ORIGINAL ARTICLE

The clinical application of deep touch pressure with a man with autism presenting with severe anxiety and challenging behaviour

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Accessible summary

- Many people who show challenging behaviour continue to be tranquilised and physically restrained.
- There have been claims that deep pressure touch can be of beneficial in reducing agitation and distress, particularly in people with autism spectrum disorders.
- Deep pressure touch is demonstrated to have a beneficial effect on extreme agitation, including lowering increased heart rate and respiration, as well as reducing the need for physical restraint and medication.
- This paper describes a ''low tech'' approach to the systematic use of deep pressure touch that can be readily applied in many settings.

Summary

Although there have been claims of significant therapeutic benefits arising from the use of deep touch pressure techniques with children with autistic spectrum disorders, to date there have been few empirical investigations of its use with adults with autistic spectrum disorders and anxiety in clinical practice. This paper reports on the systematic use of deep touch pressure within a structured programme for a man with autism who was presenting with severe challenging behaviour. The programme led to significant reductions in the use of both physical restraint and medication, as well as appropriate physiological changes, with a parallel increase in the person's quality of life. The implications of this approach are discussed with regard to both theory and practice with the aim of increasing the provision of more appropriate forms of support for people who present with challenging behaviour.

Keywords *Aggression, anxiety, autism, challenging behaviour, deep touch pressure, restraint*

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Introduction

Sensory abnormalities, that is unusual responses to sensory stimulation or behaviours with the apparent function of increasing specific sensory stimulation, have often been reported as being associated with autistic spectrum disorders (ASD) (O'Neill & Jones, 1997, Harrison & Hare, 2004). To date, clinical interventions aimed at re-mediating the difficulties associated with such abnormalities have not been empirically evaluated. However, there is increasing evidence that sensory abnormalities associated with the tactile sensory system may be implicated in the development and maintenance of forms of challenging behaviour in people with learning disabilities.

Both self-restraint (Oliver *et al.* 2003) and an apparent preference for restraint (Kinnel 1984) have been noted as being associated with self injurious behaviour in people with learning disabilities. The latter concept of preference for restraint refers to the instances of people with learning disabilities whose behaviour appears to have the function of eliciting physical restraint from their carers. This can result in people immediately engaging in forms of challenging behaviour when restraint is removed. In the case described by Kinnel, the function of eliciting physical restraint was to reduce the feelings associated with acute anxiety states. During restraint the person being restrained appears calm and relaxed as a result of all controls and choices being removed from the individual, therefore, they again became agitated and aggressive upon release of restraint, as anxiety increases. During such restraint, the person being restrained may appear to be very calm and relaxed, becoming agitated and aggressive upon release from constraint. Oliver *et al.* (2003) identified four categories of self restraint observed in people with learning disabilities namely self restraint by use of the persons own body (e.g. sitting on hands), self restraint by holding on to objects (e.g. wearing a helmet), self restraint by seeking restraint by others (e.g. wanting hands to be held) and self restraint by using clothes or other material. In the case of the latter category of self restraint, Oliver *et al.* (ibid) report cases of people with learning disabilities who have rolled themselves in bed clothes (Francezon *et al.* 1981), wrapped themselves in sheets (Peterson & Peterson 1968) and wrapping hands inside clothing (Hardy *et al.* 1984). The prevalence of such self restraint in people with learning disabilities has been determined as being as high as 21.7% (Powell *et al.* 1996).

Conventionally, the treatment for people with learning disabilities who present with distress or challenging behaviour relating to acute anxiety has been the use of anti-psychotic medication, often in conjunction with physical restraint, despite the lack of evidence to support the use of the former (Murphy *et al.* 1993). With people who have ASD, sensory abnormalities or severe anxiety, there have been accounts of the use of more specific therapeutic interventions, in particular, the clinical use of forms of touch. The use of what is termed deep pressure touch as a clinical intervention as been reported with other clinical groups (e.g. children with diagnoses of attention deficit hyperactive disorder (King 1998; Vandenberg 2002) and in non-clinical groups for the reduction of over-arousal (Krause 1987), as well as with people with severe learning disabilities (Hegarty & Gale 1996). What is termed deep touch pressure (Tagaki & Kobagasi 1956) i.e. forms of touch involving hugging, stroking the skin or swaddling can be distinguished from light touch pressure, i.e. superficial stimulation involving tickling or stroking of body hair, the latter is arousing of the sympathetic nervous system leading to increased pulse rate and respiration, whereas the deep pressure touch is calming and leads to reduction in pulse rate and respiration. Although there have been previous discussions of the use of deep pressure touch with people with ASD, to date there have been few experimental or clinical studies of its efficacy of effectiveness (see Baranek 2002 for a comprehensive review motor and sensory interventions in ASD). Grandin (1992) describes the construction and use of a deep touch pressure device, the ''squeeze machine'', which she designed to alleviate her own feelings of extreme anxiety relating to ASD. Describing the use of such a device with college students without ASD, Grandin reported that a similar feeling of relaxation was experienced by 60% of participants. Grandin's proposal that the systematic use of a mechanical ''squeeze machine'' reduces anxiety is supported in part by studies by Imamura *et al.* (1990) and Edelson, Goldberg-Edelson, Kerr and Grandin (1999). This latter study examines the use of a Grandin ''squeeze machine'' to bring about reductions in over-observed arousal and anxiety in children with ASD using a randomized control methodology. Edelson *et al.* reported significant physiological and behavioural changes, which were taken as supporting the proposal that deep pressure touch reduces arousal. Grandin suggests that the application of deep touch pressure may be beneficial for those people with ASD who are over sensitive to sensory stimulation or those who suffer with acute anxiety, and that such an approach appears to have few, if any side-effects. Other reported cases of the use of deep pressure include the work reported by McClure & Holtz Yotz (1991), which used foam padded splints in the successful treatment of self-injurious behaviour in a child with ASD, and by Zisserman (1992).

To date, the studies of the clinical use of deep pressure touch for which empirical data is available have either involved children and/or utilized specific devices, such as weighted vests (Vandenberg 2002) or ''squeeze machines'' (Edelson, Goldberg-Edelson, Kerr & Grandin 1999), neither of which would necessarily be acceptable to or feasible with adults with ASD and/or anxiety. Therefore, in order to examine the clinical utility and efficacy of the use of deep pressure touch in adults with ASD, a case is described in

which an idiosyncratic deep pressure touch intervention was developed and implemented to reduce distress and anxiety induced challenging behaviour in a man with ASD.

Case study

B was a man aged 31 years with moderate learning disabilities whose ASD was not recognized until he was 29. B had some verbal language and his verbal comprehension was assessed at an age equivalent of 7.5 years using the British Picture Vocabulary Scale – II (Dunn, Dunn, Whetton & Burley 1997). He tended to communicate about topics of interest to himself and could be quite repetitive in his communication with other people, often asking questions about people and future events about which he already had the relevant information. B lived at the family home until he was 26 years old, when he moved to residential provision. Following a breakdown in this provision, he was admitted to an Assessment and Treatment service for people with learning disabilities. He had varied interests, including heavy metal music and doing jigsaw puzzles. He was reported as being upset from changes in his daily routine and environment, and presented as emotionally labile.

Initially physical exercise was prescribed as being an important factor in reducing his levels of anxiety, over arousal and aggressive behaviours towards other people. However, this later proved to be the precipitating cause in a chain of events that led to the medical condition rhabdomylosis. Rhabdomylosis causes the breakdown of striated muscle fibre (see Sauret *et al.* 2002), which is a potentially a life threatening condition (most commonly seen in marathon runners). Due to this physical restraint and vigorous exercise were contra-indicated as control mechanisms for the exhibiting behaviours. Further to this, the medications used in order to bring about sedation proved to have little impact on B's presenting behaviour, and he was frequently subject to physical restraint.

At the time of the intervention, B was presenting with several behaviours that were described as challenging. These included, seeking verbal reassurance and repetitive speech patterns, grabbing members of staff, throwing objects and physical aggression towards other people. In addition he presented as agitated and over aroused. B developed rhabdomylosis following a period of extensive exercise (meant to reduce arousal and divert from aggression), resulting in increased arousal, increased anxiety state, increased levels of aggression leading to physical restraint and medications, over an extended period of time (17 hours). Other contributing factors included, decreased calorie intake, decreased fluid intake, increased perspiration and summer temperatures in excess of 80°C.

B was admitted to hospital where he received treatment for the presenting medical condition (increased fluids, increased oxygen and enforced rest). Following his return to the Assessment and Treatment service, antipsychotic medication was discontinued and a structured behavioural programme based upon a functional analysis of his presenting behaviour was implemented. The programme was developed on the basis of information about B's history and from direct observation within a functional analysis framework (O'Neill *et al.* 1990). B's mother reported that when he was a child and became upset, she would hold him on her knee, giving him a big hug. She was also able to identify that as a youngster he would always choose to wear a tight coat (that he had outgrown) when leaving the home environment (i.e. potentially anxiety provoking) regardless of the weather. Staff on the unit reported that B was ''only really happy'' at night when he was tucked up in his bed (bedclothes tucked in tight around him). Prior to being in restraint, he appeared frightened rather than angry and appeared relieved when placed in restraint. It was observed that on release from restraint, B immediately precipitated being placed back in restraint by grabbing at staff members. B would attempt to grab and hold onto staff rather than strike out at staff. He appeared to want the physical contact maintained rather than this being removed. Thus, holding onto staff was a form of self restraint employed to reduce his levels of anxiety. Much of his behaviour appeared to be related to changes in his immediate social and physical environment. It was therefore hypothesized that B found specific responses to his challenging behaviour, such as physical restraint, inherently reinforcing. Hence, the continued restraint being contingent on his behaviour, appeared to serve the function of reinforcing his aggressive behaviour (see Figure 1).

Therefore, a programme was developed to provide positive touch to B that was not contingent on his presenting with challenging behaviour. This was developed as part of an integrated intervention that involved providing deep touch pressure as part of a structured daily timetable (Table 1). Deep touch pressure was provided in the form of ''tuck in'' that involved the following stages:

1. B and a member of staff going to a designated quiet room.

2. B to lie down on his back on a mattress with his head supported by two pillows.

3. A top sheet was laid over B, covering his body from the shoulders to his ankles. This was then tucked in tightly under his body.

4. A second folded sheet was laid over his torso and also tucked in under his body.

5. A kitchen timer was set for 15 mins.

6. The member of staff remained with B at all times, talking with him and showing him books and magazines.

7. If B showed any signs of discomfort or requested that the session should end, the member of staff set the timer to sound and ended the session.

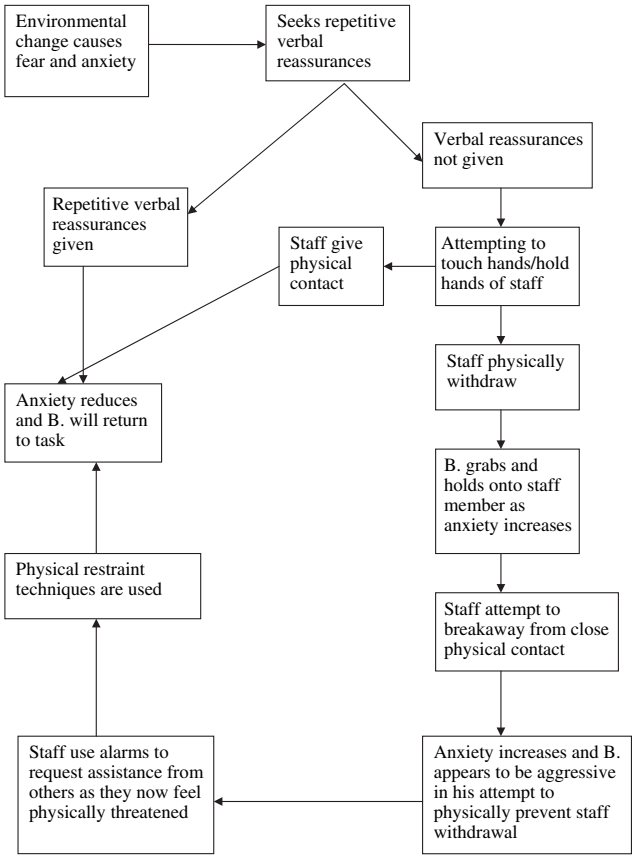

Figure 1 Functional analysis of B's presenting behaviours.

8. When the timer sounded B removed the sheets by sitting up and received an appropriate tangible reinforcer (chocolate/drink), accompanied with social reinforcer.
9. B continued to the next session in his activity timetable.

B's timetable involved using a kitchen timer to indicate the end of each activity and the beginning of the next, in order to give a concrete form to B's time management. If restraint was to be used, the same timer was to be used to indicate to B the end of the period of restraint and the start of the next timetabled activity (set at one minute and repeated if necessary until restraint was discontinued).

All staff working with B received training in ''tuck in'' as a necessary component of his care plan. It was emphasized to staff that the application of deep touch pressure was not a method of restraint and that B could end the session at anytime simple by sitting up or rolling over. In addition to the structured timetable, a seven stage reactive plan was developed for staff to follow. This identified the path from B's usual presentation, through anxiety to aggression, with the management strategies required for each stage. For example, B's reactive strategy identified that when he became increasingly anxious he presented with a fixed stare and glazed facial expression (possible loss of peripheral vision - related to anxiety disorders), lip smacking and chewing lips (possible dry mouth – related to anxiety disorders). At this point low level positive touch was increased to a constant application until the symptoms of anxiety reduced and B was able to resume his daily activities as planned.

Clinical outcome

In order to evaluate the efficacy of the intervention data relating to the use of restraint, as required medication and relevant physiological variables (respiration and pulse rate, temperature and blood pressure) were collated for the pre and post intervention periods. From the information illustrated in Figures 2 and 3, it can be observed that when from the intervention commenced in September, both the number of occasions on which physical restraint and as required (prn) medication were used declined markedly. The amount of time that B was restrained for reduced from 1954 minutes in the month prior to the intervention to 240 minutes in the month after its implementation, reducing further to 40 and 35 minutes in the next two months and stabilizing at between 0–2 minutes over the next four months. The eight instances of the use of concurrent restraint and as required medication that occurred following the start of the pro-

Table 1 Example from structured time-table for B

Approx. time	Activity	Staff tasks
12.15pm	B to have 'tuck in' session see protocol for Deep Touch Pressure.	Staff will take B to the calm room. He will lie down on the mattress, his head on two pillows. Staff will use two sheets to 'tuck' B in (see protocol). Staff will set the timer for 15 min. Staff will remain with B at all times.
12.30pm	B's timer sounds indicating the end of the session.	Upon the sound of the timer, staff will end the session, and give B a reinforcer of choice (choc/drink etc).
12.35	Art Session	Staff will take B to the art room They will set the timer for 15 min. Staff will engage and encourage the completion of the task given.
12.50	B's timer sounds indicating the end of the session.	Upon the sound of the timer, staff will end the session, and give B a reinforcer of choice

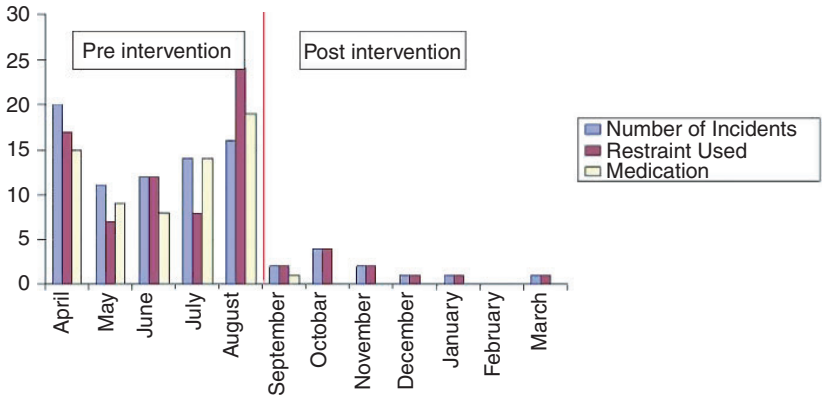

Figure 2 Number of incidents, use of restraint and use of as required medication, pre and post intervention.

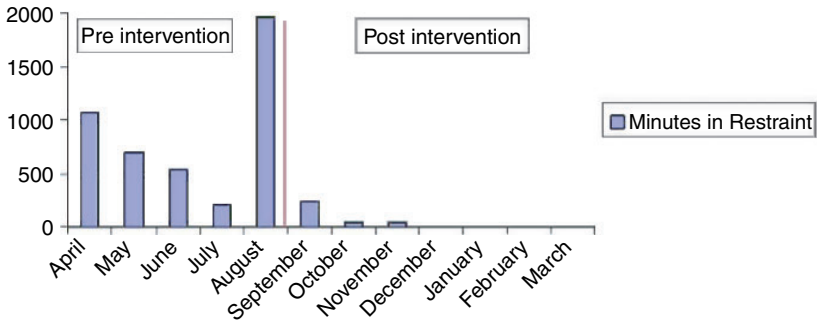

Figure 3 Minutes in restraint pre and post intervention.

gramme appear to have been due to the staff learning the new skills required to run the programme. During this process, it was noted that some staff members had difficulties in implementing the parts of the programme involving non-contingent positive touch. It appeared that the role of therapeutic touch was seen as been directly opposed to organizational policies that serve to protect clients from possible inappropriate touch/sexual abuse. When difficulties arose in providing positive touch non-contingent upon B's challenging behaviour B became more anxious resulting in an increase in challenging behaviours which took B back into his known territory of restraint. In addition, relevant physiological data (temperature, pulse rate, respiration and blood pressure)were collected pre and post intervention. The monthly means for these data are shown in Table 2.

Table 2 Physiological information pre and post intervention

	Mean temperature/C	Mean pulse/min	Mean respiration/min	Mean BP
August	36–38	84	24	180/100
September	36–38	80	20	140/100
October	36.5–37.5	80	20	120/80
November	36.5–37.5	75	20	120/80
December	36.5–37.5	75	20	120/80
January	36.5–37	75	20	110/70
February	36.5–37	75	20	119/78

Table 2 Again, it was evident that all of the physiological markers had changed in the predicted downwards direction following the introduction of the programme.

Conclusions

In the case described, the 'standard' treatment of anti-psychotic medication and restraint appeared to have little effect and may in part have been maintaining B's aggressive behaviour by providing the desired outcome of restraint contingent on this behaviour. The programme developed to incorporate deep touch pressure was effective in reducing the incidences of B's anxiety related challenging behaviour, resulting in a reduction in the use of physical restraint and medication, and also appears to have led to clinically important physiological changes. Given that deep touch pressure was implemented as part of the overall structured programme developed for B, at this stage it is not possible to identify it as the principle element in the reduction of B's challenging behaviour. Given the specific circumstances with risk of serious injury to both B and the staff working with him, it was neither practical nor ethical to attempt to isolate the specific effects of deep touch pressure, for example by removing it from the programme for a set period and monitoring change or otherwise, in the use of restraint or medication and in the physiological variables. However, the specific contribution of deep touch pressure to reduce the levels of restraint and medication observed after

the start of the structured programme can be estimated in three ways. First, B had a history of seeking restraint and the functional analysis undertaken after his admission to the Assessment and Treatment service identified that B's challenging behaviour was frequently reinforced by consequent physical restraint by staff. Second, when staff members had difficulty implementing the parts of the programme involving non-contingent positive touch, but other aspects of the structured timetable were still being implemented, B presented with symptoms of anxiety leading to incidents of challenging behaviour that led to physical restraint and as required medication being used. Taken together, this lends support to the notion that the critical component of the structured programme was deep touch pressure, implemented in the 'tuck in' procedure. Thirdly, the observed reductions in blood pressure, pulse rate, respiration rate and body temperature from their elevated pre-intervention levels to more normal levels post-intervention may be taken as further evidence of the efficacy of the intervention as a whole, with such reduction in pulse and respiration rate and in blood pressure are as predicted when deep touch pressure is used (Edelson et al 1999). It is also possible that some of the positive physiological changes observed post-intervention were due to the decrease in the incidents of anxiety induced aggression.

As previously described, it is important to acknowledge that some staff were ill at ease with the non-contingent ''tuck in'' and ''positive'' touch components and this raises both ethical and practical issues for the clinical use of non-contingent touch with people with learning disabilities, as staff beliefs and feelings about the nature and course of challenging behaviour and their responses are paramount in the effective implementation of behavioural programmes (Bailey *et al.* 2006; Murphy *et al.* 1993). Therefore, in parallel with outcome evaluation studies of the clinical use of deep touch pressure, there is also a need to examine staff beliefs around the use of non-contingent touch as compared to other responses to challenging behaviour if such approaches are to be successfully implemented.

There is clearly a need for further research in this area, possibly involving both controlled trials and controlled case studies, with people who are experiencing high levels of anxiety, in order to demonstrate the clinical effectiveness of the use of deep touch pressure, for people with autistic spectrum disorders as well as people with severe anxiety disorders. In order to carry out such work it is also important that assessment tools and procedures are developed in order to identify those people who might respond to and benefit from deep touch pressure. It is hoped that the present work has demonstrated the potential of deep touch pressure as a safe and effective approach to reducing anxiety and challenging behaviours and increasing quality of life.

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