

Autism and Sensory Processing problems

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Abstract

In recent years there has been an increasing recognition that, in addition to the aspects of autism spectrum disorder that are already understood, many individuals, both children and adults, struggle to process their sensory environment in an integrated way. The resulting sensory processing disorder can occur in any sensory modality and can cause the individual additional stress and distress. Although the expertise to assess these problems is increasingly available, the evidence on the treatment options remains limited and interventions often have to be provided by clinicians utilising available resources.

Introduction

Living in a sensory environment is a challenge individuals have to manage on a daily basis, coping with the constant bombardment of information from multiple sources, for example sights, sounds, smells, tastes and touch. The brain is constantly interpreting these senses, utilising frameworks of current understanding and previous experiences as points of reference. This 'sensory processing' develops throughout life, particularly in childhood, as children are exposed to new experiences and sensations. In most children sensory processing is straightforward but in some it can be problematic. Sensory processing problems are becoming increasingly recognised as issues that require assessment and management in many children and adults with autism spectrum disorder (ASD).

Sensory Processing Disorder and ASD

Sensory processing disorder is a condition in which the information received through the senses is not integrated correctly, thus affecting the individual's daily functioning. It can affect any of the sensory modalities and is classically divided into three types.

- Sensory Modulation Disorder: over-responding or under-responding to sensory stimulation. This includes sensory-seeking behaviours.
- Sensory Based motor disorder: incorrect processing of sensory information which affects motor output such as coordination and posture.
- Sensory Discrimination Disorder: incorrect processing of the sensory information occurring in all senses.

These problems are associated with a number of neurodevelopmental conditions, particularly ASD. They have been described for several years but have not reached mainstream thinking until more recently. Neither ICD10 nor DSM-IV has included sensory processing disorder as a criterion for the diagnosis of ASD but this has changed in the recent publication of DSM-5. However, it remains unclear what proportion of children with ASD have these problems. Estimates have been as high as 95% (1).

Triad of impairments in ASD and sensory problems

ASD has been classically characterised by impairments in three main areas of development: social relatedness, communication skills, and the presence of stereotyped behaviour, interests and activities. Stereotyped behaviours typically associated with autism include hand-flapping, finger flicking, rocking or spinning; self-injury such as head-banging and hand-biting may also occur (2).

Sensory processing problems have been suggested as a factor in the presentation of these behaviours. For example, one hypothesis for the presence of stereotyped behaviours in autism is that the dysfunction in processing sensory information that is characteristic of the disorder results in the adoption of aberrant behaviours in an attempt to make sense of and regulate stimulation from the environment (3). However, despite the abundance of literature documenting the unusual responses to sensory stimuli, the nature of sensory processing difficulties in autism and their relationships to the core functional and behavioural disturbances of the disorder remain poorly understood (4). The neurobiology of this area remains unclear, as is the case for many areas of research in ASD, but there have been some studies (5). In addition, culture and environment have always influenced caregiver perceptions of child development, especially mental health, and there is some evidence to support that they can also contribute to the perception of sensory experiences of children with ASD (6).

How sensory processing problems present in clinical practice

In clinical practice, carers often describe the stress children with ASD feel from managing the sensory information around them. This has the potential to affect any child on the spectrum, whether high or low functioning, and, although the younger children appear more susceptible to these problems, they can create difficulties at any age. However, as with other issues in ASD, sensory processing problems are not a consistent finding. Furthermore, the presentation of sensory problems does differ significantly between children, with descriptions of being hypersensitive or hyposensitive to different sensory modalities. Adding to this complexity is the finding that children can be oversensitive or undersensitive to different stimuli within the same sense.

Clinically the boundary between normality and senses being considered hypersensitive or hyposensitive can sometimes seem quite arbitrary and this becomes a subjective judgement. It becomes clinically important, however, if it is causing them distress, discomfort or affecting their ability to function (7).

An early example of when this may be evident is if parents of children with ASD suspect hearing impairment or hearing loss during the first two years of life, which may be indicative of unresponsiveness to sound, a sensory processing problem (8).

Clinically, individuals with ASD will respond to different sensory processing problems in a number of ways. They may avoid the stimuli, show distress in their presence or seek out the stimuli if they feel under-stimulated; so-called sensory-seeking. Examples of how individuals are either oversensitive or undersensitive to sensory stimulation include the following.

- *Olfactory* May avoid certain smells. This may contribute to eating problems or those who are under-sensitive may sensory-seek, for example, smelling people.
- *Taste* May find certain tastes unpleasant or strong. This could result in a limited diet. Those who are under-sensitive to taste may lick or taste anything or seek out certain specific tastes.
- *Auditory* Anxiety can result from loud, sudden or less obvious noises, such as a ticking clock. Those who are under-sensitive may seek or create noise.
- *Tactile* This can affect both light pressure and deep pressure. May find certain fabrics or clothes

labels uncomfortable. This can explain the avoidance of personal contact in some cases or why deep pressure can reduce anxiety in under-sensitivity. Some children may have abnormal pain thresholds.

- *Visual* May be hyposensitive or hypersensitive to light levels, or affected by too many things within their visual field. Some can be intolerant of flicker in fluorescent tube lighting.

- *Vestibular* May have difficulties with spinning, jumping, or coping with unstable surfaces, or may have excessive motion sickness. Those who are hyposensitive enjoy these sensations and this may be a reason why some spend time rocking or spinning.

- *Proprioception* Hyposensitivity can appear similar to overactivity present in ADHD with constant moving to “remind” the body constantly of its position. Individuals may use tactile sensation or their visual system to compensate. In addition, those who are hyposensitive or hypersensitive to proprioception may have difficulty regulating the sensation of hunger.

This overload of sensory information can have significant effects on behaviour or be responsible for emotional difficulties such as anxiety. Some children will have sudden outbursts of aggression or tantrums often called “meltdowns”, whilst others will become progressively more withdrawn or say they are tired. The sensory processing problem may be a significant factor in causing the child to feel overwhelmed, for example, in a typical school setting but it may be difficult for the child to express this.

Sensory problems in other conditions

Difficulty in processing sensory information is also reported in other neurodevelopmental and neurological conditions such as intellectual disability, ADHD, children born prematurely or in brain injury but in some children it appears to be their only problem area.

The presence of sensory processing problems does appear to affect the presentation of comorbid problems. It may be a reason that children with both ASD and intellectual disability can be significantly more sensitive and avoidant than the children with intellectual disability alone (9).

Recognition and Assessment in ASD

Due to the complexity of the different ways in which an individual with ASD can present, it can be difficult to recognise sensory processing problems. Clinicians should be aware of these factors as potential difficulties for the children. A detailed history from the family, together with direct observation in the appropriate setting may help to reveal the main issues. However, in some cases a more detailed assessment is required.

The availability of assessments for sensory problems is quite variable. Much of the work in this area has been developed by occupational therapists, who still remain instrumental in assessing children for these problems and for developing interventions. Other professionals who have received training in assessing and managing sensory problems may now be accessible. Unfortunately, there is no single definitive test for the problems. However, there are standardised tests and questionnaires which can be used by appropriately trained professionals.

How are sensory problems treated?

Although there is no set treatment for managing these problems, sensible measures can be adopted to reduce their impact. Because it can often be difficult to isolate a single sensory processing difficulty as the direct cause of a problem, the evidence base remains limited.

The intervention tends to be based on the individual’s needs and on the available resources. Much of the work consists of consultations with families and organisations such as schools and colleges

on how to modify the sensory environment to meet the child's needs. This may also involve training professionals such as teachers or learning support assistants in techniques to recognise the sensory processing difficulties and to adapt the learning environment. It is often evident in clinical practice that families have adapted their home life to accommodate many of these problems. Children who have sensitivities to smells or tastes are not given the foods which upset them (unfortunately, the family tends not to be able to have them either) and this could be a reason for the limited diet in many of these children.

What techniques can be tried for sensory problems?

There are several different techniques that can be adopted to try to help to alleviate the sensory problems. The aim should be to make life less stressful while minimising the impact on other family members and on the school environment.

First of all, it is important to identify which sensory issue the child is experiencing, as this will help to indicate what environmental modification is required. For example, use of pale coloured uncluttered background which is less visually stimulating for a child with hypersensitivities could result in the child being able to focus more on the class work. Similarly, wearing headphones may reduce reaction to background. Pre-warning the child of sudden noises like fire alarms, bells etc. can be helpful in reducing stress. Some children are very aware of certain smells, such as perfumes, disinfectants or the smell of school dining halls. If the child is distressed because of the smell of the dining hall, this could be helped by allowing the child to eat elsewhere, which may be less disruptive to all concerned. If the child is very sensitive to becoming too hot or too cold a thermometer could be used as a visual prompt to put on or take off clothes.

Other treatment options

A 'sensory diet' is the description of simple techniques providing children with activities to regulate the oversensitivity or undersensitivity (10). For example, spinning activities could be used for some children with vestibular problems. The evidence for the effectiveness of this approach is limited, as it is for many of the interventions for sensory processing problems in children with ASD.

In 'Sensory Integrative Therapy' a programme is devised to help modulate the processing problem with the aim of either down-regulating or up-regulating a specific sensory area, for example, hypersensitivity to touch. The resulting programme usually involves a combination of different elements such as wearing a weighted vest, being brushed or rubbed with various instruments, riding a scooter board, sitting on a bouncy ball, being squeezed between exercise pads and other similar activities, depending on what is required. These interventions typically follow assessment and recommendations by an occupational therapist with expertise in this field. This intervention is highly dependent on the skills and experience of the therapist/s. A systematic review by Lang et al. (11) concluded that the current evidence-base does not support the use of Sensory Integration Therapy in the education and treatment of children with ASD and that more research is needed in this area.

No pharmaceutical treatment has been advocated for this area. There are reports of use of aripiprazole yielding improvements in the registration, inattention/distractibility, auditory processing, and modulation of visual input affecting emotional responses and activity level (12). However, its clinical use in generic settings has been limited due to lack of evidence.

Prognosis

The long-term prognosis of children identified as having sensory processing problems remains unclear. It appears that in many cases there are distinct improvements while in others there is little change. This probably reflects the diverse nature of those diagnosed with ASD.

GP comment.

What have I learned from this paper?

1. I understand that sensory processing problems are estimated to occur in the vast majority of children with autism spectrum disorder (ASD). Individuals affected may have three types consisting of sensory modulation disorder, sensory based motor disorder and sensory discrimination disorder.
2. People with ASD can be hypersensitive or hyposensitive to sensory stimuli such as smells, taste, sounds, vision, touch and body position. As a result, they may also present with stereotyped behaviours and experience major problems such as limited diet, anxiety or outbursts of aggression.
3. I learnt that it is important to be aware of the sensory overload and a detailed history from the family and an observation in appropriate setting can help to identify the main difficulties.
4. Management is directed towards alleviating the identified sensory issues and include modifying/ adapting the sensory environment at home and school as well as provision of sensory diet or sensory integrative therapy by an Occupational Therapist, although evidence for these interventions is limited.

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References

1. Tomchek, S. D., & Dunn, W. (2007). Sensory processing in children with and without autism: American Journal of Occupational Therapy, 61, 190–200
2. Baranek, G. (1999). Autism during infancy: Journal of Autism and Developmental Disorders, 29, 213–224. doi:10.1023/A:1023080005650.Ben
3. American Psychiatric Association. (2013). Diagnostic and Statistical Manual of Mental Disorders (5th ed.) DC: Washington.
4. Baranek, G. T. (2002). Efficacy of Sensory and Motor Interventions for Children with Autism. Journal of Autism and Developmental Disorders, 32(5), 397–422.
5. Orekhova EV, Tsetlin MM, Butorina AV, Novikova SI, Gratchev VV, Sokolov PA, Elam M, Stroganova TA. Auditory cortex responses to clicks and sensory modulation difficulties in children with autism spectrum disorders (ASD). PLoS One. 2012;7(6):e39906. doi: 10.1371/journal.pone.0039906. Epub 2012 Jun 29.
6. Caron KG1, Schaaf RC, Benevides TW, Gal E. Cross-cultural comparison of sensory behaviors in children with autism. Am J Occup Ther. 2012 Sep-Oct;66(5):e77-80. doi: 10.5014/ajot.2012.004226.
7. Karim K., Alvina A, O'Reilly M., (2014) Chapter 12 Sensory Processing problems and executive functioning difficulties, In A practical Guide to Mental Health Problems in Children with Autistic Spectrum Disorder, Pub. Jessica Kingsley
8. Dahlgren SO, Gillberg C. (1989) Symptoms in the 1st 2 years of life – A preliminary population study of infantile-autism. European Archives of Psychiatry and Clinical Neuroscience 238: 169–174.
9. Joosten A.V., Annette V; Bundy, Anita C. (2010) Sensory processing and stereotypical and repetitive behaviour in children with autism and intellectual disability. Australian Occupational Therapy Journal, 54(6) 366-372
10. Wilbarger, P. (1995). The sensory diet: Activity programs based on sensory processing theory. Sensory Integration Special Interest Section Newsletter, 18, 1–4.
11. Langa R, O'Reilly M, Healy O, Rispoli M, Lydon H, Streusand W, Davis T, Kang S, Sigafoos J, Lancioni G, Didden R, Giesbers S. Sensory integration therapy for autism spectrum disorders: A systematic review. 2012 July–September;6(3):1004–1018.
12. Fung LK, Chahal L, Libove RA, Bivas R, Hardan AY. A retrospective review of the effectiveness of aripiprazole in the treatment of sensory abnormalities in autism. J Child Adolesc Psychopharmacol. 2012 Jun;22(3):245-8. doi: 10.1089/cap.2010.0103. Epub 2012 Apr 26.