



Treatment of idiopathic toe-walking in children with autism using GaitSpot Auditory Speakers and simplified habit reversal

Ann Marcus^a, Brigit Sinnott^a, Stephen Bradley^a, Ian Grey^{b,*}

^aSt. Catherine's Association, Co. Wicklow, Ireland

^bRoyal College of Surgeons in Ireland - Bahrain, PO Box 15503, Buisateen, Bahrain

ARTICLE INFO

Article history:

Received 11 September 2009

Accepted 17 September 2009

Keywords:

Idiopathic toe-walking

Autism

Treatment

Applied behaviour analysis

ABSTRACT

This study aimed to examine the effectiveness of a simplified habit reversal procedure (SHR) using differential reinforcement of incompatible behaviour (DRI) and a stimulus prompt (GaitSpot Auditory Squeakers) to reduce the frequency of idiopathic toe-walking (ITW) and increase the frequency of correct heel-to-toe-walking in three children with autism. The study involved a delayed multiple baseline changing criterion design across individuals. Firstly, a baseline phase was conducted to determine the number of intervals where ITW occurred. Secondly, the GaitSpot Auditory Squeakers were paired with reinforcers. Thirdly, children wore GaitSpot squeakers over the heels of their feet under their shoes for a small number of 10 min sessions and when weight was placed on their heel, a squeak was emitted which was subsequently reinforced. Fourthly, the length of time the children wore the GaitSpot Auditory Squeakers was extended. Finally, the GaitSpot Auditory Squeakers were faded out and tests for generalisation and maintenance of heel-to-toe walking were conducted. The intervention produced substantial reductions in ITW across all participants though degree of reduction differed. The role of SHR and additional modifications for the treatment of ITW are discussed.

© 2009 Elsevier Ltd. All rights reserved.

1. Idiopathic toe-walking

Idiopathic toe-walking (ITW) is a diagnosis of exclusion given when a child presents with a bilateral toe-to-toe gait when physical or neurological disorders have been ruled out (Babb & Carlson, 2008). Although considered part of the normal gait spectrum in early development, toe-walking is considered abnormal when persisting past the age of two. However, for individuals with Autistic Spectrum Disorder (ASD), it may become established and persist long past the age where it can be considered part of normal development (Heilbronner & Castanada, 2006). Though prevalence rates of ITW have not been firmly established, recent estimates suggest a rate of occurrence of approximately 20% in individuals with ASD (Ming, Brimacombe, & Wagner, 2007).

The consequences of ITW can include a shortened Achilles tendon and ankle equinus (tightening or shortening of the muscles when there is less than 10–20° ankle joint dorsiflexion during walking; Sobel, Caselli, & Velez, 1997). Persistent engagement in toe-walking may also lead to the development of an abnormal gait pattern as adults and possibly postural problems (Pendharkar, Daniel, & Begg, 2008). As a result, intervention is recommended prior to the development of these and other physical problems. However, physical interventions such as physiotherapy or the use of casts appear not to have any lasting positive effect on ITW (Eastwood, Menelaus, Dickens, Broughton, & Cole, 2000; Hirsch & Wagner, 2004).

* Corresponding author.

E-mail address: igrey@rcsi-mub.com (I. Grey).

Curiously, the behavioural treatment of ITW has received relatively little attention and only a few isolated examples are available. In one early example, [Hobbs, Altman, and Hallidin \(1980\)](#) successfully reduced toe-walking behaviour in a young boy using a combination of weighed boots and a DRO. A later study by [Barrett and Linn \(1980\)](#) also treated toe-walking in a 9-year-old boy with a moderate intellectual disability by integrating positive punishment (positive practice overcorrection; [Foxx & Azrin, 1973](#)) within a physical therapy program resulting in a substantial reduction in the frequency of toe-walking. One possible factor that may contribute to a lack of applied behavioural studies in this area is the absence of a clear behavioural conceptual approach to ITW. In the literature, toe-walking is frequently described as a stereotypic behaviour or stereotypic motor movement ([Cushings, Adams, & Rincover, 1983](#); [Schreibman, Heyser, & Stahmer, 1999](#)) yet has also been described as a habitual behaviour ([Caselli, Rzonda, & Lue, 1988](#)). Behaviour is defined as stereotypy when it meets the criteria of repetition, rigidity and invariance, as well as a tendency to be inappropriate in nature ([Turner, 1999](#)). As stereotypes in autism are distinguished by their lack of developmental and social appropriateness; there is a risk that behaviours that appear repetitive, restricted or stereotypic within the context of developmental and social norms may be identified as a stereotypical behaviour when they may not be ([Cunningham & Schreibman, 2008](#)). As such, behaviours are defined as stereotyped based upon topographical characteristics of behaviour ([Miltenberger, Fuqua, & Woods, 1998](#)). However, 'habitual behaviour' is a term lacking technical definition in primary ABA sources (e.g., [Cooper, Heward, & Heron, 2007](#)) and there is no consensus as to whether stereotyped and habitual behaviours refer to different phenomena. This lack of clarity in the conceptualisation of ITW suggests that different possible sources of motivation may underpin ITW which in turn has a number of implications. Firstly, stereotyped behaviours are generally considered to be functionally related to sensory consequences which may narrow the range of treatment options to sensory matched interventions. Secondly, established habit reversal techniques may not be implemented for ITW owing to a conceptualisation as being sensory motivated.

Due to the automaticity of walking it is much more plausible that by the time an individual with ASD consistently toe-walks it is a habituated behaviour. Automaticity is a general term that refers to any skilled and complex behaviour that can be performed easily with little attention, effort or conscious awareness ([Wyer, 1974](#)). Within behaviour analysis, 'automaticity' is considered as "fluent contingency shaped behaviour" ([Greer, 2002](#), p. 43), and describes behaviour where the learner has become skilled at automatically behaving in a particular way, and without having to think about what to do. Walking is a behaviour that is learned, practiced and then becomes automated with the walker no longer aware of selecting, using and reacting to specific environmental information. In effect, walking occurs outside of conscious awareness and consequently toe-walking may also become automatic in the same sense.

Habit reversal (HR) is a behaviourally based multi-component treatment procedure implemented for the purpose of reducing habituated or automatic behaviour that may be troublesome and serve no adaptive function ([Miltenberger et al., 1998](#)). Originally developed by [Azrin and Nunn \(1973\)](#), the procedure has been used to address a range of repetitive or stereotyped behaviours that have negative physical (i.e., tissue damage) or social effects (embarrassment, social stigma) for the individual including tic disorders ([Clarke, Bray, Kehle, & Truscott, 2001](#)), trichotillomania ([Elliot & Fuqua, 2002](#)), stuttering ([Woods, Fuqua, & Waltz, 1997](#)), nail biting ([Woods & Miltenberger, 2001](#)), oral digital habits such as thumb sucking ([Long, Miltenberger, Ellingson, & Ott, 1999](#)) and chronic skin picking ([Twohig & Woods, 2001b](#)). According to [Miltenberger et al. \(1998\)](#) habit reversal and variations of the procedure have been shown to be effective based upon more than 25 years of research across a spectrum of habits and related behaviours. HR is based on the premise that individuals are often not aware of the repetitive behaviour occurring and the procedure generally consists of four main phases: awareness training, competing response training, motivational procedures and generalisation procedures.

More recent research ([Miltenberger, Fuqua, & McKinley, 1985](#); [Twohig & Woods, 2001a](#)) has employed a simplified version that consists of three steps: awareness training, competing response training and social support. Simplified habit reversal begins with awareness training and individuals are taught to discriminate the occurrence of the target behaviour. Competing response training involves teaching the client to engage in behaviour incompatible with the target behaviour. Establishing a competing response is typically achieved with differential schedules of reinforcement of which one variation of differential reinforcement of incompatible behaviour (DRI), whereby, reinforcement is delivered for a response that is topographically incompatible with a behaviour targeted for reduction ([Jones & Baker, 1990](#)). This is followed by what is termed social support training where the client is provided with motivation for continued use of competing response procedures. The instructor prompts the client to engage in the incompatible behaviour when appropriate and they positively reinforce the successful use of the desired behaviour ([Williams & Friman, 2006](#)). Although simplified habit reversal procedures can be taught relatively quickly, many sessions may be needed to strengthen and promote maintenance of the desired behaviour change ([Williams & Friman, 2006](#)).

While HR has been found to be effective for treating behaviours across age groups; however, its use with children and adults with intellectual disabilities and/or autism has not been well established. It has been suggested that motivational problems and stimulus control problems often account for failure of habit reversal in these groups and both of these factors are likely to be present when children with ASD present with ITW ([Miltenberger et al., 1998](#)). Specifically, establishing appropriate stimulus control for heel-to-toe-walking is difficult.

While HR has a long history of usage, we can find no study on its application to ITW in children with Autistic Spectrum Disorder. HR training is not contraindicated for most individuals, thus, along with the potential of a DRI to serve as the competing response component, the current study aims to evaluate the effectiveness of a simplified habit reversal in reducing the frequency of ITW in three individuals with Autistic Spectrum Disorder. To establish appropriate stimulus

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات