

# CHAPTER 16 ELIMINATION DISORDERS

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## Brief Overview of Disorders

Elimination disorders are commonly diagnosed in childhood and are characterized by the absence of bladder or bowel control that would be expected based on the child's age or current stage of development. This chapter provides an overview of the two primary elimination disorders identified in *The Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; American Psychiatric Association [APA], 2013): enuresis and encopresis. The chapter reviews the clinical presentation and evidence-based treatment approaches, including parental involvement, modification and adaptations, and measuring treatment efficacy, for each disorder and provides a clinical case example.

### Enuresis

Enuresis is characterized by repeated voiding of urine into the bed or clothing in youth at least 5 years of age, chronologically or developmentally (APA, 2013). For children to meet criteria for enuresis, such voiding, whether involuntary or intentional, must occur twice a week for at least 3 months or result in clinically significant distress or functional impairment. Additionally, this behavior cannot be attributed to a medication side effect or a general medical condition (e.g., diabetes, spina bifida, epilepsy). Subtypes are identified as nocturnal only (nighttime bedwetting), diurnal only (wetting during the day), and nocturnal and diurnal. Limitations of the existing criteria have been reviewed in the literature and primarily focus on poorly defined criteria, which are too broad, yield subjective interpretation, or are restrictive to the extent that they result in the exclusion of children who would otherwise need intervention (von Gontard, 2012). It is hypothesized that different underlying etiological pathways exist for diurnal and nocturnal enuresis. Based on the greater medical comorbidities and physiological abnormalities

observed in children with diurnal enuresis compared to those who experience nighttime wetting, this chapter focuses primarily on nocturnal enuresis (Järvelin et al., 1991; Rushton, 1995).

Enuresis and subclinical bedwetting are common problems experienced by school-age children. Estimates from a large, longitudinal study indicate that at least 20% of first graders experience occasional bedwetting, while 4% wet the bed at least twice a week (Butler et al., 2008). Approximately 10% of school-age children experience nighttime bedwetting compared to the 2% to 3% who experience daytime wetting (McGrath, Mellon, & Murphy, 2000; von Gontard & Nevéus, 2006). Enuresis is more common in boys than girls, with rates of 9% and 7% in 7- and 9-year-old boys as compared to 6% and 3% in 7- and 9-year-old girls (Byrd, Weitzman, Lanphear, & Auinger, 1996). Early literature suggests that prevalence rates steadily decline as children get older; by adolescence, only approximately 1% to 2% experience enuresis (Feehan, McGee, Stanton, & Silva, 1990; Glazener & Evans, 2004).

Nocturnal enuresis is most commonly conceptualized within a biobehavioral framework, given the strong physiological underpinnings of the problem and the associated behavioral approaches to treatment (Houts, 1991). Specifically, it is characterized by the child's voiding of urine while asleep despite continence during the day (van Gool, Nieuwenhuis, ten Doeschate, Messer, & de Jong, 1999). A minority of these children, approximately 5% to 10%, experiences a comorbid dysfunction in daytime urinary abilities (e.g., increased urgency and frequency), and approximately one third of children with nocturnal enuresis experience comorbid constipation (McGrath, Caldwell, & Jones, 2007; Schmitt, 1997). The etiology of enuresis is quite varied, which ultimately reflects the heterogeneous nature of the disorder (McGrath et al., 2000). Many children with nocturnal enuresis exhibit a maturational delay that affects their ability to detect a full bladder overnight (Campbell, Cox, & Borowitz, 2009). Functional bladder capacity may be diminished, production of vasopressin may be decreased, or there may be excessive fluid intake before bedtime, all of which may cause a release of large amounts of urine and exacerbate the child's difficulties with urine retention while asleep (Devitt et al., 1999; Norfolk & Wooton, 2012; Yeung et al., 2002). Evidence of heritability of nocturnal enuresis is strong, as 77% of youth with enuresis have a first-degree relative with a history of the condition (von Gontard, Schaumburg, Hollmann, Eiberg, & Rittig, 2001). Although children with nocturnal enuresis commonly are considered heavy sleepers, this notion likely stems from anecdotal report, as little empirical evidence exists (Nevéus, Stenberg, Läckgren, Tuvemo, & Hetta, 1999).

Psychosocial implications of enuresis have garnered much attention in the literature, but findings are inconsistent. It is estimated that upward of 20% to 30% of children with nocturnal enuresis evidence behavioral difficulties. Although this is two to four times higher than children without voiding problems, it is comparable to children with other chronic illnesses (Hirasing, van Leerdam, Bolk-Bennink, & Bosch, 1997; Liu, Sun, Uchiyama, & Okawa, 2000). However, inconsistencies across studies as well as the use of small convenience samples have precluded the identification of a definitive relationship between nocturnal enuresis and psychological problems (Wolfe-Christensen, Veenstra, Kovacevic, Elder, & Lakshmanan, 2012). Overall, given the involuntary nature of nocturnal enuresis, bedwetting is not considered a function of psychological disturbance. Rather, emotional and/or behavioral problems may result from the stigma, stress, and embarrassment associated with the child's bedwetting. For example, early literature suggests that the emotional difficulties seen in children with nocturnal enuresis are not the cause of the condition but rather the result of negative parental response to the child's bedwetting (Sharf & Jennings, 1988). Additionally, early studies on self-esteem indicate that bedwetting can have negative emotional effects, as youth's self-esteem improved with treatment, but there is no evidence to support a causal relationship in the opposite direction (Hägglöf, Andrén, Bergström, Marklund, & Wendelius, 1997; Moffatt, Kato, & Pless, 1987; Panides & Ziller, 1981). Although some studies report no increase in psychological problems for children with enuresis, others have demonstrated elevated rates of clinically significant internalizing, externalizing, and attentional problems in this population based on parent report (De Bruyne et al., 2009; Friman, Handwerk, Swearer, McGinnis, & Warzak, 1998; Hirasing et al., 1997; Joinson, Heron, Emond, & Butler, 2007).

## **Encopresis**

Encopresis is a common problem among school-age children, affecting between 1.5% and 7.5% of youth between 6 and 12 years of age and accounting for upward of 25% of visits to a pediatric gastroenterologist and 3% to 6% of psychiatry referrals (Doleys, 1983; Levine, 1975; Olatawura, 1973). The condition is characterized by repeated defecation in inappropriate places (such as in clothing or on the floor), with episodes occurring at least once a month for 3 months (APA, 2013). For children to meet criteria for encopresis, they must be at least 4 years of age, and the behavior must not be exclusively attributed to medications or a general medical condition other than constipation. The diagnosis has two identified

subtypes to indicate whether the fecal soiling is a result of constipation: with constipation and overflow incontinence and without constipation and overflow incontinence (APA, 2013).

The majority of children with encopresis have an early history of chronic constipation, typically developing before 3 years of age (Partin, Hamill, Fischel, & Partin, 1992). The underlying pathophysiology of childhood constipation is based on many factors and is somewhat elusive as no specific organic cause can be identified in upward of 90% of young patients (Loening-Baucke, 1993). Characteristics of chronic constipation include infrequent bowel movements (e.g., fewer than 3 per week), fecal incontinence, active stool withholding, and passage of stools that are large in diameter and hard in consistency. Stool withholding occurs in nearly all (89%–100%) children with chronic constipation and in only 13% of those without (Partin et al., 1992; Taubman, 1997). With such large, hard, and difficult-to-pass stools, children often develop fearful reactions to defecation. As a result, progressive stool retention is common. In fact, children and their parents have identified fear of pain associated with defecation as a very prominent factor in the child's constipation and active withholding (Bernard-Bonnin, Haley, Bélanger, & Nadeau, 1993; Partin et al., 1992). However, with increased stool retention, defecation then becomes even more difficult as stools get progressively larger and more difficult and painful to evacuate (Rasquin et al., 2006).

In addition to pain associated with defecation, active stool retention may also result from a child's fears around toileting, including aversions to public or unfamiliar bathrooms (Benninga, Voskuijl & Taminiu, 2004; Borowitz et al., 2003; Iacono et al., 1998). Stool-specific toileting avoidance, where the child willingly urinates but refuses to defecate in the toilet occurs in approximately 80% of children with chronic constipation (Taubman, 1997). This behavior also occurs in approximately 20% of children without constipation who are in the toilet training process, often persisting beyond 4 years of age and requiring intervention in 25% of them (Blum, Taubman, & Nemeth, 2004; Taubman, 1997).

Regardless of the etiology, chronic stool retention can result in physical discomfort for the child, including abdominal pain, loss of appetite, early satiety, nausea, and vomiting. In some cases, chronic constipation paired with long-term withholding may lead to acquired megacolon, or the stretching of the rectum walls to accommodate a large amount of retained stool, which ultimately reduces rectal muscle tone, diminishes the child's ability to feel the urge to defecate, and increases the threshold of detection of this urge (Campbell et al., 2009; Voskuijl et al., 2006). The child may then experience overflow fecal incontinence, where fecal matter leaks around a retained mass of stool and into the child's

underwear. Such fecal incontinence typically occurs during the day, often multiple times a day, but only rarely occurs overnight, and mostly in cases of severe fecal impaction (Benninga et al., 1996). Overflow incontinence typically improves following a thorough cleanout of the bowel, and if successful cleanout is maintained for several months, defecation sensation and muscle tone often return to normal (Callaghan, 1964; van Dijk, Benninga, Grootenhuis, Nieuwenhuizen, & Last, 2007).

Abnormal defecation dynamics typically develop concurrently with stool retentive behaviors and are present in an estimated 45% to 70% of children with chronic constipation as well as in those with encopresis (Loening-Baucke & Cruikshank, 1986; van der Plas et al., 1996; Weber, Ducrotte, Touchais, Roussignol, & Denis, 1987). Paradoxical contraction of the external anal sphincter (EAS) muscle, or failure to relax the EAS, is commonly associated with chronic constipation. It is hypothesized that paradoxical contraction of the EAS develops in response to painful defecation or out of the child's attempts to control bowel movements during the toilet training process (McGrath et al., 2000). Regardless of whether the pattern was initiated as a response to fear or avoidance of pain associated with defecation or used maladaptively as a regulatory function, it becomes a conditioned response that contributes to the development or further maintenance of the child's chronic constipation.

Psychosocial consequences related to chronic constipation and encopresis remain understudied. Parenting stress associated with the child's fecal incontinence is commonly reported in clinical settings, largely stemming from the child's dishonesty about the occurrence of fecal accidents and the parental burden of frequent laundering of soiled clothing (Cox et al., 2003). In fact, many parents assume that the child's laziness, carelessness, or willfulness is the primary cause of the child's incontinence (Fishman, Rappaport, Schonwald, & Nurko, 2003). However, upon understanding the physiological factors that are involved in encopresis, they often experience feelings of guilt for taking an authoritarian (i.e., blaming or punishing) approach with the child (Campbell et al., 2009). Children with encopresis, particularly those who are older, may be teased and labeled by peers as "dirty" or "stinky." This name-calling can persist even after the fecal incontinence resolves and can result in rejection and social isolation. Ongoing teasing and rejection, whether by peers or by parents, can be devastating for the child and may result in poor self-esteem, hostility, or continued fecal soiling as a result of learned helplessness (Campbell et al., 2009). There is some evidence that perceived quality of life is lower for children with chronic constipation compared to that of healthy children and those with other chronic medical conditions (e.g., inflammatory bowel

disease, gastroesophageal reflux disease; Youssef, Langseder, Verga, Mones, & Rosh, 2005).

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## Evidence-Based Approaches

Given the strong physiological underpinnings of enuresis and encopresis, medical management is often the first-line of treatment or a prominent component to effective therapies. This section will thereby outline evidence-based approaches for both medical and behavioral/psychological interventions for each disorder.

### Enuresis

The spontaneous remission rate for nocturnal enuresis is approximately 15% per year, although for many children, without treatment, remission may take a number of years (Forsythe & Redmond, 1974). Therefore, it is important to initiate treatment as soon as possible to promote rapid resolution of the bedwetting with the goal of minimizing or preventing further psychosocial consequences for the child and his or her family. Prior to mental health treatment, however, children should be referred to their primary care physician or pediatric urologist for a comprehensive assessment to exclude any diseases or structural abnormalities that would cause excessive urination (e.g., urinary tract infection, diabetes, spinal cord abnormalities; Järvelin, Huttunen, Seppanen, Seppanen, & Moilanen, 1990). Additionally, medical practitioners often make recommendations regarding general management strategies, including monitoring fluid intake and routine toileting or treat comorbid constipation prior to referral for more intensive behavioral protocols (Norfolk & Wooton, 2012).

### Medical Management

The urine alarm, as discussed in the next section, is typically the first-line treatment for nocturnal enuresis, given its well-established efficacy and superiority over other therapies, including pharmacotherapy. However, desmopressin can be useful in treating enuresis, especially in circumstances where its fast-acting, albeit short-term, effects are desired (e.g., sleepovers) or in situations where the urine alarm or other behavioral methods are deemed inappropriate (e.g., various stressors that preclude consistent implementation of a behavior plan; extreme parental intolerance

of bedwetting; Butler, 2004; Norfolk & Wooton, 2012). Desmopressin is a synthetic analog of the antidiuretic hormone vasopressin, which concentrates urine, decreases urine output, and potentially increases arousability (Norfolk & Wooton, 2012). Efficacy rates vary, likely due to differences in patient populations, dosing, and behavioral therapy recommendations across studies, but, overall, desmopressin successfully reduces bedwetting (Glazener & Evans, 2004). There are few side effects of desmopressin, but children should be instructed to stop fluid intake 2 hours prior to bedtime to prevent hyponatremia with water intoxication (Robson, 2009). Long-term use of desmopressin may result in sustained improvements in bedwetting behavior in some children, but for many children, bedwetting resumes upon discontinuation of the medication (Glazener & Evans, 2004; Norfolk & Wooton, 2012). Use of desmopressin in conjunction with the urine alarm is promising and has demonstrated efficacy in children who are at risk for treatment dropout, including those with severe wetting and comorbid behavioral problems (Bradbury & Meadow, 1995; Houts, 1991).

Imipramine and other tricyclic antidepressants (TCAs) have demonstrated efficacy in reducing bedwetting compared to placebo in children (Deshpande, Caldwell, & Sureshkumar, 2012). Specifically, use of TCAs resulted in reduced frequency of nighttime wetting by 1 night per week, with approximately 20% of children ultimately becoming dry. However, use of these agents in the treatment of enuresis is cautioned due to substantial adverse side effects, which may outweigh the presenting problem (e.g., mood and sleep disturbance, cardiotoxicity, and risk of death with overdose). The International Children's Continence Society, therefore, recommends that TCAs be used only when other therapies have failed and where there is a continued significant impact on the child's functioning (Nevés et al., 2010).

## **Behavioral Treatment**

The most empirically supported treatment for nocturnal enuresis is the urine alarm (Houts, Berman, & Abramson, 1994). This approach involves the use of an alarm that is activated by moisture sensors that are either worn by the child or placed on the mattress ("bell and pad"). There is ample evidence to support the efficacy of the urine alarm as the primary approach to treatment, and it has been shown to be superior to psychotherapy and medication alone (Wagner, Johnson, Walker, Carter, & Wittner, 1982; Willie, 1986). Results of studies examining the efficacy of the urine alarm in conjunction with other behavioral strategies are promising, with an average cure rate of approximately 79% (Butler,

Brewin, & Forsythe, 1988; Fielding, 1985; Geffken, Johnson, & Walker, 1986; Mellon & McGrath, 2000; Wagner et al., 1982; Whelan & Houts, 1990). However, Mellon and McGrath underscore that these combined approaches may represent an additive effect and have not been standardized or empirically tested by other investigators.

Although seemingly straightforward, the urine alarm, whether used independently or in conjunction with other behavioral strategies, requires a considerable investment of time and effort from families. Poor outcome with this approach, including dropout, has been associated with prior failed treatment attempts, family history of enuresis, negative parental attitudes and beliefs about the child's accidents, stressful home environment, and youth's behavioral disturbance (e.g., externalizing problems; Mellon & Houts, 1995). Therefore, the primary goals of the psychological assessment are to inform families of the demands associated with this approach, including likely disruption of sleep, and to evaluate whether they can realistically and consistently implement the treatment plan (Norfolk & Wooton, 2012; Mellon & McGrath, 2000). Stressful family circumstances, including marital problems, psychiatric or significant behavioral disturbance, and extreme parental intolerance of bedwetting, have served as significant barriers to cooperation and long-term compliance with the urine alarm intervention (Butler, Redfern, & Holland, 1994; Fielding, 1985).

Dry-bed training is another behavioral intervention used to treat nocturnal enuresis. This approach is based on an operant learning model that involves shaping the child's wakefulness by adhering to a waking schedule with predetermined intervals (e.g., waking the child a few hours after he/she has gone to sleep), as well as use of positive practice (i.e., the child practices getting out of bed to toilet and sits despite the lack of urge to urinate) and punishment for bedwetting via cleanliness training (i.e., having the child change soiled bedding and pajamas; Azrin, Sneed, & Foxx, 1974). Dry-bed training also incorporates the urine alarm, which is likely an important component to this approach, as the use of dry-bed training without it is less effective (Bollard & Nettlebeck, 1981; Keating, Butz, Burke, & Heimburg, 1983). The average cure rate for dry-bed training with urine alarm use is estimated to be 75%, and typically remission is achieved in less than a month (Mellon & McGrath, 2000).

Full Spectrum Home Training is a multicomponent behavioral approach to enuresis treatment that utilizes the urine alarm and several behavioral strategies, such as retention control with monetary rewards, cleanliness training, self-monitoring, and overlearning (i.e., continued use of the urine alarm while drinking increasing quantities of water before bedtime; Houts & Liebert, 1984). This manualized intervention has demonstrated efficacy in the treatment of nocturnal enuresis, with an



average cure rate of 78.5% within 8 to 16 weeks of implementation, but has not been investigated extensively (Houts, Liebert, & Padawer, 1983; Whelan & Houts, 1990). Noted benefits of multicomponent treatment protocols compared to single-method approaches, such as the urine alarm treatment or dry-bed training alone, is the inclusion of relapse prevention components and the reduced burden on the family (Mellon & McGrath, 2000).

## **Encopresis**

Although encopresis is a common pediatric disorder with apparent psychosocial implications for children and their families, no definitive treatment protocol exists (Cunningham & Banez, 2006). Due to the prominent physiological component of constipation and encopresis, medical management is often the first line of treatment. In fact, prior to any behavioral or psychological intervention, children should be referred to their pediatrician or pediatric gastroenterologist to rule out any underlying organic etiology of the constipation and/or fecal incontinence, including Hirschsprung's disease (von Gontard, 2012). Once medical management has been initiated, practitioners typically incorporate straightforward behavioral strategies (e.g., toilet sitting schedule) or make a referral to a mental health specialist for an enhanced behavioral treatment protocol. Again, no criteria exist to inform a treatment timeline, but in general, if constipation and fecal soiling persist beyond 6 months despite consistent medical intervention, etiology of the symptoms remains unclear, and psychosocial functioning of the child or family is clearly affected, further psychobehavioral intervention likely is warranted (Cunningham & Banez, 2006).

## **Medical Management**

According to guidelines set by the North American Society for Pediatric Gastroenterology and Nutrition, essential medical treatment strategies for chronic constipation include education, fecal disimpaction, and maintenance laxative therapy (Baker et al., 1999). It is important to begin the treatment process by educating families about the physiological aspects of the condition and address any misconceptions parents may have about the deliberate nature of the child's fecal incontinence. Given the high incidence of chronic constipation in children with encopresis, medical management generally begins with disimpaction of the colon, either via high-dose laxatives or enemas, and continues with a prolonged laxative regimen to promote daily, soft bowel movements to prevent the

reaccumulation of stool (Borowitz et al., 2003; van Dijk et al., 2007). Efficacy of laxative therapy alone has not been established, as the majority of examined treatment strategies combine the use of laxatives with behavioral interventions. Information about efficacy related to specific maintenance laxative dosing and duration is also unclear, although there is some evidence that polyethylene glycol has a higher success rate than lactulose and milk of magnesia in the treatment of functional constipation (Loening-Baucke, 2002; Voskuil et al., 2004).

## **Behavioral and Psychological Interventions**

Once an organic etiology has been ruled out and medical intervention has begun, it is common for practitioners to incorporate behavioral strategies in the child's treatment plan (Sutphen, Borowitz, Hutchison, & Cox, 1995). Behavioral strategies, such as positive reinforcement, exposure, and skills building (e.g., scheduled toilet sits, dietary education, instruction/modeling of defecation dynamics), have been utilized over the past few decades and are the most common protocols used in conjunction with medical interventions (Campbell et al., 2009; Levine & Bakow, 1976). These added behavioral protocols aim to decrease fecal incontinence, establish regular bowel habits, and resolve fears around toileting (Borowitz et al., 2003). However, efficacy data on these approaches are varied, likely due to the lack of consistent definition of "improvement" across studies and, therefore, no single, well-established intervention has been clearly identified (Brooks et al., 2000). In general, combination medical-behavioral interventions, with and without dietary recommendations, appear to be the most promising interventions to date (see review by McGrath et al., 2000; Borowitz et al., 2003; Brazzelli & Griffiths, 2006; Stark et al., 1997; Stark, Owens-Stively, Spirito, Lewis, & Guevremont, 1990).

Similarly, enhanced toilet training (ETT), which pairs behavioral strategies with medical management, has demonstrated efficacy in the treatment of encopresis. In addition to skills building and positive reinforcement of self-initiated toileting and lack of fecal accidents, ETT adds instruction to parents and their children about the physiology of overflow incontinence, training and modeling of appropriate defecation dynamics, and exercises promoting the child's ability to control the EAS muscle (Ritterband et al., 2003). When compared to intense medical management, ETT demonstrated a significantly greater reduction in symptoms, and youth who received ETT required significantly fewer treatment sessions and lower daily doses of maintenance laxatives (Cox, Sutphen, Borowitz, Kovatchev, & Ling, 1999). These gains were

maintained at both 6-month and 12-month follow-up (Borowitz et al., 2003).

Medical interventions that incorporate biofeedback also have been used in the treatment of constipation and abnormal defecation dynamics, although their independent effects remain unclear (Brazzeli & Griffiths, 2007; McGrath et al., 2000). Biofeedback, through the use of electromyographic monitoring, targets the paradoxical contraction of the EAS and teaches the child to relax the EAS during straining (Borowitz et al., 2003). Early studies examining the efficacy of biofeedback in the treatment of encopresis have demonstrated some benefits in decreasing paradoxical contraction of the EAS, but methods were notably focused on the use of this technique in conjunction with medical-behavioral management (Cox et al., 1994; Cox, Sutphen, Ling, Quillian, & Borowitz, 1996; Loening-Baucke, 1996). Overall, its use has not added a significant benefit in the majority of randomized studies.

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## Parental Involvement in Treatment

Parental involvement is central in the treatment of elimination disorders. Both enuresis and encopresis have underlying pathophysiology that should be clearly explained to the parents to promote a better understanding of their children's condition and to dispel any myths related to psychopathology causing or maintaining the condition (Cunningham & Banez, 2006). Additionally, the behavioral strategies involved in the treatment of both enuresis and encopresis can be demanding and require consistent follow-through on the parents' part. It is, therefore, crucial not only to conduct a comprehensive assessment of the potential barriers related to parental cooperation and compliance (e.g., marital stressors, existing psychiatric conditions) and the support mechanisms that are in place, but also to have a thorough discussion with the family about the demands and foreseeable challenges that may affect treatment success.

Parental stress and anxiety may be an important facet of the treatment model for elimination disorders. An association between maternal anxiety about children's health and use of pediatric health services has been established for several chronic conditions (Brown, Connelly, Rittle, & Clouse, 2006; Janicke, Finney, & Riley, 2001; Spurrier et al., 2000). For encopresis, there is support for an association between higher baseline parental anxiety and greater use of an online intervention (Magee, Ritterband, Thorndike, Cox, & Borowitz, 2009). Additionally, parents of children with enuresis endorse higher overall stress than do parents of

controls, and stress in parents of children with enuresis is significantly related to increased report of children's behavior problems (De Bruyne et al., 2009). Although it can be argued that parental stress leads to increased problem behaviors in children with enuresis, it also may be the case that parental stress and frustration may lead to overestimation of the severity of problem behaviors in their children (Butler & McKenna, 2002; Joinson et al., 2008; van Hoecke, Hoebeke, Braet, & Walle, 2004). Further investigation into the role of parental stress in the maintenance or exacerbation of elimination problems in the child is clearly warranted, as it may have implications for treatment beyond the initial educational component of an intervention.

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## Adaptations and Modifications

As discussed, treatment approaches for elimination disorders are understudied. From the available evidence, it appears as if a combination of medical and behavioral management is most effective. However, limitations associated with these approaches preclude their routine use in clinical settings. The combination of behavioral intervention with medical management requires expertise in both arenas (e.g., medical knowledge about defecation dynamics and laxative therapy, psychological knowledge relevant to intensive behavioral management, child development, and family systems), which few practitioners possess (Ritterband et al., 2003). Additionally, time and cost associated with medical appointments, as well as potential psychosocial implications such as embarrassment, serve as salient barriers to more widespread implementation of these interventions (Ritterband et al., 2003).

To address these challenges, a fully automated Internet-based version of ETT, entitled UCanPoopToo, was created to promote increased access for parents seeking treatment for their children with encopresis. The initial version of the 3-week program was designed for parents and children to complete together and consisted of educational content delivered via three core modules focusing on the anatomy and pathophysiology involved in defecation, bowel cleanout and laxative therapy, and behavioral treatment of encopresis. The program was designed to be engaging and interactive and, thus, incorporated numerous illustrations, animated tutorials, and reinforcing quizzes (Ritterband et al., 2003). Initial findings suggest this Internet intervention is a promising method for the delivery of enhanced behavioral treatment of encopresis (Ritterband et al., 2003). Specifically, children who participated in the Internet-based intervention demonstrated reduced frequency of fecal soiling (i.e., from an average of 6

fecal accidents per week to an average of 0.5 accidents per week after the intervention), increased defecation in the toilet, and increased self-initiated trips to the bathroom as compared to controls receiving routine care from their primary care physician. The cure rate was 70% for children who received the Internet intervention compared to 45% for controls.

More recently, UCanPoopToo underwent a revision to incorporate additional educational content, online diaries, and arcade-style video games used as a reward for completing the educational components of the program (Ritterband et al., 2013). A 1-week follow-up was also added to the intervention, lengthening it to a total of 4 weeks. Consistent with previous findings, results from a larger randomized controlled trial indicate that children who received the intervention in conjunction with routine care not only had significantly fewer fecal accidents at postintervention compared to those who had received only routine care, but they had fewer accidents at 1-year follow-up as well (Ritterband et al., 2013). Specifically, children who used the UCanPoopToo intervention demonstrated a 50% reduction in fecal accidents at 4 to 6 weeks as compared to controls. They also experienced a gain in encopresis-specific knowledge. The majority of children and their parents liked the program and perceived it to be useful, convenient, easy to use, and understandable. Clinically, the rapid gains attained through the program are notable given the chronicity of the condition for these youth, and they underscore the potential of the intervention as an adjunctive component to treatment, particularly for families with limited resources and for providers with limited expertise in the behavioral treatment of encopresis. A third national trial is under way and is in the final phase of data collection.

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## Measuring Treatment Effects

Despite the involvement of pediatric psychologists in the treatment of these functional disorders over the past few decades, barriers still exist that limit empirical examination of treatment approaches and outcome. At present, diagnostic limitations associated with these conditions make it difficult to study interventions and their effects systematically (von Gontard, 2012). These limitations include criteria that are not well defined or, in some cases, too restrictive (e.g., for enuresis, the frequency of urinary accidents 2 times per week for at least 3 months) thereby resulting in possible exclusion of children who may otherwise benefit from treatment and, overall, limiting sample size (von Gontard, 2012). Similarly, in the case of encopresis, there are general guidelines for the treatment of constipation and fecal incontinence, but much less information is available

for treatment of fecal incontinence without constipation (Stark, 2000). The treatment literature often does not specify these subtypes, which is highly relevant to the determination of efficacy and clinical implications (McGrath et al., 2000). Consistent with these limitations, the lack of well-defined and systematically implemented treatment strategies remains problematic and makes it difficult to draw conclusions about treatment efficacy. Medical intervention, for example, may require bowel disimpaction and maintenance laxative therapy, but the approaches taken vary across practitioners, making outcomes related to this approach difficult to study systematically. Another prominent barrier in treatment outcome research is the use of convenience samples, specifically those who have failed medical intervention and are referred subsequently for more intensive behavioral treatment (Stark, 2000). Collectively, these barriers underscore the need for improved diagnostic criteria, more systematic methods for documenting/coding treatment strategies and adherence, and more controlled, between-groups studies with larger samples.

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## Clinical Case Example

Jack (identifying information has been altered to protect confidentiality), a nearly 7-year-old, Caucasian boy, was toilet trained for urination by 3 years of age but was never fully toilet trained for defecation. He developed chronic constipation around 3½ years of age, which resulted in the passage of large, painful bowel movements and associated fecal incontinence. Aside from encopresis, medical history was unremarkable. His primary care physician began treatment for constipation and fecal incontinence via stool softeners when Jack turned 4 years of age. When his symptoms persisted after several months, his primary care physician referred him to a pediatric gastroenterologist, who recommended disimpaction with enemas followed by daily administration of stool softeners, paired with a toilet sitting schedule of 4 to 5 times per day. This approach continued for more than 2 years with minimal success. At the time of referral for intensive behavioral treatment, Jack was having several fecal accidents every day, and he was passing two large, very soft bowel movements in the toilet every day. He always required prompting by his parents to attend the toilet. His medical regimen, which he had been on for approximately 2 years, consisted of 17 mg polyethylene glycol daily supplemented by fiber 3 times per week. Jack frequently engaged in retentive behaviors, including crossing his legs and hiding behind furniture. Emotionally, he began experiencing anger and poor self-esteem secondary to encopresis, and over the past several years, he had been seen by several

therapists to address these concerns. Jack's father expressed frustration and anger secondary to beliefs that the soiling was intentional, and his mother was concerned that his retentive behaviors were so ingrained that they were now "subconscious." However, Jack reported that he often did not feel the urge to defecate.

Treatment began by educating the family about encopresis and the associated pathophysiology. Goals of treatment were outlined, including helping Jack become more responsible for his toileting behavior and fecal accidents as well as ensuring that he had the requisite skills, such as proper defecation dynamics and effective toilet sitting, to pass at least one formed, easy-to-pass bowel movement in the toilet every day. In consultation with a pediatric gastroenterologist, Jack underwent a clean-out the following weekend using high-dose polyethylene glycol, and his medication regimen was changed to incorporate a laxative to promote a more robust urge to defecate. The timing of the laxative dose was shifted to the afternoon to allow more time for Jack to have a bowel movement in the evening and to prevent fecal accidents during the school day. Toilet sits were reduced to 2 per day, approximately 20 minutes after meals (i.e., breakfast and dinner), during which time he was encouraged to practice the appropriate defecation dynamics that were described in detail and modeled during the evaluation. To address retentive behaviors and fecal accidents, a behavioral incentive plan was initiated that included a monetary reward for self-initiating toileting when he felt the urge to defecate and a disincentive when his parents noticed retentive behaviors and had to remind him to go to the toilet. The importance of immediate and consistent rewards, as well as having both parents on board with this approach to promote consistency, was underscored to the parents. Last, the family was provided access to the Internet intervention UCanPoopToo to provide adjunctive psychoeducational information about the physiology of defecation, clean-out and laxative therapy, and the behavioral treatment of encopresis.

Jack made several gains in the first 2 weeks of treatment, most notably with remittance of fecal accidents and passing spontaneous, formed bowel movements in the toilet before school each morning. He demonstrated improved self-confidence and was motivated and empowered by the reward system that was in place. Specifically, Jack was enthusiastic to receive the monetary reward at each self-initiated trip to the toilet associated with an urge to defecate, and he reported looking forward to buying a toy of his choosing at the end of the week with "his own" money. Additionally, his mother reported feeling less frustrated, although she was cautiously optimistic given the chronicity of Jack's condition.

Jack maintained these improvements for several months, during which time he was weaned off laxatives. He experienced a relapse in fecal

accidents twice over the course of 2 years following this intervention. On both occasions, it coincided with changes to the family's daily schedule (i.e., travel and during the holidays). Jack consequently experienced reimpaction but underwent a clean-out followed by a period of maintenance laxatives each time. Jack has remained asymptomatic since that time, although his parents were encouraged to continue to monitor his bowel habits to prevent reimpaction.

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