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Psychological aspects of autism spectrum disorder

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Review article

Abstract

Introduction: Autism spectrum disorder (ASD) is a complex neurodevelopmental condition that occurs within the first 3 years of life, which is characterised by poor social skills, communication problems and stereotyped patterns of behaviour. Autism is a life-long disorder that has a substantial effect on the individual, their family, and society.

The **purpose** of this paper is to provide an overview about the psychosocial aspects of autism spectrum disorders.

Methods: An analysis of relevant literature, sources from the internet and published literature, personal experience and observations of the author.

Findings: Despite widespread research and greater public awareness, ASD has an unclear etiology and no known cure, making it difficult to acquire an accurate and timely diagnosis. Psychologic functions such as attention, executive function, academic functioning, memory, emotions, and sensory processing are described. There is a need for continuous psycho-social support for people with ASD and their relatives during the diagnostics and early intervention period, as well as resources that better represent the diversity of experiences and symptoms associated with ASD across the lifespan.

Conclusion: It is clear that more special education services are needed, together with timely and ongoing psychosocial support to parents of children with ASD.

Key words: *autism spectrum disorder, neurodevelopmental condition, psychological aspects.*

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1. Introduction

Autism spectrum disorder (ASD) is a pervasive developmental disorder that has both fascinated and frustrated scientific and clinical researchers. It is a major mental health, educational and social medical challenge. Autism has epidemic proportions worldwide. The Centre for Disease Control and Prevention states that autism spectrum disorder occurs in about 1 in 54 eight year old children in the USA (Maenner et al., 2016). Unfortunately, in Macedonia, there is no statistical data about the prevalence of this condition. The etiology and neuropsychological basis of this complex disorder still remains unknown. The perspective of a psychological model of autism is that the social and communicative impairments reflect fundamental difficulties in understanding other people as mental beings – the so-called “theory of mind” hypothesis of autism (Tager-Flusberg, 1999). It is a life-long disorder that has a substantial effect on the individuals, their family, and society as well. Autism is a complex neurodevelopmental disorder encompassing severe abnormalities in reciprocal social interaction, verbal and nonverbal communication, accompanied by restricted and repetitive behaviours and interests. These behavioural symptoms are present in very early childhood, before the age of 3 years. There is much variability in the disorder in terms of intellectual functioning, language ability, and severity of behavioural symptoms, (APA, 2013). This creates psychological and social impacts on affected individual and creates problems for parents in dealing with the children with ASD. This disorder is a major economic burden for all societies in the world.

It is a spectral disorder where some individuals with ASD are mildly affected by their symptoms; some are moderate impaired, whereas the others are profoundly affected. There is major heterogeneity in ASD, and the range of ASD symptoms can be classified into broad categories of core symptoms and secondary symptoms. Secondary symptoms can include conditions such as intellectual impairment, which occurs in approximately 70% of patients with ASD, aggressiveness toward others, self-injury, eating disturbances, sleeping disorders, and seizures. Clinical characteristics are changeable throughout the lifespan. For example, language difficulties and hyperactivity that is often seen in younger children can shift to relational problems, mood dysregulation, and hypo-activity in adolescence and young adulthood. Diagnosis of ASD can be challenging, but progress has been made in

refining diagnostic processes that can be addressed over the lifespan (Elder et al., 2017).

Children with ASD are more exposed to social stigmatisation and social rejection due to a lot of prejudice. Apart from stigma, Macedonia has a lack of treatment facilities, lack of trained child special educators and psychologists, lack of diagnostic procedures, lack of awareness among people, poor attention and poor resources from the government and a lack of proper welfare facilities, education facilities and rehabilitation services for children with ASD. Social institutions at the local level are not capable of ensuring that people with autism can remain in their area of residence and be provided with adequate educational and social services. The lack of statistical data on people with a disability hampers an evaluation of whether all people with any given disability are socially jeopardised and if they are able to access their rights in the field of social care. The Law on social protection established measures and services in the field of social protection and social care through social prevention, de-institutional care, protection and the right for social support (Trajkovski, 2008).

People identified with autism spectrum disorders have high frequencies of one or more co-occurring non-ASD developmental, neurologic, psychiatric, metabolic, immune, gastrointestinal and possibly causative medical diagnoses. Seizures, disturbed sleep and painful gastrointestinal disorders are some of the health conditions commonly associated with autism. Autism is frequently accompanied by mental health conditions including anxiety, depression, and ADHD. Medical conditions and consecutive pathological processes can negatively impact behavior, socialization, communication, cognitive function and sensory processing of individuals with autism. Accurate diagnosis and treatment often results in improved level of functioning and decreased severity of symptoms (Trajkovski, 2018).

Psychologists complete assessments of children with autism. The assessment can be related to diagnosis, cognition (IQ) or the way a child with autism thinks and sees the world. Psychologists have focused their efforts on the cognitive level of explanation in order to identify the underlying processes that might account for the various behavioural manifestations of the disorder. Historically, and in the interests of parsimony, the emphasis upon these theories has been to posit a single primary cognitive deficit that could

explain the development of autism. Theories from three cognitive domains have dominated the field: theory of mind – the ability to reason about the mental states of others; executive control – a set of abilities important for flexible behaviour in novel circumstances; and central coherence – the natural propensity to process information in context (Pellicano, 2007).

The **purpose** of this review article is to create an overview of current knowledge on the most prominent psychological factors that format and are formatted by the development of ASD. Also, the other **goal** is to explore diagnostics and treatment from a psychological perspective.

2. Psychologic functions in ASD

In the following pages, psychologic functions, which are altered in ASD, will be described such as attention, executive function, academic functioning, memory, emotions, and sensory processing.

2.1. Attention

Attention is a concept studied in cognitive psychology that refers to how we actively process specific information in our environment. Attention is a multi-dimensional construct that encompasses several components, including focusing, sustaining, and shifting operations, (Mirsky et al., 1999). Children with ASD do not usually have problems with sustained attention. They have problems with focusing attention, although their pattern is different from that of children with attention-deficit/hyperactivity disorder (ADHD). Those with ASD tend to “miss the forest for the trees” or over-focus attention on extraneous details while missing meaning. This difficulty has also been called impaired central coherence, (Happé and Frith, 1996). Children with ASD are more distracted by internal phenomena (e.g., special interests) than those with ADHD, whose attention is more typically diverted by external stimuli in the environment. Some children with ASD do exhibit classic ADHD symptoms of distractibility and hyperactivity (Ghaziuddin et al., 1992). Attentional abnormalities have long been documented in individuals with ASD using a variety of experimental paradigms and tasks. The predominant model of attention puts forward three critical components: alerting, orienting, and executive (Petersen and Posner, 2012). The alerting component of attention includes the ability to produce and maintain optimal vigilance and performance during tasks. The orient-

ing component of attention includes the ability to prioritise sensory input by disengaging, shifting, and re-engaging attention to a modality or location. The executive component of attention includes resolving conflict among competing responses. Sensory issues and attentional issues are closely connected to each other.

2.2. Executive function

Executive function describes a set of cognitive processes and mental skills that help an individual to plan, monitor, and successfully execute their goals. These include attentional control, working memory, inhibition, and problem solving; many of which are thought to originate in the brain’s pre-frontal cortex. One of the most consistently replicated cognitive deficits in individuals with ASD, is executive dysfunction, (Ozonoff and Jensen, 1999). The executive function domain includes the many skills required to prepare for and execute complex behaviour, including planning, inhibition, organisation, self-monitoring, mental representation of tasks and goals, and cognitive flexibility and set shifting.

Executive attention has also been shown to be impaired in young people with ASD. School-aged children and adults with ASD demonstrate larger flanker effects, i.e., slower response when the flanking arrows are pointing in an incongruent direction from the central target arrow (Mutreja et al., 2015), though there are some negative findings as well (Geurts et al., 2008). Executive function is defined as the ability to regulate one’s thoughts, emotions, and actions in order to achieve volitional goals (Zelazo et al., 2008). Executive function is one of the most studied cognitive constructs in ASD with more than 400 empirical articles since 1985 that have been covered across several comprehensive reviews (Wallace et al., 2016) and meta-analyses (Lai et al., 2016). This heavy investigation has been driven by long-standing clinical observations that individuals with ASD show executive function impairments. While intensive investigations have demonstrated that early executive function impairments are not causal of ASD, executive function skills can predict some forms of mentalising, repetitive behaviours, adaptive function skills, academic readiness, and challenging behaviours. In the following sections, we will review research in the three core components of executive functioning: updating, shifting, and inhibition, (Miyake and Friedman, 2012). Examination of more complex executive function tasks, like Tower tasks

that tap into planning and organisation skills or Verbal Fluency tasks that tap into generativity skills, reveal impairments of a moderate effect and size in individuals with ASD compared to controls. Furthermore, performance in tasks assessing planning, appear to be significantly influenced by co-occurring ADHD symptoms, while this is not the case for tasks assessing generativity skills (Lai et al., 2016).

2.3. Academic functioning

It is very important to assess academic skills, even in younger children, for the purposes of educational decision making. Many children with ASD have precocious reading skills and can decode words at a higher level than others of the same age and functional ability. The first set of difficulties relates to the ability of students with autism to attend in traditional educational environments. These students have difficulty completing an activity from start to finish. Reading and other academic strengths can be used to compensate for weaknesses, as when a written schedule is provided to facilitate transitions or written directions are supplied to improve compliance. The good memory of children with ASD may mean that spelling lists and multiplication tables are learned more easily. Specific areas of weakness also exist, with the most consistently demonstrated one being reading comprehension. Whether communicating information about routines, academic content, or social expectations, teachers use verbal language. For many learners with autism, this strategy is ineffective. They are unable to process complex verbal information. They cannot understand abstract notions. It is important that appropriate test batteries that assess both academic strengths and weaknesses be included in a comprehensive evaluation of a child and the learning patterns they suggest be interpreted in the feedback to parents and appropriate educational recommendations are made in the written report. The performance profile seen in measures of academic function is consistent with that obtained from intellectual tests. Academic skills requiring primarily rote, mechanical, or procedural abilities are generally intact, while those relying upon more abstract, conceptual, or interpretive abilities are typically deficient. Some authors in the reading domain found that individuals with high-functioning autism performed as well as or better than normal controls matched on age and IQ on tests of single-word oral reading, non-word reading, and spelling (Minshew et al., 1994). These measures all require phonological decoding

skills and thus indicate preserved or even advanced knowledge of grapheme–phoneme correspondence rules in autism. In contrast, subjects with autism performed less well than controls on two measures of reading comprehension. This pattern, in its most extreme form, is named **hyperlexia**. It is used to describe individuals with word recognition skills that are significantly better than predicted by intellectual or educational level. Hyperlexia has been documented in individuals with autism by a number of researchers (Nation et al., 2006). The cognitive and social communication characteristics serve as the basis for the development of systematic instruction and the use of visually structured environments. Students with autism may have difficulty learning in distracting environments.

2.4. Memory

Memory refers to the processes that are used to acquire, store, retain, and later retrieve information. There are three major processes involved in memory: encoding, storage, and retrieval. Memory has been a focus for researchers in search of basic psychological factors that contribute to the development of ASD (Boucher et al., 2012). Non-declarative memory includes perceptual memory (automatic and unconscious memory) and procedural memory (conditioning, habit memory, the learning of sensorimotor or cognitive skills). Declarative memory is the explicit acquisition and maintenance of information over a longer time. Non-declarative memory appears to be largely intact in individuals with ASD without ID, particularly when stimuli are non-social in nature. Tasks include implicit learning tasks, in which children are repeatedly exposed to a stimulus and learning is reflected in faster (and/or more accurate) responses over trials. Intact performance is observed in implicit motor sequence learning (Travers et al., 2010) and spatial context learning (Kourkoulou et al., 2011). However, there is some preliminary evidence of a slower adaptation of learning when the learning task biases individuals with ASD toward local features of a stimulus. Other non-declarative tasks that reveal intact performance in ASD include perceptual or conceptual priming for words, pictures, and music. However, fear conditioning tasks, in which participants are repeatedly exposed to a stimulus and learning is reflected in faster (and/or more accurate) response over trials, have revealed impairments in adults with ASD (Gaigg and Bowler, 2007).

Declarative memory research in ASD is characterised by a pattern of mixed findings of intact and impaired performance across tasks, moderated by cognitive ability. Recognition memory tasks involve the presentation of a list of stimuli (e.g. words, aurally or visually). Subsequently, participants are tested by being shown a group of stimuli (e.g. list of words) that were either part of the to-be-remembered group (targets) or not (foils). Performance has been reported as largely intact in individuals with ASD without ID for tests using nonsocial stimuli, such as lists of words, stories, and pictures of common objects. However, recognition memory may be impaired in verbal individuals with ASD and ID, and when face stimuli are used. Free recall tasks which require individuals to remember unrelated words revealed no impairments in individuals with ASD across age and immediate or delayed recall conditions; however, control groups outperformed individuals with ASD when semantically related word lists were used, suggesting that non-ASD populations were able to make use of this higher-order category to support memory (Bowler et al., 2008).

2.5. Motor development

Motor development refers to the development of a child's bones, muscles and ability to move around and manipulate things in an environment. Motor development can be divided into two sections: gross motor development and fine motor development. Children with autism tend to also have motor difficulties. Early descriptions of these children suggest that they were graceful and skillful and had few signs of motor impairment. This was part of the puzzle relating to the origins of the disorder. Later systematic studies of motor performance in low-functioning cases uncovered clear signs of delayed or abnormal motor and sensorimotor development (Jones and Prior, 1985). One author found motor imitation problems in children with high-functioning autism and basic motor functioning problems or dyspraxia which were significant handicaps to imitation (Benvenuto, 1999). Problems in producing gesture, either by imitation or spontaneously, may underlie the well-known failure of children with autism to use gesture to communicate like neuro-typical children. Motor dyspraxic and neurodevelopmental signs such as choreiform movements, gait abnormalities, balance problems, and impaired body imitation abilities are significant characteristics of autism (Goldstein et al., 2001).

Motor problems are showed to be slow in a substantial proportion of cases (DeMyer et al., 1981), although it is unknown whether neurologically impaired children with autism are different in other significant ways from those without measurable signs on these indices. Some authors compared children with autism with those who had language disorders and with controls on a neurological examination. They found motor problems across balance, coordination, fine, gross and oromotor functions (Noterdaeme et al., 2002). Using standardised tests of motor impairment and including children with Asperger's syndrome and higher-functioning autism as subjects (Ghaziuddin et al., 1994), it has been shown that both groups show signs of neuro-motor clumsiness across a range of motor systems. Their graphomotor scores, as ascertained from testing with standard visuomotor tests, remained an area of weakness in ability profiles from early to later ages. In the academic domain, although the higher IQ group had normal range scores in numeracy and literacy, their written expression was a notable weakness. Ongoing problems with written work in the school curriculum, which of course requires fine motor skills and effort (Manjiviona, 2003).

Research examining deficits in motor execution and motor planning was also presented and opens up avenues for further research. The use of magnetic resonance imaging, to establish abnormalities in neural underpinnings of motor control, is one possibility. Motor dysfunction of individuals with autism, poses concerns for parents and professionals. Delayed motor development will impact on physical activity participation and the development of daily living skills for individuals on the autistic spectrum. This clearly indicates the need for intervention studies to examine the effects of physical activity on the motor development of individuals with ASD.

2.6. Emotional processing

Emotional processing happens when an individual experiences an emotionally distressing event and is able to cope with those experiences over time to the extent that new experiences can occur (whether stressful or not) without a return to the previous distress. While individuals with ASD feel and express emotions, their emotional expressions are reduced in frequency and manifested in more ambiguous ways compared to those of typically developing individuals, as reflected across facial expressions, body postures, spontaneous language and prosody (Brewer et

al., 2016). Individuals with ASD have difficulties recognising emotions in others from their facial and bodily expressions, and their prosody. Emotion processing difficulties appear to vary greatly across individuals and studies (Nuske et al., 2013), with more pronounced difficulties reported in tasks testing recognition of complex versus simple, intense versus subtle, and negative versus positive emotions.

Empathy is another area of weakness in ASD, although recent studies suggested that difficulties in this area are related to the cognitive dimension (understand what others are feeling) rather than the affective dimension (feeling concern in response to others' emotions) of empathy (Mazza et al., 2014). Recent work by (Schwenck et al., 2012) has pointed to a double dissociation, where individuals with ASD were selectively impaired in cognitive empathy, while those with conduct disorder were selectively impaired in affective empathy. Atypicalities in the emotion processing domain are more frequently reported in studies testing brain and physiological responses to emotional displays, compared to behavioural studies. Findings include atypical physiological arousal and reduced brain activity in emotion processing circuitries in response to emotional scenes, and emotional prosody. Emotion processing difficulties have been reported to increase with age, and to be associated with lower social skills as well as lower verbal and non-verbal cognitive functioning. It is still debated whether such abnormalities in ASD represent a primary deficit in emotion processing, a manifestation of social impairments (possibly involving social-motivational and social-cognitive factors), or the final outcome of multiple social and non-social abnormalities (Vivanti et al., 2019).

2.7. Problems with sensory processing

Sensory processing refers to the way the nervous system receives messages from the senses and turns them into responses. Through the senses, we learn about our environment as well as ourselves, creating memories that contain records of our history of sensory experiences. The presence of sensory disorders in children with autism is widely recognised nowadays. The range of such sensory dysfunctions is considerable and includes tactile, auditory, visual, olfactory and gustatory hyper or hypo sensitivity. Tactile hypersensitivity is evidenced by the aversion to wearing certain types of clothing, walking on grass or textured flooring or handling

certain types of objects and materials. Some individuals show extreme anxiety in social situations because of their tactile hypersensitivity. A person with visual processing differences may have difficulties with bright or flashing lights, such as fluorescent lights. A restricted diet and refusal to eat particular foods is also common in children with autism. It is not always clear whether the refusal is related to the taste, smell or texture of the food or some combination of these characteristics.

In addition to hypersensitivity, some individuals show reduced sensitivity (hyposensitivity) to pain, cold and sound, as well as a wide range of other sensory inputs. In contrast, other people with autism appear to be strongly attracted to certain types of stimuli to the extent that they can fixate on them and tend to maintain that stimulation through repetitive and compulsive behaviours. For example, some children crave deep pressure stimulation. There are individuals who are particularly attracted to scents and tend to smell everything. There are speculations that some children's reading difficulties may be related to letters that appear wavy or completely missing. Some sensory problems may reflect the inability to coordinate or integrate sensor input from multiple sources or multiple sensing modalities. Children with this last type of problem may find it difficult to follow a conversation when there are background sounds or have visual stimulus problems when speaking. It is also speculated that sensory interference (synesthesia) may occur in some individuals; if the person can see sounds or hear pictures. Finally, some sensory dysfunctions include the vestibular system that helps regulate balance and movement, and the proprioception system that provides feedback from muscles, tendons, and ligaments on body posture (Huebner, 2001).

3. Diagnosis of ASD from a psychological perspective

The process of establishing an ASD diagnosis and linking to early intervention and support services is often a major challenge. The processes include: identifying diagnostic needs for ASD, ensuring accurate assessment by a trained professional, and opening up appropriate ASD child services that include complex individual, social and medical factors that are often difficult to manage from a logistical and financial perspective (Lappé et al., 2018). The list of experts which can make the diagnosis is long and it includes:

paediatricians, neurologists, and psychologists. The expert making the diagnosis should have extensive experience working with the wide range of symptoms. To make a diagnosis of ASD, psychologists draw on a number of sources of information: patient interviews, observations of the patient's behaviour, tests of cognitive and language abilities, medical tests to rule out other conditions, interviews with parents, teachers or other adults who can answer questions about the patient's social, emotional and behavioural development. Psychologists, working in partnership with physicians, speech and language pathologists, and occupational therapists, can lead or contribute to multi-disciplinary diagnostic teams in clinical settings. Psychologists are skilled in diagnostic practices and the assessment of cognitive and behavioural functions. After the evaluation is complete, they often play important roles in treatment and case management, making referrals to community resources, setting up interventions in schools and homes, and providing various therapies for both children and families.

4. Treatment of ASD from a psychological perspective

Children with ASD benefit from interdisciplinary treatment teams made up of various experts from various fields. Those teams typically include physicians, special educators, speech therapists, occupational therapists, and psychologists. Several interventions have been developed to treat children with ASD. Some of the most common evidence based approaches include following: Applied Behaviour Analysis (ABA), Developmental Individual-Difference Relationship-Based model (DIR), and TEACCH. ABA is an intensive method that uses teaching techniques to increase helpful behaviours and reduce behaviours that are harmful or interfere with learning. ABA therapy has been shown to improve communication, social and vocational skills. In the DIR model, also known as floor-time therapy, parents and therapists follow the child's lead in playing together while also directing the child to engage in increasingly complex interactions. The TEACCH framework promotes engagement in activities, flexibility, independence and self-efficacy through strategies based on the learning strengths and difficulties of people with ASD. There are some other promising treatments such as: Reattach therapy, Sensory Integration Therapy and art and drama therapy.

These interdisciplinary treatments can improve a variety of abilities required for daily life, for example, dressing, eating, and fine motor developments, which can assist somebody with ASD and manage their sensory overload (e.g.: sights, sounds, touch, etc.). The child should be evaluated by a professional trained in diagnosing and treating autism, so that he or she can recommend the most appropriate interventions. Such interventions can be administered by psychologists, as well as by special educators and board certified behaviour analysts. Psychologists also play an important role in helping children of all ages as well as adults with ASD manage specific challenges associated with the disorder (APA, 2019).

5. Conclusion

Autism spectrum disorder is probably the most misunderstood and puzzling of the neurodevelopmental conditions. This article focusses on the psychological aspects of ASD and diagnostics and treatment from a psychological perspective. While major advances have been made in the field, it is clear that more special education services are needed, together with timely and ongoing psychosocial support to parents of children with ASD. It is clear that ASD is a life-long condition and families must learn to shift their focus from treatments to developing life-skills as their child grows into adulthood. They should not need to rely on possible misinformation on the internet. Effective communication between service providers and families is the key to building supportive relationships that can positively affect not only the individual with ASD but also the family over a lifetime.

Individuals with ASD possess strengths of character, unique skills, and untapped resources that should not be undervalued or unappreciated. The professional discussion of these qualities communicates a belief that individuals with ASD and their families can do more than simply survive. They can live enriched and fulfilling lives and they can be valued for what they can offer to society. Some individuals with ASD, particularly those with better language and intellectual skills, can live and work independently as adults. They should have support to access employment in their community. The degree of malleability of core and associated ASD features remains unclear, as treatment effects attained in research settings are not always replicated in community settings, and more research on the mechanisms underlying psy-

chological factors in ASD is necessary to move develop our understanding. While the core deficits are common, there are clear differences in abilities with different levels of severity of autistic conditions. These differences affect adaptive behaviour as well as intervention opportunities and outcome in later life.

Teasing apart the complex causes of autism spectrum disorders will depend ultimately on the integration of information at all three levels of explanation – genetics/neurobiology, cognition, and behaviour. This pursuit, though, must be addressed longitudinally if we are to appreciate fully the changes that take place throughout development.

Macedonian politicians should start to see this diagnosis as treatable and to invest the same power, money, and effort into treating ASD that they have put into treating other chronic medical disorders (cystic fibrosis, diabetes, cancer) that affect young children.

Conflict of interest

The author declares no conflict of interest.

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