CASE REPORT

The Effects of Deep Pressure on Self-Stimulating Behaviors in a Child With Autism and Other Disabilities

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Key Words: handicapped • self stimulation

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This article was accepted for publication May 28, 1991.

This case report describes the effects of deep-pressure tactile stimulation in reducing self-stimulating behaviors in a child with multiple disabilities including autism. These behaviors include hitting the hands together, one hand on top of the other, so that the palm of one hand hits the dorsum of the other, or hitting a surface with one or both hands. Such behaviors not only made classroom efforts to have her use her hands for self-care functions such as holding an adapted spoon difficult or impossible, but also called attention to her disabling condition. These behaviors also were disruptive and noisy.

Related Literature

Several studies have described either distinctive behaviors or possible tactile functions of some children with autism. Schopler (1987) listed the exhibition of repetitive body movements, such as hand flicking, among the primary characteristics of autism. Such behaviors were similar but not identical to those of this student. An apparent lack of awareness that one is being touched by another person discriminated children with tactile defensiveness from children without tactile defensiveness in another study (Larson, 1982). Perhaps, if some autistic children are tactilely defensive in response to some stimuli, they are also unable to respond normally to another person's touch. This could lead to anxiety, confusion, and, possibly, self-stimulation to substitute for a lack of perception of tactile contact with others. Confirmation of this assumption is found in a study by Ayres and Tickle (1980) suggesting that autistic children reacting normally or overreacting to light touch, movement, gravity changes, and an air puff respond positively to sensory-integrative therapy, including somatosensory stimulation. Thus, it was reasoned that the subject of the present case report might be a child who is tactilely defensive and who might respond to the application of deep pressure as a type of somatosensory therapy.

Krauss (1987) reviewed studies of the effects of deep pressure on anxiety, with some results suggesting that deep pressure may actually alter the physiological state of an organism, perhaps even reducing the heart rate. She suggested that such reasoning is supported by early animal studies and by descriptions of early methods of restraining violent patients with mental illness.

Perhaps the most compelling argument for the importance of the tactile system and deep pressure in the development of a child with autism is made by Grandin and Scariano (1986). Grandin was diagnosed as autistic as a young child, and she described both her intense desire to receive certain types of tactile stimulation, such as deep pressure, and a disturbing, conflicting aversion to other forms of touch. Grandin went so far as to place herself into a cattle squeeze chute and then to construct a

squeeze machine, which allowed her to apply her own deep pressure to her entire body.

Case History

I first met the child, an 8-year-old girl with severe developmental delay, possible seizures, and autism, during the 1986–1987 school year. She was enrolled in a special education class for multiply-disabled children in a public school, and occupational therapy services were a part of her educational program. The Appendix summarizes descriptive data on the student.

Since first enrolled at school, the student exhibited the self-stimulating behaviors described earlier. She does this lying supine, sitting supported or unsupported on the floor with legs crossed, sitting supported in a regular chair or in her wheelchair, or standing supported at a stander.

When I first worked with her, the student responded to attempts to position her during therapy by stiffening her body, becoming agitated, and crying. She tends to stiffen and stand on her toes when placed in a supported standing weight-bearing position without foot splints applied. Perhaps this is due to tactile problems. This reasoning is further supported by the fact that passive range of motion in ankle dorsiflexion is nearly within normal limits bilaterally when she will permit passive motions to be done. Such toe standing does not appear to be due to an obligatory positive supporting reaction. When tactile cues are applied while she is supported in standing, she can maintain a standing position with both feet flat while other parts of her body, such as her arms, move actively. With the application of bilateral foot splints to hold each ankle in a position of approximately 15° from a neutral position (the position closest to neutral that could be attained when the splints were made), the student maintains a supported standing position without difficulty or signs of discomfort. She had difficulty with her therapy schedule, perhaps because it was more irregular and more difficult for her to learn than her structured classroom schedule, which was the same every day. Thus, it was often difficult or impossible to work with her when she came to the therapy room. Trial and error during therapy revealed that when deep pressure was applied in the form of firm hugs, tickles, or back rubs through the use of a back roller, the student responded by becoming more calm and occasionally smiling. Additionally, her self-stimulating behaviors appeared to decrease if she was engaged in these activities. Thus, the idea occurred to me that allowing her to wear a piece of clothing, such as an anti-burn scar pressure garment, which hugged her consistently, might help control sensory input by substituting constant, relaxing deep pressure for her self-stimulating behaviors. Additionally, the child's mother thought the self-stimulating behaviors served the function of allowing her to modulate her own sensory input. Thus, such a garment might also substitute for this same function by calming her while also freeing her arms and hands for other activities and allowing her to attend more to outside academic and social stimuli because she was more relaxed.

Application of a Pressure Garment Sewn From Pantyhose

Because commercially available anti-burn scar pressure garments are expensive and can be fitted only with a physician's prescription, a pair of support pantyhose was used to assess the initial effects of constant deep pressure and to justify costs. Bilateral gloves with sleeves reaching just above the elbows and extending below the metacarpal regions of the hands and into the thumb web spaces were sewn from this material. Although not as desirable as a vest with sleeves to cover the entire torso, the gloves were easy to sew, appeared to fit well, were easily washed and dried, and were tolerated well by the student.

The gloves were used during the 1987–1988 academic year for approximately 2 months. Observations were made during different regularly occurring classroom or therapy activity periods of 30 min, the only times when the gloves were worn. Attempts were made (a) to observe the child in the morning and in the afternoon, as fatigue occurring throughout the day might alter the effectiveness of deep-pressure input (C. Trush, personal communication, May 11, 1988); (b) to observe the child during a variety of classroom or therapeutic activities; (c) to avoid altering other aspects of her regular school day; and (d) to avoid changing the people with whom she came into contact during the data-gathering sessions.

The student was observed for two or three 1-min periods (depending on the time available) with both gloves off; then she was observed during the same activity for the same number of periods with both gloves on. The number of self-stimulating behaviors occurring during each 1-min observation period was recorded. One minute separated each 60-sec observation period to allow the observer time to rest and, thus, work for maximum accuracy in obtaining counts. It was believed that counting during the predetermined 1-min periods was accurate due to these rest periods. The two sets of data-gathering sessions with both gloves off and then with both gloves on were separated only by the amount of time required by the therapist to apply the pressure garments.

In all but two of the above-described data-gathering sessions, the two conditions of both gloves off and both gloves on were carried out during the same half-hour activity period. Once, due to time constraints, the two conditions had to be carried out on different days. These data were eliminated because they were not gathered during the same activity period, and too many unknown factors might have confounded results. Additionally, on January 22, 1988, the student's parents entered the class-

room unexpectedly and interacted with her. This may have been a factor in the increased self-stimulating behaviors recorded during that session. However, these data were retained for final analysis because they were gathered during the same activity period.

Figure 1 presents results of an analysis of these data. In four of five comparisons, decreases in self-stimulating behaviors were noted with both gloves on. When all self-stimulating behaviors were categorized as occurring either with both gloves off or both gloves on, an overall decrease of 46% in self-stimulating behaviors was noted when the gloves were on.

Application of a Pressure Garment

Given the positive results obtained with use of the sleeves, it was decided to obtain a prescription for a Jobst[1] vest with sleeves, which cost approximately $130. The garment was ordered with sleeves stopping at the wrist so as not to cover the hands. It was reasoned that if wearing the vest did indeed decrease hand slapping or hitting, it would be easier to conclude that this was because the garment applied more comprehensive and uniform pressure and hugged the child all over, thus eliminating speculation over whether it was because it covered her hands and forearms specifically. Wearing the vest did not appear to restrict her movements in any manner.

Observations were made now once a week at the same time of day and during the same classroom activity; the client sat in her long sitter with a table placed before her with toys laid on the tabletop. (See Figure 2 for a more detailed description of the setting and equipment). She was observed for 9 weeks without the garment and for 9 weeks with the garment during the 1988–1989 school year. Each observation session included seven 1-min units, each separated by 60 sec of rest for the observer. This provided a baseline measure of self-stimulating behaviors (Campbell, 1988). During observations, each incidence of self-stimulating behavior was recorded as (a) one hand slapping the other; (b) the right hand hitting the tabletop; or (c) the left hand hitting the tabletop. Thus, the behaviors of hitting the tabletop with either hand were separated from those where the student slapped one hand on the back of the other.

During the wearing periods, the pressure garment was applied by the therapist beneath the student's clothing immediately before she was placed in her long sitter by a classroom staff member. The therapist sat behind the student to count and record data, so that the student could not see her. The garment was removed immediately after data gathering and recording had ceased, to be applied again only when the next data-collection period occurred, in 1 week.

Figure 2 presents the results of an analysis of the data

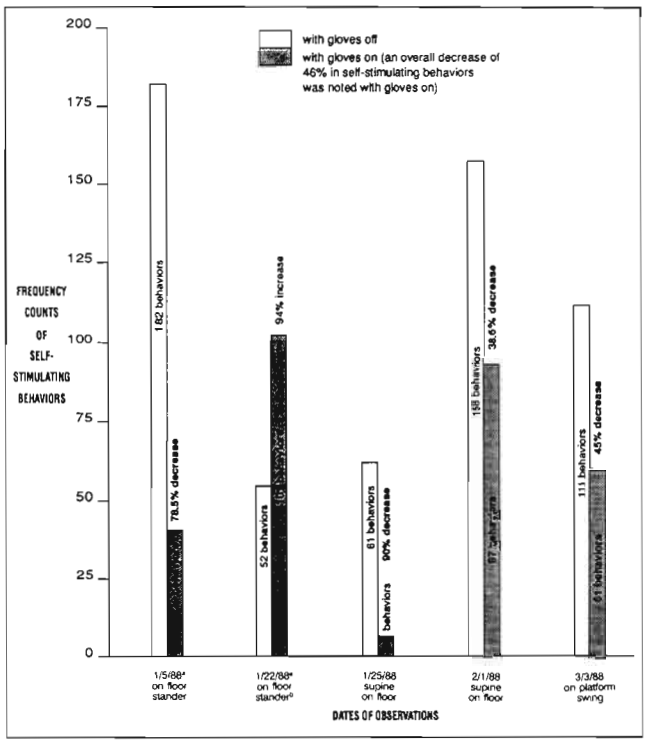

Figure 1. Comparison of subject's self-stimulating behaviors with gloves on versus with gloves off. [a]Data were gathered for one hand at a time. [b]The student's parents entered the classroom and interacted with the student during observation.

gathered during the application of the pressure garment. Total instances of self-stimulating behaviors decreased by 11.8%. However, when the types of behaviors were analyzed, frequencies of both the right and the left hands hitting the tabletop increased by 2.5% and 9.6%, respectively, while hand slaps decreased by 54.5%. Total daily instances of behaviors, with or without the garment, ranged from a low of 212 to a high of 606.

Discussion

The finding that the self-stimulating behavior of hitting the tabletop increased while the pressure garment was worn raises the question of whether this behavior is actually self-stimulating. Instead, these particular behaviors might be attempts to communicate or to explore the tabletop for toys. The communication functions of these types of behaviors have been postulated by Donnellan, Mirenda, Mesaros, and Fassbender (1984). Also, Orelove and Sobsey (1987) emphasized the need to view seemingly excessive behaviors of children with multiple disabilities as functional. If these behaviors are indeed attempts to communicate or explore, perhaps they are directed by higher-level processes not so easily influenced by deep-pressure tactile stimulation.

Conclusions to be drawn from an association between application of deep pressure and reduction of self-

[1]Manufactured by Jobst Institute, Inc., 653 Miami St., Toledo, OH 43605.

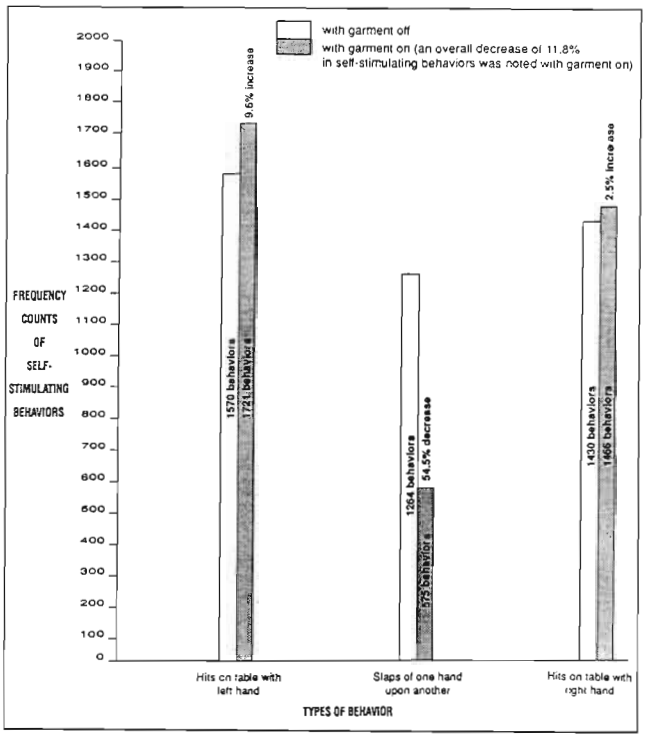

Figure 2. Comparison of subject's self-stimulating behaviors with and without the pressure garment. *Note.* The student was observed for 9 weeks with the garment and for 9 weeks without the garment. For each observation date there were seven 1-min observation periods, each separated by a 1-min rest period. All test observations were done with the student strapped in her long sitter (a device that positions a child seated with the hips flexed and the knees extended to prevent contractures) with a table placed before her and with bilateral foot dorsiflexion splints applied. This occurred at the same time of day, and all observations were done on a Thursday.

stimulating behaviors are not clear in this case. It is possible that for this child the concept of self-stimulating behaviors must be reexamined and made more precise. Some behaviors might be attempts to communicate or explore, whereas others might be more self-stimulating and related to tactile needs. Use of the gloves and garment were restricted to data-collection times. Changes in the child's behavior resulting from use of the gloves and garment did not appear to carry over into other classroom activities after such apparel was removed.

I do not recommend that any child with or without autism who exhibits either self-stimulating behaviors or evidence of tactile problems be fitted with an anti-burn scar pressure garment. The application of such a garment with the child in this study simply appeared to be an expedient manner in which to apply deep pressure, but such pressure might be applied in other ways as well, as appropriate for a particular child. Rimland (1986) pointed out that the relationship between the tactile system and autistic behaviors has been virtually unexplored. The behaviors of children with autism or multiple disabilities or both often are misunderstood. Perhaps reexamining them in light of what is being learned about the tactile system or about attempts to communicate among children with disabilities or both would be helpful. ▲

Appendix

Summary of Descriptive Data on Student

Birth history: Product of full-term pregnancy, uncomplicated labor and delivery.
Siblings: One sister.
Medications: Carbamazepine, 100 mg 3 times/day, for seizures; from 2/18/88 until 2/26/88 on penicillin, one tsp 3 times day for strep throat; carbamazepine gradually decreased in an attempt to discontinue, beginning on 10/13/88. (The child did not tolerate this and it was resumed on 12/1/88.)
Developmental levels as measured by Peabody Developmental Motor Scales (Folio & Fewell, 1983) on 1/89:
Fine-motor age equivalent: 3 months. Gross-motor age equivalent: 4 months.
Summary of developmental skills:

1. Exhibits inconsistent eye-tracking skills, regards face occasionally.
2. Rolls both directions prone to supine and vice versa with log roll.
3. Sits independently with legs crossed for approximately 1 to 3 min., then lies back into supine position.
4. Exhibits inconsistent protective reactions to the sides in sitting, no protective reactions to the rear.
5. Brings hands together at midline.
6. Exhibits fairly consistent right-hand preference.
7. Bears weight in supported standing only with hands-on support and while wearing bilateral foot splints.
8. Exhibits other self-stimulating behaviors of grinding teeth or arching body into total extension pattern when unhappy.

Acknowledgments

I thank the student's parents; the staff of the student's school; Valerie Lynch, EdD, Child Development and Retardation Center; and John F. McLaughlin, MD, Children's Orthopedic Hospital, all of Seattle, Washington, for their assistance with this study.

References

Ayres, A. J., & Tickle, L. S. (1980). Hyper-responsivity to touch and vestibular stimuli as a predictor of positive response to sensory integration procedures by autistic children. *American Journal of Occupational Therapy, 34,* 375–381.

Campbell, P. H. (1988). Using a single-subject research design to evaluate the effectiveness of treatment. *American Journal of Occupational Therapy, 42,* 732–738.

Donnellan, A. M., Mirenda, P. L., Mesaros, R. A., & Fassbender, L. L. (1984). Analyzing the communicative functions of aberrant behavior. *Journal of the Association of Persons With Severe Handicaps, 9,* 201–212.

Folio, M. R., & Fewell, R. R. (1983). *Peabody Developmental Motor Scales.* Allen, TX: DLM Teaching Resources.

Grandin, T., & Scariano, M. M. (1986). *Emergence: Labeled autistic.* Novato, CA: Arena Press.

Krauss, K. E. (1987). The effects of deep pressure touch on anxiety. *American Journal of Occupational Therapy, 41,* 366–373.

Larson, K. A. (1982). The sensory history of developmental-

ly delayed children with and without tactile defensiveness. *American Journal of Occupational Therapy, 36,* 590–596.

Orelove, P., & Sobsey, D. (Eds.). (1987). *Educating children with multiple disabilities: A transdisciplinary approach* (p. 175). Baltimore: Brookes.

Rimland, B. (1986). Foreword. In T. Grandin & M. M. Scariano, *Emergence: Labeled autistic* (p. 7). Novato, CA: Arena Press.

Schopler, E. (1987). Autism today and the health care professional's role. In M. A. Timmons (Ed.), *Feelings and their medical significance* (pp. 1–6). Columbus, OH: Ross Laboratories.