form of imagined confrontation with the feared consequences of engaging with these stimuli (imaginal exposure). For example, an individual with obsessional fears that she unknowingly hit a pedestrian while driving her car would practice driving through crowded streets for situational exposure, and then confront doubts that she hit someone and could be held responsible. The response prevention component of ERP entails refraining from compulsive rituals and other behaviors that serve as an escape from obsessional fear. In the previous example, the patient would resist checking the roadside or the local news for reassurance that no such accidents have occurred.

Randomized controlled studies from around the world (e.g., [Foa et al., 2005](#)) indicate that ERP is more effective than credible control interventions (e.g., relaxation, anxiety management, pill placebo), with large pre-post effect sizes (e.g., Hedges's $g = 1.39$ in [Olatunji et al., 2012](#)), and with a substantial percentage of patients attaining clinically-significant improvement (e.g. 69% in [Eddy, Dutra, Bradley, & Westen, 2004](#)). Despite these outcomes, a sizeable percentage of patients (14–31%) are classified as non-responders ([Foa et al., 2005](#); [Norberg, Calamari, Cohen, & Riemann, 2008](#)), and of those who respond, up to 50–60% experience at least partial relapse at later follow-up assessments ([Eisen et al., 2013](#); [Simpson, Franklin, Cheng, Foa, & Liebowitz, 2005](#)). While some authors (e.g., [Whittal, Thordarson, & McLean, 2005](#)) suggest abandoning ERP altogether on the basis of these statistics (and the perceived “intolerability” of exposure exercises as described in [Meyer, Farrell, Kemp, Blakey, & Deacon, 2014](#)), an alternative approach is to focus efforts on improving the short- and long-term outcomes of this otherwise effective intervention.

In line with this latter option, [Craske et al. \(2008\)](#) have highlighted limitations of the long-standing and widely accepted idea that exposure therapy works by breaking conditioned fear responses via habituation

(i.e., Emotional Processing Theory, EPT; e.g., [Kozak & Foa, 1997](#)). In contrast, laboratory research on fear extinction indicates that these associations do not break or disappear; rather exposure therapy leads to the learning of *new* non-threat (i.e., inhibitory) associations that compete with (rather than “break”) older threat associations. An important aim of exposure therapy, therefore, is to promote the encoding and long-term recall of the newly learned non-threat connections so that they will inhibit fear-based learning; a process termed “inhibitory learning”.

Research examining various facets and applications of inhibitory learning has accumulated in the last few decades, with some inconsistencies in findings across studies. Since the introduction of this area in 2008, however, there have been no comprehensive reviews critiquing this body of empirical work. Moreover, the recent experimental and clinical literature testing a priori hypotheses related to the inhibitory learning approach has focused almost exclusively on specific fears (e.g., spiders, heights, public speaking). Yet when the aforementioned room for improvement in ERP outcomes is considered along with the potential of the inhibitory learning approach, one recognizes the promise of translating this approach to the treatment of OCD. The aim of the current paper, therefore, is threefold. First, we highlight the major tenants, advantages, and confines of both the emotional processing and inhibitory learning accounts for how ERP is applied in the treatment of OCD. Second, we present a critical review of the existing human literature addressing implications of inhibitory learning for exposure therapy. While there exists a comprehensive animal literature on extinction learning and return of fear that parallels basic human laboratory research ([Milad & Quirk, 2012](#); [Milad, Rauch, Pitman, & Quirk, 2006](#); [Phelps, Delgado, Nearing, & LeDoux, 2004](#); [Quirk & Mueller, 2008](#)), there have frequently been contradictory findings when comparing animal and human studies (e.g., [Thomas & Ayres, 2004](#); [Vervliet, Vansteenwegen, Hermans, & Eelen, 2007](#)). Accordingly, this review will reference important research using animal populations, but focus primarily on translational research using human participants. Third, we translate the inhibitory learning literature to the use of ERP for OCD. OCD is a heterogeneous condition requiring adaptation of ERP in various ways. Specifically, research has identified four theme-based symptom dimensions ([Abramowitz et al., 2010](#); [McKay et al., 2004](#)), including: (a) contamination obsessions and decontamination rituals, (b) obsessions about being responsible for harm and checking rituals,

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