

Is there a relationship between changes in sensory profile and bladder and bowel dysfunction in children?

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Hypothesis / aims of study

Bladder and bowel dysfunctions (BBD) frequently encountered during childhood represent prevalent urological challenges necessitating multifaceted evaluation criteria for clinical diagnosis. This encompasses a spectrum primarily characterized by lower urinary tract symptoms, encompassing manifestations such as urinary incontinence, urgency, frequency, hesitancy, enuresis, dysfunctional voiding, as well as symptoms indicative of constipation and fecal incontinence. Roughly 40% of patients seeking assistance at pediatric urology clinics receive a BBD diagnosis.

The literature delineates biological, neurodevelopmental/biobehavioral, behavioral, and environmental factors as contributing to BBD risk. Alongside these factors, the observation that children and their caregivers may not fully perceive bladder and bowel fullness, or experience diminished recognition of the need and urgency for toileting despite lessened fullness, prompts inquiry into potential issues with sensory registration.

Our objective was to explore potential correlations between children's sensory profiles and difficulties with bladder and bowel control.

Study design, materials and methods

Parents completed the Childhood Bladder and Bowel Dysfunction Questionnaire (CBBDDQ), comprising 18 questions, to assess BBD in children aged 5-11 years. Simultaneously, they also completed the Sensory Profile (SP) questionnaire, which evaluates children's sensory profiles across 14 subcategories organized into three primary sections. Spearman correlation analysis examined the relationship between CBBDDQ scores and SP scores.

Results and interpretation

Data were gathered from 78 children (31 females; 47 males) who exhibited no anatomical or neurological abnormalities, utilizing an online survey. The mean age of the patients was 6.33±2.12 years (ranging from 5 to 11 years). The average score on the CBBDDQ was 16.22±8.77 (ranging from 1 to 39), while the total score on the SP was 512.05±59.43 (ranging from 349 to 609).

A negative and weakly significant correlation was observed between the CBBDDQ score and several sensory processing domains, including vestibular processing ($r = -0.225$, $p < 0.05$), oral sensory processing ($r = -0.266$, $p < 0.05$), modulation of visual input affecting emotional responses and activity level ($r = -0.239$, $p < 0.05$), emotional/social responses ($r = -0.227$, $p < 0.05$), items indicating thresholds for response ($r = -0.278$, $p < 0.05$), and the total score of the SP ($r = -0.275$, $p < 0.05$). However, there was no statistically significant relationship between the CBBDDQ score and auditory processing, visual processing, touch processing, multisensory processing, sensory processing related to endurance/tone, modulation related to body position and movement, modulation of movement affecting activity level, modulation of sensory input affecting emotional responses, as well as behavioral outcomes of sensory processing ($p > 0.05$) (Table 1).

The vestibular system plays a crucial role in maintaining bodily balance, while regions within the motor cortex govern voluntary urination and motor planning. A potential immaturity within the motor cortex can directly impact balance and induce sensory hypo or hypersensitivity within the vestibular system (1). The system is also associated with distrust of gravity and may result in insufficiency in the relaxation mechanism of the pelvic floor muscles, which requires timing on the toilet. Anxiety about movement may also cause immobility, resulting in a decrease in the peristaltic motility of the gastrointestinal system.

Children encountering challenges with **oral sensory processing** often exhibit selective eating habits and limited food intake, potentially leading to a detrimental cycle wherein gastrointestinal issues and problematic eating behaviors reciprocally influence each other, contributing to constipation and difficulties in establishing a regular toileting routine (2). Children with oral feeding hypersensitivity may have problems eating and drinking foods with various textures. These defensive mechanisms in the tactile system cause hypersensitivity not only in the oral but also in the pelvic floor, which can cause hardening of the stool and cause extra toilet-holding maneuvers in such children, which can increase BBD complaints.

Children who have problems with **modulation of visual input affecting emotional responses and activity levels** often have problems with visual perception and may normally be more sensitive to exploring life by seeing. They may have problems learning and adapting to body activities that they cannot see. The decrease in their body's background visual perception can cause problems in functions such as defecation and urination. Generally, children not being able to see where the stool comes out and where the stool goes to the toilet creates anxiety and anxiety in children, which can make them more prone to BBD.

As the severity of BBD difficulties escalates, the decline in **emotional/social response scores** may impede children's coping mechanisms in response to their urological challenges. Elevated scores on CBBDDQ correspond to a decrease in the child's self-regulatory abilities.

Items indicating thresholds for response scores show that sensory threshold values change when the sensory inputs chosen by the child change. This can cause bladder and bowel sensations to deviate from the normal threshold value and cause problems in toilet timing.

The observed negative correlation between CBBDDQ scores and **SP total score** underscores the intimate connection between the sensory system and bladder and bowel functions.

Table 1: Correlation Analysis

Childhood Bladder and Bowel Dysfunction Questionnaire (CBBDDQ)		(CBBDDQ)
		1.000
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Auditory Processing	r	-0.066
	p	.567
Visual Processing	r	-.108
	p	.347
Vestibular Processing	r	-.225*
	p	.048
Touch Processing	r	-0.193
	p	.091
Multisensory Processing	r	-.223*
	p	.050
Oral Sensory Processing	r	-.266*
	p	.018
Sensory Processing Related to Endurance/Tone	r	-0.126
	p	.273
Modulation Related to Body Position And Movement	r	-0.207
	p	.069
Modulation of Movement Affecting Activity Level	r	-0.216
	p	.058
Modulation of Visual Input Affecting Emotional Responses and Activity Level	r	-.239*
	p	.035
Modulation of Sensory Input Affecting Emotional Responses	r	-.057
	p	.620
Emotional/Social Responses	r	-.227*
	p	.046
Behavioral Outcomes of Sensory Processing	r	-.223
	p	.050
Items Indicating Thresholds for Response	r	-.278*
	p	0.014
Total Score	r	-.275*
	p	.015
Spearman's *p<0.05 **p<0.01		

Conclusions

It is unequivocal that an intricate interplay exists between the sensory system and bladder and bowel functions. In conclusion, we think that defining the sensory profiles of children diagnosed with BBD is of great importance in tailoring treatment interventions. We believe it would be very valuable to enrich the physiotherapy methods used in treating children with BBD with targeted sensory input.

References

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