

## THE USE OF VIRTUAL REALITY HYPNOSIS WITH TWO CASES OF AUTISM SPECTRUM DISORDER: A FEASIBILITY STUDY

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### Abstract

The use of a 'virtual reality' hypnotherapeutic procedure was trialled for feasibility as a possible treatment modality for autism (4 sessions over 2 weeks) with 2 boys aged 14 and 15 years old. The aim of the study was to determine if the procedure would be acceptable to autistic patients and thus have some potential as an intervention for reducing anxieties and/or alleviating symptoms associated with autism. Results indicated that the procedure had no effect on autistic symptoms, however, the parents of both boys reported that their son enjoyed the sessions, was attentive and relaxed throughout and that they would pursue this procedure if it were available. Furthermore, they indicated that they believed it was an effective technique to gain their son's attention, and this, combined with the fact that the boys found it enjoyable and engaging, led them to believe there is significant potential for this particular treatment modality. Copyright © 2008 British Society of Experimental & Clinical Hypnosis. Published by John Wiley & Sons, Ltd.

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**Key words:** autism, feasibility, hypnosis, treatment, virtual reality

### Introduction

Autism is a neurodevelopmental disorder presenting in childhood that affects up to 1 in 150 children in the United States (CDC, 2007). The condition is characterised by severe impairments in socialisation, communication and behaviour. Children with autism may display a range of problem behaviours such as hyperactivity, poor attention, impulsivity, aggression, self-injury and tantrums. Furthermore, these children often display unusual responding to sensory stimuli such as hypersensitivities to certain sounds, colours, smells or touch and a high threshold of pain (APA, 1994). The prevalence of autism is increasing at epidemic rates (Yazbak, 2003) that are not accounted for by changing diagnostic criteria or improved diagnostic systems (Blaxill, Baskin and Spitzer, 2003; Croen, Grether, Hoogstrate and Selvin, 2002).

Effective treatment for the condition remains elusive and, at present, the condition is considered a lifelong disorder (APA, 1994). There is no pharmaceutical agent indicated for autism although anti-depressants, anxiolytics/tranquillizers, anti-psychotics and anti-convulsants are occasionally prescribed to limited effect and with concomitant side-effects (Strock, 2004). Intensive behavioural treatments have some demonstrated efficacy (Lovaas, 1987; McEachin, Smith and Lovaas, 1993), however their cost and the time

commitment required (in excess of 30 hours per week) make them prohibitive for most families.

Other treatments, including nutritional supplementation, various dietary regimes and hyperbaric oxygen, each have a limited and generally poor evidence base. Therefore, there is a dearth of effective treatments for children with autism despite a growing need for effective, accessible and affordable treatments.

Hypnosis is a therapeutic tool that incorporates relaxation along with other treatment components, including imagery, self-suggestion and desensitisation (O'Neill, Barnier and McConkey, 1999; Evans and Corman, 2003). O'Neill and colleagues (1999: 71) describe hypnosis as 'a state of intense relaxation and concentration, where the mind becomes detached from everyday cares and concerns. In this relaxed state, the mind can respond to suggestions and imagery for mental pictures.' Research and clinical data suggest that hypnosis is an effective adjunct to treatment for attention deficit hyperactivity disorder (Calhoun and Bolton, 1986), anxiety disorders (Evans and Corman, 2003), chronic pain management, and physical health problems, such as tinnitus and asthma (Harasymczuk, 2000; Flammer and Bongartz, 2003).

Given that children with autism are often anxious responders to a variety of everyday stimuli (e.g. different places, people, crowds, loud noises, bright light, and strange smells), it is possible that hypnosis may be useful for this population. However, autistic children are unlikely subjects for traditional face-to-face hypnosis due to their poor attention and inability to receive and provide appropriate verbal cues. They may be considered to have a very low susceptibility to hypnosis (Patterson, Wiechman, Jensen, and Sharar, 2006). In traditional hypnosis procedures, considerable effort is required on the part of the client to self-generate scenarios, and to imagine cued scenes or objects. This can be particularly difficult for children with autism as they typically have limited cognitive skills.

Some promising developments in audiovisual technology may facilitate autistic children's capacity to concentrate on, and imagine, hypnotic scenarios. These developments include audiotaped or computer-assisted hypnosis, which have the advantages of eliminating the need for a live hypnoterapist, thus making hypnosis less effortful and anxiety-provoking for those with a low susceptibility to hypnosis. The use of computer generated stimuli can facilitate the hypnosis process by capturing and guiding the child's attention. Further developments include the use of *immersive virtual reality* as a medium for delivering hypnosis and for other anxiety management treatments (Patterson et al., 2006). This medium has the effect of isolating children from the outside world, including any anxiety provoking stimuli, giving them the illusion of being inside a two- or three-dimensional computer-generated environment.

There are variations in virtual reality (VR) technologies. Most VR technologies are relatively low cost, easy to use, have the potential for a large user base and can fit into a small space such as a therapist's office. A relatively low level of complexity of computer graphics is required (Hodges, Anderson, Burdea, Hoffman, and Rothbaum, 2001). The technology can improve the convenience of the therapy for both the therapist and the child because of the reduced concentration required from the child and because the therapist does not need to be present for the duration of the hypnosis session (Anderson, Rothbaum, and Hodges, 2001).

Virtual reality distraction technology has been found to be associated with reduced pain and anxiety in children undergoing distressing medical procedures (Berenson, Wiemann, and Rickert, 1998; Wolitzky, Fivush, Zimand, Hodges, and Rothbaum, 2005). These studies have suggested that children are open to, and enjoy using, virtual reality

technology. These studies did not incorporate hypnosis, but studies with adult burn and dental pain patients have found virtual reality hypnosis (VRH) to be effective in reducing pain and anxiety (Patterson et al., 2006).

The procedure tested for feasibility in the present study was specifically designed to be used for VRH. The technology and software was developed in Australia and patented by Virtual Medicine Pty Ltd. This technology has a number of potential advantages over previous VR technologies. The procedures used in previous research with children undergoing medical procedures are referred to as *fully immersive*, having the effect of immersing children in a highly stimulating three-dimensional world. These were multi-sensory and interactive environments, involving combinations of verbal, spatial, visual, auditory and tactile stimulation. In contrast, the two-dimensional technology developed by Virtual Medicine is referred to as *partially immersive*, involving more limited auditory and visual stimulation, so as to bring the client to a more hypnotic relaxed state, and *reducing* clients' attention and awareness rather than *increasing* stimulation. The program is considered only partially immersive as users wear liquid crystal display goggles that allow them to see their actual surroundings via peripheral vision even while the program is running. This enables users to control their level of engagement to a degree and this was seen as critical for the autistic population due to their tendency towards over-stimulation.

If VRH is shown to be a feasible intervention for autistic children then we may have a new and effective resource that may assist in reducing the overall burden of the condition. The clinical effectiveness of the intervention, however, would need to be evaluated in a controlled trial. This intervention would be available almost immediately as the technology and software is already commercially available to health professionals through Virtual Medicine. The intervention is affordable as sessions are charged to health professionals on a per-session basis of \$15 USD.

## **Method**

### *Participants*

The first participant, 'Ricky', was a 14-year-old male who lived at home with his mother, with regular care also provided by his father who lived elsewhere. Ricky was diagnosed with autism at 3 years of age and the most recent independent assessments conducted when Ricky was 13 years of age confirmed the diagnosis. Ricky's score on the Childhood Autism Rating Scale (Schopler, Reichler, DeVellis and Daly, 1980), considered the gold standard in the field (Matson, Smirolfo and Hastings, 1998), placed him in the 'moderate' category. Ricky is largely non-verbal and requires assistance to attend to basic daily living requirements of eating, dressing, toileting and hygiene. He presented as a very compliant boy and demonstrated characteristics of poor eye contact, inattention, and unusual body postures and movements.

The second participant, 'Aaron', was a 15-year-old boy who lived at home with his mother, with little contact with his father. Aaron was formally diagnosed at 3 years of age as severely autistic. Formal assessments have not been conducted since Aaron was very young; however, his symptoms of severe cognitive, communication and behavioural deficits are consistent with that diagnosis. For example, Aaron has minimal functional language, severe attention deficits, and marked hyperactivity. He presented as a restless participant, often fidgeting and moving around. He was able to complete the VRH sessions, albeit with marked hand, arm and postural movements throughout.

## Measures

### Autism Treatment Evaluation Checklist (ATEC; Rimland and Edelson, 2005)

The ATEC was developed in 1999 to help researchers evaluate the effectiveness of various treatments for autistic children and adults, and to help parents determine if their children benefit from a specific treatment. Parents and teachers use the ATEC to monitor or track how well their children are progressing over time, even without the introduction of a new treatment. The ATEC consists of four subscales, covering the areas of speech/language/communication; sociability; sensory/cognitive awareness; and health/physical/behaviour. Internal consistency is acceptable (Rimland and Edelson, 2005) and three published studies have shown the ATEC to be sensitive to changes as a result of a treatment (Klaveness and Bigam, 2001; Jarusiewicz, 2002; Lonsdale, Shamberger, and Audhya, 2002).

### VRH Response Questionnaire (VRHR; Austin, 2006)

The VRH response questionnaire was developed by the first author for the purpose of this study in order to capture information about the child's experience with VRH that the ATEC is not sensitive to. It consists of 22 items relating to specific symptoms often associated with autism (e.g. hyperactivity, poor eye contact, and sound sensitivity) plus items recording the level of enjoyment the child experienced in relation to the sessions (as rated by the attending parent). Free response items recorded the parents' thoughts of any changes in their child they attributed to the VRH and not captured by the forced choice items, plans to pursue the intervention for their son, and an opportunity to comment freely on any aspects of the VRH intervention.

### Virtual Reality Hypnosis (VRH)

VRH is a new technology developed and patented by Virtual Medicine Pty Ltd (Melbourne Australia). The VRH method uses a head mounted display (see Figure 1) to create a non-threatening, virtual reality environment, where the hypnotherapeutic process



**Figure 1.** The Virtual Reality Hypnosis System, developed by Virtual Medicine Pty Ltd.

can be implemented. The immersive experience of the VRH is considered only 'partial' as users can maintain sight of their actual surroundings via the periphery of the video goggles which are not completely sealed. This distinguishes it from fully immersive techniques that completely separate users from their true surroundings.

In the program evaluated in this study, the hypnotherapeutic process is embedded and subliminalised in stage performances by a popular Australian children's entertainment group, 'Hi-5'. The Hi-5 program uses a combination of traditional, hypnotherapeutic techniques (i.e. spoken words and voice intonation), and other, more subliminal, communication strategies that include: body language, music, song, dance, visual metaphors, storytelling, colour psychology, binaural beats, biophilia, dual scripting, reframing, matching and mirroring and other cognitive behavioural techniques.

### *Procedure*

VRH sessions were conducted each Wednesday and Friday over 2 consecutive weeks at the private office of the first author (a registered psychologist). Ricky and Aaron were asked to sit or lie comfortably and the video goggles and headphones were placed in position. Upon checking that the child was comfortable and ready to commence the program, the first author asked for a 'thumbs up' sign. When the sign was given, the program was commenced.

### *Results*

Scores on the ATEC showed no change from pre to post VRH intervention for either boy. That is, the children showed no change in communication, sociability, sensory or cognitive awareness or physical behaviour.

Similarly, the VRHR Questionnaire indicated the children's behaviour did not change after undergoing the intervention. Parents' responses indicated that their children's levels of anxiety and calmness also did not change in response to the intervention. Nevertheless, the parents' responses indicated that both children enjoyed the intervention; Aaron 'mildly' and Ricky 'very much'. Ricky's mother elaborated on this, saying: 'He certainly seemed very relaxed during each session and I could tell he enjoyed it. He was also very quiet and calm in the car on the way home and seemed more sleepy in the late afternoons.' This enjoyment of the intervention is noteworthy as neither of the boys had been exposed to the Hi-5 entertainment group previously. Ricky's mother also said that she would take up VRH as an intervention for her son if it was available and affordable, saying: 'I think it could be a very helpful programme to help getting to sleep at night, or as part of an ABA (Applied behavioural Analysis) program for relaxation.' Aaron's mother indicated that she would consider taking up VRH as an intervention option, if modifications were made such as the eyeglasses being fully sealed (i.e. fully immersive VRH).

## **Discussion**

The results of this feasibility study suggest that VRH is not an intervention that makes any impact on autistic symptomatology over a 2 week, 4 session program. To put this in perspective, however, it is important to realise that this was the expected result as there are currently no non-pharmaceutical treatments for autism that have any demonstrated efficacy over an equivalent timeframe.

Despite the lack of efficacy, parents of both boys indicated that they (and their child) liked the intervention. Both Ricky's parents indicated that if VRH were commercially available and affordable they would seek it out as an intervention for their son. Aaron's

mother also suggested this, however, she indicated that she would like to see an 'autism-specific' program developed first. For example, a program that dealt with autistic symptoms specifically, rather than the general anxiety-reduction program used in this study. This was an intriguing result and discussions with both boys' parents indicated that they saw potential in this intervention but believed benefits would take longer to accrue and would require more sessions. Additionally, they felt that different programs could be used sequentially to address specific issues. For example, they suggested that there could be a specific program for toilet training, basic social communications, appropriate play and eating.

To more rigorously evaluate the effectiveness of VRH for autism, further development would need to be made to the VRH program. Being based on the children's entertainment group, Hi-5, the program may not meet the needs of older children, such as the two boys who participated in this study. It also needs to be determined whether the spoken language incorporated into the VRH program is an appropriate form of communication to implement behavioural change for children with autism, since the part of the brain involved in the interpretation of language is the neocortex, which may be deficient in people who experience intellectual difficulties (Caine and Caine, 1991; Kopp, 2000). If this is the case in autism, the VRH program could be modified so that there is less reliance on parts of the brain concerned with the interpretation of spoken language. For example, the program incorporates body language, music, song, dance, visual metaphors, storytelling, colour psychology and other non-verbal forms of communication, which could be given more emphasis than in the current Hi-5 program.

It would also be worthwhile to develop other measures of the child's response to the VRH intervention. For example, although the parents of the children indicated on visual analogue scales that the intervention did not reduce anxiety and increase calmness, their additional comments contradict this, suggesting that the boys were more relaxed and calm after the intervention than before. Additional measures of anxiety, such as therapist observation and physiological recordings (e.g. galvanic skin response), may help to more fully explore any anxiety reducing effect of VRH for children with autism.

Given the novelty of VRH and its use with autistic children, an important first step in evaluating it is to determine whether children and their parents are open to it as a possible treatment modality. This feasibility study provides promising preliminary evidence that children with autism accept and enjoy the VRH procedure and that their parents are sufficiently impressed by its potential to choose it as a form of treatment if it was available and accessible. Further research, with more children of varied age ranges, needs to involve a VRH program developed specifically for autistic children and utilise a longer treatment period.

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