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# Exposure with response prevention versus habit reversal in Tourette's syndrome: a controlled study

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## Abstract

The intentional nature of tics provides the opportunity to apply behavioural interventions aimed at tic reduction through interruption of stimulus-response sequences. The aim of this study has been to evaluate the effect of exposure and response prevention (ER) versus habit reversal (HR) in 43 Tourette's syndrome (TS) patients. The three outcome measures were: the Yale Global Tic Severity Scale (YGTSS), 15-min tic frequency registrations monitored at the institute and 15-min home tic frequency registrations. Both treatment conditions resulted in statistically significant improvements on all outcome measures ( $p < 0.0001$ ). No significant differences were found between the treatment conditions on any of the outcome measures, although there was a tendency in favour of ER on the YGTSS ( $p = 0.05$ ). These results suggest that, at least in the short term, TS tic symptoms can be treated effectively with both types of treatment.

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## 1. Introduction

Tourette's syndrome (TS) is a neuropsychiatric disorder characterized by multiple motor and vocal tics. Tics are sudden, rapid, recurrent, nonrhythmic, stereotyped movements or vocalizations that are experienced as irresistible but can be suppressed for varying lengths of time ([American](#)

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Psychiatric Association, 1994). Tics and TS related impulsive behaviours can be provoked by both external and internal events (Eapen, Moriarty, & Robertson, 1994; Leckman, King, & Cohen, 1999). Bliss (1980) had described unpleasant sensory experiences that precede tics, and that can be relieved by performing the tic. This description has challenged the commonly held belief that tics are involuntary. Several studies addressing the phenomenon of premonitory sensations and the intentional nature of tics have been performed thereafter (see Scahill, Leckman, & Marek, 1995, for a review). In tic-disordered patients, over 90% of tics seem to be preceded by unpleasant sensations and urges in contrast to 7% of patients with other movement disorders (Lang, 1991; Leckman, Walker, & Cohen, 1993). In general, performance of tics relieves these sensations. In addition, there seems to be a strong relationship between the experience of premonitory sensations and the ability to suppress tics (Kurlan, Lichter, & Hewitt, 1989).

Whereas a biological basis for TS and its associated phenomena is generally assumed, insight into the functional maintenance of tics may be provided by learning theory (Turpin, 1983). Through a process of operant conditioning, i.e. negative reinforcement, the sequence of unpleasant premonitory sensations followed by tics that relieve these sensations may account for the maintenance of tics. Due to their potential to eliminate unpleasant sensory stimuli, tics can be considered as conditioned responses that will be performed whenever a new sensation appears. In addition, through classical conditioning, different kinds of stimuli (i.e. cognitive, emotional, and external) may become associated with the sensory stimuli and ticcing responses.

Derived from learning theory principles, interventions have been developed aimed at interrupting the stimulus-response sequences. To date, the hallmark of behavioural interventions for tics is habit reversal (HR). HR is based on the premise that tics are maintained by response chaining, lack of awareness of their occurrence, excessive practice, social reinforcement and tolerance of the tics (Azrin & Nunn, 1973). The primary ingredients of HR are an awareness training on the occurrence of a specific tic, and subsequently the application of a response incompatible with the tic, to interrupt or inhibit the tic (Miltenberger, Fuqua, & McKinley, 1985; Peterson & Azrin, 1992). In addition, HR may comprise relaxation and reinforcement techniques (Azrin & Nunn, 1973; Peterson & Azrin, 1992). By applying HR, tic reductions between 55% and 95% have been reported (Peterson & Azrin, 1993).

Derived from the well-known repertoire of behavioural techniques, a new strategy for tics has been developed as an extension to HR, i.e. exposure and response prevention (ER; Hoogduin, Verdellen, & Cath, 1997). ER entails exposure to the sensations and urges that precede tics, and response prevention of the tics. Theoretically, the patient habituates to the premonitory experiences, thus resulting in tic reduction (Hoogduin et al., 1997). ER has proven to be effective in the treatment of obsessive-compulsive disorder (OCD; Abramowitz, 1996; Riggs & Foa, 1993). Tics in TS bear similarities with compulsions seen in OCD with regard to their intentional character (Cath et al., 2001; Lang, 1991; Turpin, 1983). In OCD, prolonged exposure to feared stimuli by means of ER results in decrements of both subjective anxiety and heart rate (Grayson, Foa, & Steketee, 1982; Marks, 1987). In one report of a TS patient to whom ER has been applied, improvement of voluntary tic control and relief from the premonitory itching sensation has been demonstrated (Bullen & Hemsley, 1983). Hoogduin et al. (1997) have tested the habituation hypothesis in TS patients during ten 2-h sessions, in which the patients were exposed to the sensory experiences while suppressing every tic or impulse. Within-session habituation was found in three of the four patients. Improvements in ticcing behaviour varied from 68% to 83% (Hoogduin et al., 1997).

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