

Habit Reversal Treatment of Repetitive Hand Writing in a 7-Year-Old Child With a Learning Disability

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Habit reversal (HR) is a cognitive-behavioral treatment for tic disorders, Tourette syndrome, stereotypic movements, and habit disorders. This case study utilizes aspects of habit reversal, including awareness training, self-monitoring, and competing response training, as an intervention for obsessive-compulsive repetitive air handwriting in a 7-year-old girl with a significant learning disability. Therapy is provided on an outpatient basis in a private practice setting. Analysis of in-home, at-school, and in-session data collected by the parents, teacher, and therapist show decreased frequency in repetitive handwriting. Supplemental and cojoint administration of antianxiety medication extinguishes all obsessive handwriting within a 6-month period. These results support previous research demonstrating the efficacy of cojoint cognitive-behavioral and medication treatment of acute obsessive-compulsive symptomatology in children.

Keywords: *habit reversal; obsessive compulsive disorder; cognitive behavioral therapy*

1 Theoretical and Research Basis

Obsessive-compulsive disorder (OCD) is a neurobehavioral disorder characterized by recurrent obsessions and/or compulsions that cause marked distress and/or interfere in one's life (American Psychiatric Association, 2000). Obsessions are recurrent and persistent thoughts, images, or impulses that are intrusive and egodystonic. Compulsions are typically observable repetitive behaviors or covert mental acts whose function at least in part is to neutralize or alleviate obsessions and accompanying distress (Moore, Mariaskin, March, & Franklin, 2007). Although most children recognize the senselessness of OCD, such insight is not required for this age group.

OCD in children and adolescents is more common than previously thought, with a 6-month prevalence estimate of clinically significant OCD in approximately 1 in 200 children and adolescents (Flament et al., 1988). In a clinical sample, the modal age of onset of OCD was 7 years and the mean age was 10 years (Swedo, Rapoport, Leonard, Lenane, &

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Cheslow, 1989) Unfortunately, it appears that OCD in children and adolescents is under-recognized and often untreated (Fireman, Koran, Leventhal, & Jacobson, 2001). Common childhood compulsions include washing, repeating, checking, touching, counting, ordering, hoarding, and/or praying. Childhood OCD is associated with a number of comorbid conditions, including attention-deficit hyperactivity disorder (ADHD), tic disorders, other anxiety disorders, and mood disorders. In fact, the majority of children with OCD will receive another lifetime psychiatric diagnosis (Flament et al., 1990; Geller et al., 2001). Comorbidity rates for tic disorder and Tourette syndrome are particularly high, with as many as 80% of childhood-onset cases of OCD experiencing co-occurring tic disorder or Tourette syndrome (Leonard, Lenane, Swedo, Rettew, & Cheslow, 1992).

Cognitive-behavioral therapy (CBT), in particular exposure plus response prevention (E/RP), is an empirically supported treatment for OCD (Expert Consensus Panel For Obsessive-Compulsive Disorder, 1997). March and Mulle (1998) developed a manualized CBT treatment of childhood OCD that is developmentally sensitive and utilizes E/RP. CBT in combination with pharmacotherapy appears to have the greatest effect on reduction in OCD symptomatology (Geller, 2007; March, 2003). However, not all adults or children with OCD demonstrate a clinically significant decrease in OCD symptoms following CBT (Baer & Minichiello, 1998).

Habit Reversal (HR), first introduced by Azrin and Nunn (1973), is comprised of multiple CBT procedures, including response detection, awareness training, response prevention, self-monitoring, and social support. Founded on a behavioral model, HR assumes that, despite a potential biological origin, tics and other, similar, repetitive behaviors can get worse or can improve or can continue unabated due to environmental factors (Himle, Woods, Piacentini, & Walkup, 2006). A premonitory urge or sensation is thought to precede the tic or repetitive behavior, which in turn serves the function of reducing the aversive urge or stimulus, but simultaneously strengthens the connection between the unwanted behavior and the premonitory urge through negative reinforcement. Identification of key premonitory sensations that precede the unwanted tic or repetitive behavior is considered a key component of HR. Substituting the tic or other unwanted repetitive behavior with a competing response is thought to break the vicious cycle that previously bonded the premonitory urge with the tic/unwanted behavior, because, quite simply, an individual cannot perform antagonistic or competing behaviors simultaneously. This multicomponent CBT treatment can be time and labor intensive, but in recent years an abbreviated HR procedure with children has successfully alleviated both motor and vocal tics (Woods & Luiselli, 2007; Woods, Miltenberger, & Lumely, 1996), nervous habits (O'Connor et al., 2001; Woods & Miltenberger, 1996), Tourette syndrome (Himle et al., 2006; Peterson, 2007), and stereotypic movements in nonautistic children (Miller, Singer, Bridges, & Waranch, 2006). Given these encouraging findings combined with the high comorbidity of OCD with Tourette syndrome and tic disorders (Radomsky, Bohne, & O'Connor, 2007), it is surprising that little or no research appears to have been conducted that investigates efficacy of HR in reducing compulsions in children diagnosed with OCD. Indeed while there are important etiological differences between impulse control disorders (ICD) and OCD, Radomsky et al. (2007 pp. 304) argued, "There is some overlap, however, in applying the same treatment principle in distinct ways . . . in both tics and rituals, exposure may be a useful technique."

This case report describes the treatment of repetitive air handwriting (i.e., writing the alphabet in the air with one's fingers repetitiously) in a child diagnosed with OCD using elements of HR combined with pharmacotherapy. The overarching clinical objective was to decrease frequency of unwanted air handwriting in both school and home settings. The HR treatment package required consideration of both the child's relatively young age (i.e., 7 years) and a comorbid learning disorder. Treatment outcome was measured through teacher report, parent- and child-collected data, and in-session frequency data, including a follow-up at 3 months posttreatment.

2 Case Presentation

Pam (a fictitious name) was a 7-year-old girl who was referred by her parents for outpatient individual therapy in a private practice. After demonstrating adjustment difficulties in the first grade, including difficulty learning new information and following directions, she had participated in a comprehensive neuropsychological evaluation 3 months prior to the referral by a consulting neuropsychologist. The neuropsychologist highlighted a combination of auditory processing concerns, pronounced difficulties performing holistic information processing, and risk factors suggestive of developmental dyslexia that in combination contributed to atypical attention difficulties and a nonverbal learning disability. Cognitive-behavioral therapy had been recommended in the neuropsychological report for the purpose of helping Pam develop self-regulatory skills when confronted with novel tasks. *Parent, teacher, and self-report Behavior Assessment System for Children—2nd Edition (BASC-2)* ratings did not indicate clinically significant, internalizing or externalizing problems. However, mild anxiety, compulsive behaviors (i.e., ritually closing doors and cupboards), and problems with perseveration were noted. Pam's full-scale IQ as measured by the *Wechsler Intelligence Scale for Children—4th Edition (WISC-IV)* was close to borderline mental retardation (MR). However, this result appeared to be primarily driven by a very low processing speed score, and Pam's teacher reported that Pam was performing at grade level in school.

3 Presenting Complaints

An intake evaluation, which included administration of the Children's Yale-Brown Obsessive-Compulsive Scale (CY-BOCS), indicated that Pam met the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR*; American Psychiatric Association, 1980 [text revision]) criteria for OCD (300.3). A subsequent evaluation by a consulting child psychiatrist confirmed this diagnosis. The primary presenting complaint was high-frequency and repetitive air handwriting (i.e., using an index finger to write the letters of the alphabet in space) that was occurring both at school and home, typically during times of transition and/or distress. The parents reported that this behavior had emerged since completion of the aforementioned neuropsychological evaluation but was consistent with other compulsive behaviors Pam had demonstrated previously, including repetitive finger licking and self-stimulatory behaviors (e.g., smelling fingers and rubbing her private areas).

Intensity and frequency of the handwriting behavior was not only interfering with Pam's ability to attend in class, but it was also causing social ostracism and embarrassment as fellow classmates had begun to comment upon and tease Pam about these unusual behaviors. The parents were particularly alarmed by a school observation report written by the school psychologist, who identified "finger wagging, hand flipping, tapping on her body, and sliding in her chair" across two sessions. Of note, the psychologist had concluded much to the parents' chagrin that "the movements that [Pam] engaged in appeared involuntary; therefore, no behavioral recommendations are offered at this time."

4 History

Pam's onset of repetitive air handwriting was recent (within 2 months of the referral) and sudden. During a 30-min school observation made 2 weeks prior to the referral showed 26 instances of air handwriting during that period. In a separate 45-min school observation, approximately 15 instances of handwriting occurred. Concurrent to these school observations, Pam's parents reported that she would engage in this behavior at home, typically in the morning just prior to transitioning to school. They estimated that during peak handwriting times she would average approximately a handwriting gesture per minute, an estimate roughly equivalent to the aforementioned school observation data.

Pam was a full-term and healthy child at birth. Her parents report she reached all major motor, cognitive, and language milestones within normal limits during the first 3 years of life. During Pam's second year of preschool, she experienced difficulty following instructions. A school-based neuropsychological evaluation was conducted and found a receptive speech delay. Pam began taking speech therapy once per week at this time (age 4). Inattention and difficulty following instructions were noted during kindergarten. As previously indicated, these adjustment difficulties intensified during first grade and led to the more thorough neuropsychological evaluation.

Pam's parents report that her air handwriting was the most recent of multiple repetitive behaviors their child had performed beginning at age 4. They recalled that Pam would repeat words multiple times for no apparent reason, as well as repeatedly close cabinets, repeatedly lick and smell her fingers, and consistently arrange her toys in a specific order.

5 Assessment

The author served as Pam's therapist during weekly sessions scheduled at a private practice office. Pam's mother and/or father participated in at least a portion of all sessions. During the initial intake, Pam disclosed that she wrote the letters of the alphabet in order and sometimes clouds when she was engaged in air handwriting. She was able to identify feeling anxious and/or excited as the most common emotions that accompanied these behaviors. CY-BOCS findings were consistent with Pam's self-report and indicated repeating rituals and ordering/arranging compulsions, with moderate interference and distress associated with the compulsions. Pam reported little or no control over these compulsions but demonstrated relatively good insight into her repetitious behaviors.

Following initial intake, Pam's parents and teacher were asked to track frequency of handwriting at both home and school during 5- and 15-min increments each day. Frequency was recorded on a form that included the time of day and activity being performed, the number of handwriting gestures, and a Likert-type scale severity rating on a scale of 0 to 5. Pam's teacher completed the daily ratings at school while her mother and/or father completed home ratings. Frequency evaluations occurred for both 5- and 15-min intervals. With the exception of a noted increase in frequency of handwriting shortly before school, no other environmental condition appeared to influence the frequency. Accordingly, parents and teachers were encouraged to select different times of day to increase the settings and contexts in which handwriting behaviors were prevalent. Pam was unaware of these observations while they were taking place.

6 Case Conceptualization

The etiology of OCD is complex and may include psychological, genetic, and neurobiological influences (Storch, Geffken, & Murphy, 2007). In the present case, while Pam's repetitive behaviors appeared to reflect symptoms of OCD, the target behavior (i.e., repetitive air handwriting) resembled in some senses complex tics and/or a habit disorder—two disorders that have historically been responsive to HR. As previously stated, E/RP is often the cognitive-behavioral treatment of choice when working with children and adolescents diagnosed with OCD. However, systematic inclusion of a competing response when attempting to reduce/eliminate Pam's air handwriting seemed indicated if not essential. Specifically, response prevention asks participants to block rituals through a combination of exposure to the anxiety-producing stimulus and conscious refusal to engage in compulsive behaviors. The author believed Pam would have more difficulty reducing unwanted air handwriting in the absence of being encouraged to pursue a competing, contradictory behavior when the urge to hand write occurred. Her young age and comorbid learning disability made successful implementation of HR a challenge, especially given the inconsistent success of HR with young children (Miltenberger, Fuqua, & Woods, 1998). However, she presented with multiple positive prognostic indicators, including a high motivation to reduce air handwriting given the social ostracism she was experiencing in school, an advanced degree of insight, age-appropriate verbal communication skills, and a high level of family support. Positive treatment gains were ultimately supplemented with conjoint psychopharmacological treatment.

7 Course of Treatment and Assessment of Progress

Treatment consisted of 15 sessions over the course of 20 weeks. The family did not attend a session between weeks 8 and 12. This interruption in treatment coincided with the family temporarily losing insurance benefits. During this extended interval between sessions, the psychiatric evaluation occurred, psychopharmacological treatment commenced, HR practice and monitoring continued, and the therapist was in intermittent phone and e-mail contact with the parents. Prozac was the SSRI chosen by the treating psychiatrist,

and over the course of a month, the daily dosage level was systematically increased from an initial dose of 4 mg per day to 16 mg per day. The client attended 4 additional weekly sessions during this period of time and then 2 additional sessions over the following 4 weeks. A generally downward trend in air handwriting frequency continued during this period. On the 15th treatment session, which occurred roughly 5 months after initial contact with the family, the client and parents reported a virtual cessation of air handwriting in the previous 2 weeks. This appointment coincided with the first month of summer and no school, and it was decided that a follow-up appointment would be scheduled for the second week of the PAM's return to school in the fall. At this 2-month follow-up, PAM and her parents reported a continuation of previous treatment gains and maintenance continued at a 6-week follow-up.

The treatment was modeled after the four-phase HR treatment package utilized by Woods and Luiselli (2007). A brief description of each phase and the challenges encountered are discussed below.

Phase I: Awareness Training

The first objective was to increase Pam's awareness of the unwanted air handwriting. The therapist worked with Pam to identify, describe, and produce this compulsive behavior in session. Response detection training was practiced during these sessions (Sessions 1 and 2). Specifically, each time Pam engaged in air handwriting she was signaled by the therapist and/or a parent for the purpose of increasing her awareness. Frequency data was recorded during 5-min increments in both sessions, at home, and at school. The parents and teacher were instructed to signal Pam during these practice sessions whenever she was engaging in the compulsive behavior. The parents verbally noted the behavior while the teacher made a hand signal in class that was designed to alert Pam.

Phase II: Self-Monitoring

This phase (Sessions 3 and 4) extended the awareness training conducted to focus on air handwriting outside of sessions. Pam, her parents, and her teacher recorded air handwriting frequency during designated periods (5 and 15 min) of the day. These results were reviewed by therapist during sessions, which led to the finding that Pam was engaging in a higher frequency of air handwriting both immediately prior to leaving home from school and also shortly before lunch time when in school.

Phase III: Relaxation Training

During this phase (Sessions 4 through 8), the therapist taught Pam deep breathing, a simplified version of progressive muscle relaxation, and calming self-statements. In addition, given that Pam was reporting a significant amount and intensity of worries during most days, the therapist decided to supplement her treatment package with the manualized Coping Cat CBT intervention that facilitates the recognition of anxious feelings and encourages the development of strategies to cope with anxiety (Kendall & Hedtke, 2006). The first 12 out of 16 sessions of the Coping Cat program was administered between

Sessions 3 through 14. A typical session would include a 10-min review of the prior week's homework and school performance; 10 min of HR training, education, and homework planning; 15 min of Coping Cat training; and 15 min of free play time.

Phase IV: Competing Response Training

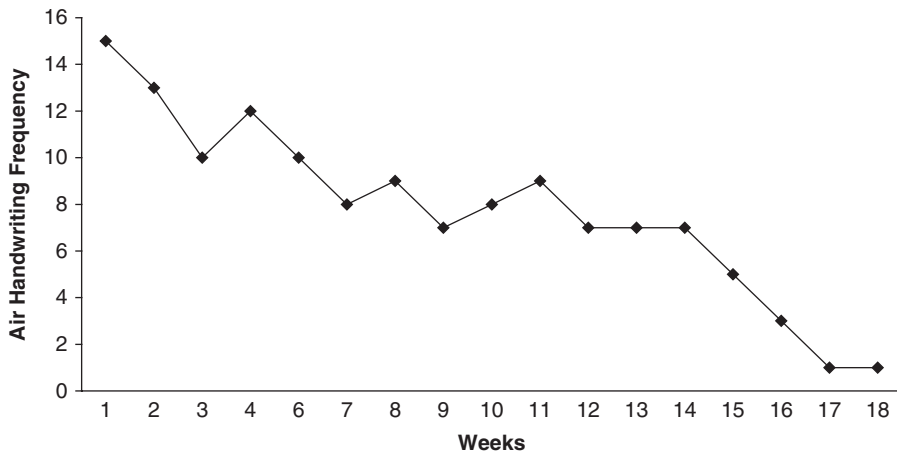
The final phase of the therapy focused in part on the creation, practice, and monitoring of responses that were antagonistic to the air handwriting. Pam was encouraged to develop a competing response that she would be comfortable performing both at school and home. Initially, she chose to wear a colorful rubber band bracelet that she would remove from her wrist and stretch with her fingers when the urge to air write occurred and/or she caught herself air writing. Pam practiced both in session and at home substituting the rubber band stretching for air handwriting. She demonstrated a moderate decrease in air handwriting during the course of this practice but reported after the third week of practicing that she no longer wished to wear the bracelet and wanted to choose another competing response. After discussions with Pam, her teacher, and parents, the therapist learned that she had grown tired of the tedium associated with taking her bracelet on and off of her wrist. A need for a substitute behavior that could more easily be enacted emerged. Ultimately, Pam was agreeable to writing letters, clouds, and/or miscellaneous doodles in a small notebook/journal in place of air handwriting. Though this substitute behavior was arguably not a classically antagonistic response to the target behavior, it proved to be a socially acceptable, unobtrusive substitute behavior that was much easier for her to perform as compared to the rubber band stretching. Pam continued to experience reductions in air handwriting during this latter phase of treatment. Furthermore, she was rarely engaging in the competing response (i.e., writing in her journal) during the treatment follow-up as well.

Outcome of treatment, as demonstrated in Figure 1, consisted of two major developments. Prior to administration of psychotropic medication, Pam demonstrated a gradual and moderate decline in air handwriting frequency that appeared to plateau. She demonstrated clinically significant, less frequent air handwriting, but still engaged in the behavior with some consistency. Following supplemental administration of psychotropic medication, a steady decline in air handwriting resumed until it was virtually extinguished by Session 15.

8 Complicating Factors

Pam's young age and comorbid learning disability made educating and training her in HR a challenging proposition. As would be expected of a child her age, concepts had to be repeated multiple times and in age-appropriate language to ensure understanding and skill acquisition. As previously stated, her strong motivation to reduce unwanted air handwriting, combined with parental support and diligent adherence to practice and assessment helped to compensate for her developmental status. Though it was less than ideal for Pam and her parents to miss 4 weeks of treatment, shortly after competing response training was adjusted from utilizing a rubber band to writing in a notebook, her parents still provided information regarding the frequency of her air handwriting during this absence and during the psychiatric evaluation and psychotropic medication administration occurred. Finally,

Figure 1
Frequency of Air Handwriting in 15-Min Intervals During Baseline and Treatment Phases



Note: BL = baseline; AT = awareness training; SM = self-monitoring; RT = relaxation training; CRT = competing response training; PM = psychotropic medication

though it is difficult to determine the precise contribution of HR treatment versus psychotropic medication toward the positive outcome, the data suggest that both treatments contributed positively and significantly.

9 Managed Care Considerations

Pam was referred for treatment by a neuropsychologist who had recently evaluated her. Therapy sessions were initially reimbursed by her health insurance. Unfortunately, midway through treatment the family lost health insurance. Such development coincided with their 4-week absence from therapy. When Pam resumed treatment she was enrolled in a new insurance plan and all remaining sessions were reimbursed.

10 Follow-Up

Pam attended two follow-up sessions, spanning a total of 4 months following treatment cessation. She continued to maintain the gains achieved even after she had resumed school. Her parents reported the various schoolteachers and administrators were amazed with her progress, commenting that Pam appeared like a “new person.”

11 Treatment Implications of the Case

Treatment in this case included techniques derived from HR (Azrin & Nunn, 1973) supplemented with psychotropic medication. Case studies are inherently vulnerable to threats of

internal validity, so the following inferences about treatment are offered with caution. Similarly, even assuming that elements of the HR treatment were responsible for improvement, it is impossible to determine whether all treatment components (awareness training, self-monitoring, response competition, relaxation training, Coping Cat training) contributed to the positive outcome. The same limitations associated with case study methodology apply when attempting to distinguish the relative contribution of HR and psychotropic medication.

Pam's air handwriting presented an unusual challenge in that it appeared driven by OCD features but resembled more closely a complex motor tic or habit disorder. A striking feature of her presentation was the high frequency and complexity of air handwriting behaviors. Implementing an RP approach to reducing and/or extinguishing unwanted air handwriting seemed beyond the developmental and coping capacities of this young child. That is, asking Pam to keep her hands still and endure the compulsion to handwrite stoically seemed difficult if not impossible. Rather, giving her a substitute behavior to perform that would not increase self-consciousness or lead to social ostracism appeared to be the more relevant and achievable goal. As previously indicated, the ultimate substitute behaviors that Pam chose (i.e., stretching a rubber band and writing symbols in a journal) may not have been classically antagonistic to the original behavior. Yet her ability to engage in these substitute behaviors and comfort level with employing them appeared more critical to the process than forcing her to engage in a substitute behavior that she was not comfortable with and/or did not provide at least some minimal relief to her.

The combined treatment package of HR and psychotropic medication was augmented with general relaxation and coping skill acquisition embodied by the Coping Cat program (Kendall & Hedtke, 2006). Pam presented with multiple worries and reported frequent and intense periods of anxiety, which is consistent with her OCD diagnosis. Therefore, her prognosis appeared likely to include chronic anxiety that would place a demand upon her coping resources. It seemed necessary to provide Pam with rudimentary awareness training and anxiety coping strategies that would extend beyond the resolution of her presenting problem. The author has found the Coping Cat program to be an effective and engaging method to teach these techniques to young children.

12 Recommendations to Clinicians and Students

This case study provides preliminary data to support the implementation of HR with young children experiencing compulsive behaviors due to OCD. The author recommends that a close assessment of the child's developmental status, particularly verbal skills, as well as the child's motivation to change be carried out and that parental resources/support be available when deciding whether to implement HR. Successful implementation of HR requires consistent practice and willingness to expose oneself to at least a minimal level of anxiety because the client is asked to respond to the premonitory stimulus in an antagonistic manner than previously adopted, in the presence of adult caretakers to assist and monitor progress.

Another recommendation is that the treatment provider remain flexible both in terms of the overall treatment package as well as the competing response utilized. It appears that HR treatment alone contributed to a clinically significant decline in unwanted compulsive behavior. Yet midway through the treatment package the unwanted behaviors were not

completely extinguished, and the decreases had begun to level out. At this point, parents, with the encouragement of the therapist, consulted a child psychiatrist and ultimately decided to supplement HR with psychotropic medication. This flexibility appeared to allow for the greatest gains and virtual extinguishment of the undesired behavior. The outcome is consistent with research suggesting the combined utility of CBT and psychotropic medication in treating difficult and/or unusual OCD presentations (Geller, 2007; March, 2003).

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