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SENSORY PROCESSING OF PERSONS WITH AUTISM SPECTRUM DISORDER

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SUMMARY

Sensory processing is a complex, neurobiological process in which a person uses his/her senses, experiences information or stimuli from the environment, sends information to an appropriate centre for receiving and processing information, and responds to environmental stimuli. Sensory processing is the base of mental and social functioning, leading to the development of complex abilities at an older age. The authors emphasize the importance of the first seven years of life for the adequate development of sensory processing and therefore emphasize the importance of early intervention. Symptoms of incomplete sensory processing are manifested by atypical behavioural reactions in response to sensory stimulation. Atypical sensory processing stands out as a specific and universal symptom of people with autism spectrum disorder and most commonly manifests as hypo or hypersensitivity to various sensory information.

This paper aims to review and analyze the studies examining the specifics of sensory processing of persons with autism spectrum disorder. When reviewing the literature, all studies clearly show that individuals with autism spectrum disorder exhibit pronounced specificities in all domains of sensory processing. The most common problem is the processing of auditory information. Responses to sensory stimuli are context-dependent, in which a person may appear hypersensitive in a particular situation, while in another situation he may be hyposensitive to the same stimulus source. In addition to hypo and hypersensitivity, the problem of sensory integration and detection of stimulus sources is often manifested in these individuals. More recent studies also report the relatively frequent occurrence of distortion, synesthesia, and sensory-specific satiety.

Following the above findings, in order to plan adequate defectological treatment, it is necessary to take into account all the specifics of sensory processing of persons with autism spectrum disorder.

Key words: autism spectrum disorder, sensory processing, hypo/hypersensitivity

INTRODUCTION

More recent research in the field of child development confirms the importance of the first years of life for proper functioning and later development, emphasizing the fact that learning and development of brain functions are interdependent processes and as such play a very important role in the development of certain abilities and skills as a reflection of the first acquired childhood experiences (Fox & Rutter, 2010, according to Cvijetić, 2016). Therefore, increasing importance is given to early intervention to promote child development through individualized and specialized treatment and prevent stagnation of intellectual development. The effectiveness of these programs has been proven by many studies, with some of the key components of the success of

early intervention programs highlighting early onset and longer duration (Cvijetić, 2016). To initiate an intervention on time, it is necessary to detect the earliest deviations in development and areas of disagreement. Several developmental screening tests can help us in this respect.

Most children enjoy a healthy and active childhood, independently engaging in daily activities according to their age, abilities and skills, necessary to them. These skills are expected to be mastered over a specific period, without or with minimal support from the environment. This also applies to the perception and processing of sensory stimuli. Sensory integration is a neurobiological process that organizes sensations from our body and environment and enables the efficient use of the body in the environment (Ayres, 1973). More broadly, sensory integration rests on preserved sensory processing, which implies the ability to perceive information or stimuli, then send that information to specific cortical fields where the information is received and processed to prepare an adequate response to registered stimuli (Gligorović, 2013). We receive all this information through the visual, auditory, tactile, olfactory, gnostic and vestibular systems known as our senses. Usually, we think of the senses as separate channels of information; however, they just need their integration to get a reliable picture of the world around us and our roles in it (Biel, 2009). In the first seven years of life, sensory processing and integration play an essential role in a child's later development since mental and social skills rest on these basic processes. For several months after birth, the child is mainly focused on the senses and movement and organizes the behaviour accordingly. He adopts, develops and modifies his first learned skills following those senses. The exploration of space, the creation of relationships with people around them, and the placement of themselves in spatiotemporal relationships also have their strongholds in sensorimotor processing. From all these skills, at a later age, complex integrative actions such as practical activities, speech, play, and even more complex ones, such as academic ability to read, write, compute, harmonious behaviour, and good socio-emotional relationships emerge (Maćešić-Petrović, 2014).

If our brains do not adequately discriminate, filter, organize, and integrate sensory information, resulting in inadequate directing of effective behaviour, then we are talking about sensory integration dysfunctions that can affect a person's daily functioning (Maćešić-Petrović, 2014). It is important to emphasize that we are talking about a disorder of sensory processing only when all the sensory receptors and neural pathways transfering information from the periphery to the centres in the brain are intact (Ayres, 2002). Children who have a sensory deprivation life in the early stages of development have little contact with people and things in the environment, do not adequately develop their sensory, motor and intellectual functions. However, although children are not exposed to situations of external sensory deprivation, they may have disorders of sensory processing and integration. Sensory stimulation may be present in the child's mid-range environment, but in some children, this information does not stimulate or reach all parts of the brain that should and need to be stimulated. Such internal sensory deprivation prevents cerebral development of functions that depend on complete sensory processing (Maćešić-Petrović, 2014). Symptoms of incomplete sensory processing are manifested by atypical behavioural reactions in response to sensory stimulation (Suarez, 2012).

Behavioural responses that are more pronounced than expected are called hypersensitivity (Grandin, 1992 according to Balasco, Provenzano, & Bozzi, 2020). A hypersensitive child may react hypersensitively to bright lights, such as a camera flash, but may also be disturbed by ordinary daylight, covering his eyes with his hands or wearing sunglasses, which may seem inappropriate. Such a child often avoids eye contact and shows the problem of maintaining attention due to visual distractors (Matsushima & Kato, 2013, according to Đurić-Zdravković, Japundža-Milisavljević, & Gagić, 2016). Also, children may be hypersensitive to auditory stimuli that are typical of everyday functioning such as home device sounds, traffic, or loud speaking. As a result, a violent emotional reaction may occur when children cover their ears and avoid the noise source. In the area of tactility, it can be avoided to wear a certain type of fabric whereby the child has a feeling of scratching or tightening, then avoiding hugs and vigorous rubbing of the affected part of the body. Refusing to wash the hair or cut the nails is also common. A hypersensitive child may also exhibit an aversion to certain odours and flavours, which may result in an over-selectivity of foods, confining themselves to dishes of typical texture and taste. Children with vestibular hypersensitivity have difficulty changing their walking or crawling directions on uneven or unstable surfaces. They feel disoriented after turning, jumping or running and often express fear and anxiety when their feet are not on the ground (Melillo, 2016, according to Marković, 2017). The problem can also occur at the level of the proprioceptive system; hypersensitivity is usually manifested by poor movement organization with the child impossibility to align body parts in a particular direction. The problem can also arise in the proprioceptive system, where hypersensitivity is usually manifested by poor movement organization due to misunderstanding of the relationships between those parts of one's body. As a result, children have a problem in manipulating objects, dressing independently and maintaining a certain body position (Ayres, 2008, according to Maćešić-Petrović, 2014).

In contrast, there are situations where children need a stronger sensory stimulus to register, process, and respond to it at all. Such children are said to be hyposensitive, that is, they lack the expected responses to typical stimuli (Baranek, Foster, & Berkson, 1997, according to Balasco, Provenzano, & Bozzi, 2020). These individuals show particular interest in illuminating objects and can thus gaze at the sun without having to close their eyes (Ayres, 2008, according to Maćešić-Petrović, 2014). They are fascinated by reflections and brightly coloured objects. When they enter an unfamiliar room, they walk around touching everything before settling down. They often sit for hours moving their fingers or objects in front of their eyes. They can search for sound sources, lean their ear on electrical equipment and noisy toys, or enjoy the crowds. They often make sounds themselves to stimulate hearing by banging on doors, tapping things, tearing up paper or producing rhythmic sounds (Ayres, 2008, according to Maćešić-Petrović, 2014). The authors of one study report that in some children, non-observation of olfactive stimuli occurs, while in other children, a pronounced problem can be observed in the form of hypersensitivity to the composition or structure of the meal and therefore some foods are rejected (Yasuda et al., 2016, according to Đurić-Zdravković et al., 2016). To stimulate the sense of smell and taste, children tend to intensively smell inedible objects, bring them to the lips or even to lick them. They like to mix flavours, such as sweet and sour (Goldstein & Morewitz, 2011). Such children need intense stimuli to get

their attention. It may seem sometimes that such children do not feel pain or a change in temperature. In these cases you could expect them to be prone to self-harm, they may bite their hand or bang their heads against a wall. Pressure, tight clothes, tight hugs and rough and tumble games are something they prefer. They seek all kinds of movements and can turn or swing for a long time without dizziness or nausea (Melillo, 2016, according to Marković, 2017). People find them clumsy because they run into objects and other people and they often stumble and tend to fall.

Both types of reactions can occur in any domain of sensory processing or multiple domains simultaneously. One review study indicates that concurrent hypersensitivity for visual and auditory stimuli occurs in the range of 47.3% to 69% of individuals (Stefanelli, Zanchetta, & Furtado, 2020).

Sensory processing dysfunction is particularly prevalent in individuals with autism spectrum disorder (Glumbić, 2006). Sensory processing disorder is a common feature of individuals with autism spectrum disorder and can be considered as one of the criteria for diagnosis (Robertson & Baron-Cohen, 2017).

According to the DSM-5 classification (American Psychiatric Association, 2013), autism spectrum disorders (hereinafter referred to as ASD) belong to the group of neurodevelopmental disorders in addition to communication disorders, specific learning disorders, motor disorders, intellectual disabilities and ADHD.

ASD is characterized by a deficiency in social communication and social interactions that occur in different contexts that cannot be linked to general developmental delays, as well as limited, repetitive behaviours, interests, or activities. Symptoms must exist in early childhood, but they need not be fully manifested until social demands exceed capacity constraints or can be masked by learned strategies in later life. All of these symptoms together limit and impair daily functioning (American Psychiatric Association, 2013).

The aim of the paper

This paper aims to review and analyze the available literature reviewing the characteristics of sensory processing in children with ASD.

METHOD

An overview of the relevant literature was made through a review of the electronic databases available through the Consortium of Libraries of Serbia for Unified Acquisition (KOBSON) as well as Google Scholar Advanced Search. Searches were made through the following search engines: ScienceDirect, Ebscohost, SpringerLink and WileyInterScience. The following keywords were used in the search: autism, sensory profile, sensory processing, auditory processing, hyper and hyposensitivity, synesthesia.

Review of research

Sensory processing difficulties in children with ASD

Various data on the incidence of sensory processing difficulties in children with ASD can be found in the literature. According to Baranek et al., (2006), this percentage is 69%, while other authors state that as many as 95% of children with ASD aged three to six years have some kind of sensory processing disorder (Tomchek & Dunn, 2007, according to Đorđević, Glumbić, & Langher, 2019). Two more studies show that more than 90% of children with ASD exhibit some form of sensory dysfunction (Marco, Hinkley, Hill, & Nagarajan, 2011; Kilroy, Aziz-Zadeh, & Cermak, 2019).

Some authors report other prevalence results. They point out that difficulties in processing various sensory information are present in children with ASD in the range of 40 to 71%. The aforementioned difficulties in children manifest in the form of ignoring auditory stimuli or, on the contrary, overreacting, intensely observing the movements of their own hands, focusing attention on rotating objects or having many details, smelling edible and inedible objects, the unprovoked dropping of things out of hand and exaggerated delight when a person finds a new place (Ornitz, 1979; Bujas-Petković & Frey-Škrinjar, 2010, according to Mamić & Fulgosi-Masnjak, 2012).

The authors of one review study state that in many studies, atypical sensory processing stands out as a specific and universal symptom of people with ASD (Bogdashina, 2013). Today, atypical sensory processing is one of the diagnostic criteria of the American Psychiatric Association (2013). A description of unusual reactions to sensory stimuli has been noted in Kanner's earliest reports of people with ASD. He described that children with ASD were often afraid of loud sounds and the effect of moving objects (Kanner, 1943). These children can act very stubbornly as if they intentionally did not want to focus their attention on stimuli. While one day there is no response to certain stimuli, the next day may show an overreaction to that same stimulus. This indicates an inconsistency in the behaviour of persons with ASD and can be explained by the specific functioning of the brain of these individuals (Gourley et al., 2013; Miller et al., 2007, according to Đurić-Zdravković, Japundža-Milisavljević, & Gagić, 2016).

Asperger concluded that the response to sensory stimuli depends on the context, whereby a person may appear hypersensitive to noise in a particular situation, while in another situation they may be hyposensitive to the same noise level (Frith, 1991). Other authors have confirmed that the type of reactivity to the sensory stimulus differs significantly in the same person. They observed that a person may be hypersensitive to light and texture but hyposensitive to pain and the recall of their name (Elwin, Ek, Kjellin, & Schröder, 2013). These findings are supported by research results using different sensory reactivity assessment instruments. Thus, some results show that hyposensitivity to one type of stimulus is observed in 78% of subjects with ASD and that hypersensitivity to another type of stimulus can be observed in 44% of the same sample. 33% of individuals with ASD have been identified as hypersensitive to tactile types of information, but in contrast, only 4.4% of those individuals are hypersensitive to visual stimuli (Crane, Goddard, & Pring, 2009; Tavassoli et al., 2015, according to Taylor, Holt, Tavassoli, Ashwin, & Baron-Cohen, 2020).

In addition to hypo and hypersensitivity, the problem of sensory integration and detection of stimulus sources is often manifested in these individuals. More recent studies also cite the relatively frequent occurrence of distortion, synesthesia, and sensory satiety in people with ASD (Harrison & Hare, 2004, according to Đorđević, Glumbić, & Langher, 2019). Synesthesia is a condition in which a person unusually experiences the senses, for example, words can evoke tastes, sequences such as months and numbers can be visualized as spatial landscapes, and graphemes can evoke colours (Ward et al., 2017). In the general population, the prevalence of synesthesia is 2-4% (Simner, 2006, according to Leeuwen, Petersen, Burghoorn, Dingemanse, & Lier, 2019), while in people with ASD it is significantly more common and is around 20% (Neufeld et al., 2013, according to Leeuwen et al., 2019). The extremely high co-occurrence of synesthesia and autism suggests that the two conditions are related, but the exact nature of that relationship is unknown (Leeuwen et al., 2019).

In children with ASD, difficulties are most commonly detected in the domain of the auditory system (about 40% of cases), followed by the tactile and visual systems (19% of cases), and only 5% of the sample included children have difficulties in the olfactory system (Klintwall et al., 2011, according to Đorđević et al., 2019). In contrast to this research, the results of which coexist with many prominent studies, the authors Sakarneh, Sabayleh, and Alramamneh find slightly different results. Their study found that children with ASD most commonly exhibited difficulties in the domain of tactile perception, then olfactory, visual, and most rarely in the domain of auditory perception (Sakarneh, Sabayleh & Alramamneh, 2019).

In one retrospective study, involving over 200 individuals with ASD, the authors found that 100% of participants had problems processing auditory information (Greenspan & Weider 1997, according to Tomcheck & Dunn, 2007). Reviewing previous research, the same authors concluded that differences in auditory processing are one of the most commonly reported sensory processing problems in children with ASD (Bettison, 1994; Dahlgren & Gillberg, 1989; Gillberg & Coleman, 1996; Rimland & Edelson, 1995; Vicker, 1993, according to Tomcheck & Dunn, 2007). The screening was performed to cover a large sample of children with ASD. The authors found that of 94% of children who exhibited atypical responses to sensory stimuli, 39% showed insufficient sensitivity, 19% excessive sensitivity, and 36% of children combined sensitivity to stimuli (Greenspan & Wieder, 1998, according to Mamić, Fulgosi-Masnjak, & Pintarić-Mlinar, 2010).

Sensitivity to auditory stimuli in childhood is one of the strong discriminators between children with ASD and children without ASD (Dahlgren & Gillberg, 1989, according to Tomcheck & Dunn, 2007). Children with ASD usually do not pay attention to everyday stimuli, such as ringing or other noise, and often do not hear when spoken to. They may respond by panic to the sound of a vacuum cleaner, a motorcycle or other strong, intense sounds (Lang et al., 2012, according to Đurić-Zdravković, Japundža-Milisavljević, & Gagić, 2016).

Earlier studies aimed at determining whether the clinical manifestations of auditory hypersensitivity match the audiological findings of children with ASD have shown that as many as 76.1% of children surveyed have a neat audiological finding. A similar study examined the same issues and found that 55% of children with ASD,

compared to only 6% of typical development children, exhibited the aforementioned problems. This fact has led the authors to conclude that behavioural manifestations of hypersensitivity to auditory stimuli are not related to auditory tract dysfunction, but rather that the problem arises at the level of the cortex (Gomes, Rotta, Pedroso, Sleifer, & Danesi, 2014; Demopoulos & Lewine, 2016). Also, studies comparing the EEG and MEG findings of children with ASD and children of the typical population have shown significant differences in response latencies in the auditory, somatosensory and visual cortex areas (Bruneau et al., 2003; Edgar et al., 2013; Marco et al., 2011; Miyazaki et al., 2007; Oram Cardy et al., 2008; Roberts et al., 2010; Vandenbroucke et al., 2008; Wilson et al., 2007, according to Cardon, 2018).

Many authors have noted the presence of tactile hypersensitivity in individuals with ASD (Blakemore et al., 2006; Cascio et al., 2008; Grandin, 1996; Marco, Hinklei, Hill, & Nagarajan, 2011; Tommerdahl, Tannan, Cascio, Baranek, & Vhitsel, 2007). Despite the increasing exploration of altered sensory processing in these individuals, the underlying mechanisms of the emergence of differences in responses to tactile stimuli have largely remained unknown (Tavassoli, Bellesheim, Tommerdahl, Holden, Kolevzon, & Buxbaum, 2015). Using the Short Sensory Profile, Rogers et al., found that there was a direct or indirect relationship between tactile information processing and adaptive behaviour (Rogers et al., 2003). The authors, who investigated hypo and hypersensitive responding in children with ASD, in addition to parental reports, made direct observation of the tactile activities of children. It was found that hyposensitivity responses to tactile stimuli have been unequivocally associated with the more pronounced social and communicative difficulties experienced by these children, whereas hypersensitive responses are positively correlated with nonverbal communication difficulties and repetitive behavioural patterns present (Foss-Feig et al., 2012). Based on the reports of parents who reported dysfunction of their children's tactile processing, a group of authors correlated tactile sensitivity with various components of attention (Wodka et al., 2016). In addition to hyperactivity, Hatch-Rasmussen cited the need for self-isolation, general irritability and distractibility as possible consequences of dysfunction of the tactile system (Hatch-Rasmussen, 2007, according to Christopher, 2019). Similarly, some authors point out those children who exhibit a higher level of tactile hypersensitivity will manifest behavioural problems, recurrent verbalizations, visual stereotypes, and difficulty maintaining and flexibly shifting attention (Baranek, Foster & Berkson, 1997; Cesaroni & Garber, 1991; Grandin 1995, according to Tomcheck & Dunn, 2007). A possible explanation for hyposensitivity to tactile stimuli is the mechanism of inhibitory control. They explain that tactile sensations reach the certain cortex structures by the thalamocortical route, stimulating cells that are responsible for inhibitory control of adjacent cells, thereby suppressing responses to tactile stimuli and thereby increasing the pain threshold in these individuals (Carpenter, 2003; Markram & Markram, 2010; Markram, Rinaldi, & Markram, 2007; Puts, Edden, Vodka, Mostofski, & Tommerdahl, 2013; Puts et al., 2013; Zhang, Francisco, Holden, Dennis, & Tommerdahl, 2011, according to Tavassoli, et al., 2015).

There was also a strong positive association between tactile abnormalities and severe delay in global self-regulation such as appetite, sleep, and attention, suggesting

that atypical touch responses may have effects on a wide range of individual functioning (Silva & Schalock, 2013, according to Christopher, 2019).

Research findings in the field of visual perception are different, depending on whether the identification or discrimination of a visual stimulus is examined (Kushki et al., 2011). People with ASD generally score worse on tests that require the perception of the human face than other stimuli (Behrmann, Thomas, & Humphreys, 2006).Given that a human character requires global rather than local visual processing, such results are not surprising given that people with ASD tend to focus on a single detail and are often unable to view the larger picture (Happé, & Frith, 2006; Robertson & Baron-Cohen, 2017). Visual perception in people with ASD is associated with a deficit in social skills (Dakin & Frith, 2005). The authors linked the time of fixation to a specific part of the face of the interviewee and associated with success in social competence (Klin, Jones, Schultz, Volkmar, & Cohen, 2002). Participants observed short movie inserts showing dialogues from a specified distance from the computer. Data logging began after each participant reported an adequate level of comfort and unobstructed view of the screen. Eye-tracking was made possible by a system that unobtrusively fitted on the participant's cap. Participants with ASD focused more on the mouth than on other parts of the face. Earlier studies found that people with ASD tend to focus on the lower parts of the face when observing the interviewee (Langdell, 1978). It was determined that respondents with ASD those with a longer fixation on the mouth were most likely to have better social skills than subjects who had a longer fixation on subjects. On the other hand, increased fixation on the mouth does not necessarily imply that the person's focus of attention is on speech. As the authors explain, the reason for this opinion is the fact that people with ASD often have a problem of prosody and context comprehension relative to word understanding. If participants are asked to perform a segmental speech perception task, the respondent focuses on the part around the lips (Lansing, McConkie, 1999, according to Klin, Jones, Schultz, Volkmar, & Cohen, 2002). However, if participants are asked to perform a prosodic speech perception task, then the respondent focuses on the upper face area. In this study, we can observe that respondents focused on the literal aspects of speech and less on the facial expressions of speakers (Klin et al., 2002). The ability to evaluate facial expressions and obtain socially relevant information by observing the interviewee's facial expression is one of the conditions for reciprocal social interaction and interpersonal communication (Lansing & McConkie, 1999).

Some studies have suggested that people with ASD have certain facial recognition abnormalities. In an experiment evaluating face recognition, it was found that children with ASD had lower face recognition compared to their peers with typical development (hereinafter referred to as TD). The same study also evaluated discrimination against persons and objects, where TD peers were better at discriminating against unknown persons. There was no difference in distinguishing the objects. Such results suggest that impaired facial recognition is not a result of attention deficit and discrimination, but rather that it is associated with ASD characteristics (Boucher & Lewis, 1992). In tasks where the goal is to single out a particular stimulus, in addition to many distractors, people with ASD are more successful than TD persons (Robertson & Baron-Cohen, 2017). There is a wealth of literature available to suggest that people with ASD have

abnormalities in face perception. Tantam and co-workers compared children with ASD and TD children in finding unusual facial and object expressions among the photographs offered. Children with ASD were predominantly unsuccessful in extracting unusual facial expressions, naming emotions, but were successful in tasks requiring them to single out a particular subject or to display a face depicted in reverse. Such findings imply the possibility of a different way of processing visual information in individuals with ASD (Tantam, Monaghan, Nicholson, & Stirling, 1989).

In children with ASD, selectivity in food selection is noticeable at an early age. Parents of children with ASD describe their children as picky, and prone to rejecting foods of a particular texture, taste, or appearance (Christopher, 2019). This can be a problem in nutritional independence in children with ASD. In addition to independence, constipation and poor oral-motor development can occur due to over-picking (Shea, 2015). Excessive selectivity in eating is influenced by parents' suggestions, choice, sensory perception, visual and gustatory (Blissett & Fogel, 2013). Too much selectivity in choosing and rejecting new foods can grow into neophobia (Kumazaki et al., 2018). Neophobia is one of the major obstacles to introducing a diverse diet. It is noticeable that neophobia is more appropriate in persons who have worse discrimination of smell and taste (Luisier et al., 2015).

Benetto, Kushner, and Hyman (2007) compared the taste and odour sensation of ASD and TD persons. It has been observed that olfactory identification is worse in individuals with ASD than in TD, and gustative in the case of sweet and salty stimulations and less accurate for bitter and acidic flavours. The authors concluded that poorer results in people with ASD imply that there is a problem with the sensory processing of the senses of taste and smell. Considering that taste and odour discrimination tasks represent sensory tasks and identification is a verbal task type, these findings may be related to the fact that individuals with ASD often have problems with verbal labelling and semantic memory (Hedner et al., 2010; Oberg et al., 2002, according to Galle, 2013). The problem of identifying odours and flavours, but not detecting them, suggests a deficit in the social sphere of people with ASD (Suzuki, Critchley, Rowe, Howlin, & Murphy, 2003). Disorders in the processing of olfactive stimuli are one of the predictors of poorer social functioning of people with ASD (Bennetto, Kuschner, & Hyman, 2007).

Sensory processing and age

One study was conducted comparing the quality of sensory processing of younger and older examinees with ASD. The authors examined accuracy when identifying offered odours, and younger children were found to be much more accurate in identifying stimuli than older respondents (Brewer, Brereton, & Tonge, 2008, according to Balasco, Provenzano, & Bozzi, 2020). In a subsequent study, 3 years later, the same subjects expressed more difficulty in identifying olfactory stimuli (May et al., 2011, according to Balasco et al., 2020). However, it has not yet been determined how and when altered olfactory processing occurs in children with ASD (Galle, Courchesne, Mottron, & Frasnelli, 2013). Other studies examining the quality of sensory processing in children of the typical population aged 3 to 10 years using the first version of the Sensory Profile (Dunn, 1994) as a measuring instrument, found no statistically significant differences

in the quality of sensory processing concerning age and gender of respondents (Dunn & Westman, 1997). Baranek et al., (2006) conducted an extensive study of 258 children of both sexes with ASD and found no statistically significant differences in the quality of sensory processing between boys and girls (Baranek et al., 2006).

CONCLUSION

The literature review showed different data on the frequency of sensory processing difficulties in children with ASD. It can be found that 40% to over 90% of children with ASD exhibit some form of sensory dysfunction. The most common difficulties are hypo and hypersensitivity to auditory stimuli, then tactile, visual and least to olfactory ones. In addition to hypo and hypersensitivity, the problem of sensory integration and detection of stimulus sources is often manifested in these individuals. More recent studies also report the relatively frequent occurrence of distortion, synesthesia, and sensory satiety. Some authors point out that the inconsistency in the behaviour of persons with ASD can be explained by the specific functioning of the brain structures of these persons. Sensitivity to auditory stimuli in childhood is one of the powerful discriminators between children with ASD and children in the typical population. Many authors have noted the presence of tactile hypersensitivity in people with ASD; however, the underlying mechanisms for the emergence of differences in responses to tactile stimuli have largely remained unknown. Hyposensitive responses to tactile stimuli are linked by the authors to the more pronounced social and communication difficulties experienced by these children. Visual perception difficulties are associated with a deficit in social skills. It has not been determined whether this is due to fewer social interactions or due to difficulties in processing visual information. In children with ASD, at an early age, selectivity in food selection is noticeable, which may be an obstacle to the independence of these children and may lead to inadequate oral motor development.

Given the importance of complete sensory processing to the harmonious development of persons in all life fields, it is clear why these specifics of sensory processing of persons with ASD must be taken into account.

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