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## Emotional Intelligence in Autism

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**Abstract.** Emotional intelligence is a term, which includes various abilities and skills, which enable a person to perceive and handle emotional situations both his own and those of other individuals with the aim of his social and personal development. More specifically, the first part of this work presents an analysis of the role of emotional intelligence in the individual. Then, the 8 pillars of metacognition are mentioned, the role of humor in EI, taking distances with the help of EI, the correlation with hormones, the mindfulness model, the new layered model on EI, and the EI in gifted individual. In the second part, the literature review focuses on the role of EI in autism, the views of Kanner and Asperger, the expression and understanding of emotions of people with ASD through EI, the mindfulness and the use of robots in autism.

**Keywords.** Emotional Intelligence, Mindfulness, Metacognition, Autism, Mental Retardation, Research

### 1. Introduction

Emotional Intelligence, in general, but also specifically in autism disorder, is a broad topic, which requires constant study, as new and emerging data emerge. According to the literature, it refers to an ability of the mind which refers to emotional states. The aim of this short research paper is the holistic study of emotional intelligence through recent published research studies.

**2. Emotional Intelligence.** The Sahinetal. (2016), attempted to investigate the relationship between intelligence, emotional intelligence and creative thinking skills, which are considered a complex and multidimensional issue. Thus, through the study that was conducted, they aimed to determine the type of relationship between students' emotional intelligence and their creativity. They also aimed to find out how their emotional intelligence affects the prediction of creativity in specific areas.

Initially, some studies such as Singh and Sharma (2012), Haroand Castejon (2014), Leanaand Köksal (2007), Felfeand Köster (2001), Sahinetal. (2016), no correlations were found between emotional intelligence and general intelligence and skills underlying it.

On the other hand, Kramerand Katzko (2002), Yakmacı Güzel (2002), Sak (2004) and Köksal (2007), in Sahin (2016), ruled that there was a significant correlation between emotional intelligence and general intelligence.

For this purpose, a new study was conducted in which 239 charismatic students (122 girls and 111 boys) from two experimental high schools participated. In addition, Kaufman

domain creativity tests were used, adapted by Sahin (2016) and the Trait Emotional intelligence-Short Form questionnaire, adapted by Deniz, Özer & Işık, (2013). The results were analyzed with the statistical analysis program SPSS.

The findings showed that sociability, which is one of the sub-dimensions of emotional intelligence, was associated with creativity and at the same time the self-disposition for creativity in the daily life of the individual, was associated with all the dimensions of emotional intelligence. In conclusion, it was found that sociability was able to predict creativity at the academic level, artistic performance and creativity in the daily life of the individual, in contrast to the other dimensions, which failed to do so (Sahin et al. 2016).

Casino-García (2021), report in their study that the psychological well-being of students in general, affects their academic performance, their social relationships and their coexistence with others in school. However, when this issue concerns students of non-formal development or with specific needs, then it is vital. In general, studies on the effect of charisma on students' self-image and self-esteem have dual results. The key factor for the well-being of the aforementioned students is Emotional Intelligence (EI) and it needs to be developed by schools and various educational institutions.

In this research, the Casino-García et al. (2021), study the relationships between the various profiles of emotional intelligence, self-image and self-esteem of gifted children between the ages of 8 and 18, who attend general schools in Spain but are peers of typical development. Thus, a total of 118 diagnosed gifted students and 122 typically developing students participated. The Self-Concept Scale Form 5 (AF5), the Rosenberg Self-Esteem Scale (RSES) and the Trait Meta-Mood Scale-24 (TMMS-24) were used to conduct the research. In addition, the selection of groups of students was made based on their grades in the three dimensions of emotional intelligence. Then, the differences in the self-esteem and self-confidence of the students were analyzed, according to their emotional intelligence profile.

The findings show a classification of profiles, three clusters in both groups and the identification of differences between the profiles of emotional intelligence, self-esteem dimensions and self-image of gifted children, but this did not happen with the group of typically developing children. In conclusion, what was found causes significant implications for professionals in the field of education and health, both for the evaluation and for the implementation of specially adapted intervention programs, in case of vulnerability of students (Casino-García, 2021).

**Emotional Intelligence And Humor.** The study of Yassini & Mehrdad (2014), aims to compare emotional intelligence and humor in gifted and non-gifted students and results in a causal and comparative study. In terms of emotional intelligence, it seems that charismatic individuals generally score higher than normal developmental individuals. The results showed that there is a noticeable correlation between emotional intelligence, optimism / emotion and humor in gifted and non-gifted students, as higher scores were obtained and thus these findings confirmed the initial hypotheses.

**The factors.** Several studies were conducted on people of different ages and occupations and the score of emotional intelligence of girls was found to be higher than that of boys, aged 15-18. Perhaps, the main reason is that women, compared to men, give more value and weight to emotions (Saygili, 2015).

**8 Pillars X 8 Layers Model of Metacognition.** Metacognition is a scientific field, which has attracted the interest of scientists, especially in the 21st century. Despite the extensive research that has taken place, an interdisciplinary model has not yet been proposed, on the basis of which it is possible to shed light on the issues that have arisen regarding the true nature of

metacognitions and the methods that can be applied to develop metacognitive skills in the subjects. The aim of the study conducted by Drigas and Mitsea (2021) is to present a new, multilevel and interdisciplinary model which is based on established theories that have been extracted from various studies (psychological, natural sciences, environmental, cognitive, philosophical, etc. K.). The two researchers describe in detail the cognitive and metacognitive processes involved in each level of the model, while emphasizing the relationship that develops between control processes and attention (Drigas & Mitsea, 2021)

According to the proposed multilevel model, each layer of metacognition involves a specific control system of high order and functionality, which operates according to a series of procedures involving attention. The same is true with other cognitive processes. The higher the level, the more sophisticated features and functions are manifested that are perfectly in line with the subjects' need for the creation of abstract mental representations, higher-order thoughts and emotions. The eight layers of the eight pillars of metacognition are as follows: 1) Understand the sensory processing system. 2) Self-assessment of facilitators as well as inhibitors of sensory processing. 3) Regulation of physiological and sensory processes. 4) Adaptation of sensory processes. 5) Recognizing the stimuli, the different sensory characteristics as well as the changes in the visual field. 6) Distinguish between competing or similar stimuli. 7) Recall of sensory information and 8) mobilization of useful strategies. These levels are the same in all metacognitive processes (Drigas & Mitsea, 2021).

The aim of the familiar model of cognition is to enrich the research data regarding the way and the pace of evolution of cognition, with the ultimate aim to develop effective strategies that can be applied in the educational context (Drigas & Mitsea, 2021)

The main conclusion that emerged from the creation of the model by the two researchers is that special attention should be paid to the process of self-regulation, as it helps to move us from the lowest levels of existence to the highest. The value of self-observation is maximized over time. Through self-observation, subjects gain self-awareness (Drigas & Mitsea, 2021).

Of course, self-observation is a perpetual process. Philosophically, self-observation as a type of metacognition is equivalent to the process of remembering finite moments of consciousness, which are recalled in memory and through them individuals perceive more holistically the events that have occurred. Continuing, it should be mentioned that metacognition is an "open type" activity, ie each subject handles the metacognitive processes in his own way. More specifically, metacognitive processes expand as the observer deepens his or her description of his or her own cognitive system (Drigas & Mitsea, 2021).

By no means should we forget that the eight structured stages of cognition (using terms of consciousness) are interrelated and each is related to a kind of intelligence out of the eight proposed by Gardner (linguistic - verbal, logical - mathematical, visual - spatial, intrapersonal, interpersonal, musical, physical and naturalistic According to the model, the main metacognitive elements, such as self-observation, self-regulation, flexibility, recognition, discrimination and memory are considered multilevel processes and not The same is true for cognitive processes. As we ascend to a level they manifest more advanced and refined characteristics and functions that meet the needs of the subjects for the creation of abstract mental representations, motivations, thoughts and feelings of the upper class. The rise from the lowest to the highest levels of metacognition is directly intertwined with both advanced forms of self-knowledge and high levels of self-observation, which in turn presuppose ever-higher control processes. Each level of metacognition also describes a higher order control system, which operates according to a set of rules (Drigas & Mitsea, 2021).

Finally, the multilevel model of metacognition aims both at proposing an alternative approach and at clarifying that metacognition passes through strictly defined developmental

stages. The conclusion that emerges from all this described research process is that the existing educational systems should pay attention to the creation of appropriate metacognitive learning environments, which will promote systematic education at each specific metacognitive level (Drigas & Mitsea, 2021).

**Relationship Between Emotional Intelligence Level and Decision.** Kurtoğlu (2018), through his study wanted to examine the relationship between the levels of emotional intelligence and decision-making strategies of gifted students, in secondary education. In addition, this study explored the impact of gender and class levels on decision-making strategies and emotional intelligence. Also, the literature states that it is remarkable is the evaluation of the level of emotional intelligence, but also the decision-making process of the gifted students. Thus, the study was triggered by the fact that no relevant research has been conducted.

**Metacognition, Stress, Relaxation Balance & Related Hormones.** This study by Driga and Mitsea (2021) studies the interaction between cognition and the stress response. More specifically, the main purpose of the research is to detect the interaction between cognition, the sympathetic and parasympathetic nervous systems and neurotransmitters, which are the main hormones associated with stress induction. Researchers seek to answer a number of questions related to the aforementioned relationship. The ultimate goal is to draw new stress management strategies based on the conclusions that can be drawn, which can be applied in the family, school and work context. Since the majority of everyday situations faced by modern people cause stress, there is an urgent need for in-depth study of resistance to them, in order to successfully deal with stressful situations and not disturb the balance of the psyche of subjects (Drigas & Mitsea, 2021).

More specifically, stress hormones together with the hormones of happiness compose a "wired" control system and at the same time determine emotions, mood and behavior in various aspects. They align with the flow of evolution and survival by enabling one to adapt one's strategies and behaviors in order to adapt quickly to environmental change. In contrast, the deregulation of stress and joy hormones causes a variety of disorders, such as anxiety disorders, ADHD and depressive disorder. According to the latest research data, small changes in neurochemical levels have consequences on the mental health of subjects. At the same time, these hormones interact with the structures of the brain and are vital for the processing of emotions and for the transmission of emotional messages to the brain (Drigas & Mitsea, 2021).

The ANS, in turn, is a major system that is activated by stress and maintains a crucial role in maintaining the homeostasis of the body. At the same time, it should be mentioned that it works unconsciously and is connected to most tissues and organs of the body. Research has shown that many stress-related illnesses, such as depression, have to do with the sympathetic nervous system (Drigas & Mitsea, 2021).

Cognition refers to a set of higher self-regulatory abilities, skills and strategies that allow one to live happily. It concerns the understanding, the awareness and the conscious control of the cognitive processes that are responsible for the behavioral control (Drigas & Mitsea, 2021).

Research by Drigas and Mitsea (2021) has shown that subjects who train the metacognitive ability of attention are able to more effectively regulate their negative emotions, mood and stress. In the opposite position are people who are negatively biased, as this attitude has as a consequence their emotional deregulation. Attention can be argued to serve as a preliminary strategy for further regulation of emotional and stress. People who focus on education - and practice we could say - have been shown to increase their positive emotions and consequently enhance the processes of attention, control and flexibility. Through mindfulness training, individuals gradually acquire the ability - flexibility - not to engage in information with a negative sign and to be directed to alternatives and thus achieve their emotional

regulation. The most effective strategies for regulating attention as well as emotion come from conscious interventions, as the regulation of stress and emotions depends on cognitive skills such as attention (Drigas & Mitsea, 2021).

**Mindfulness Model and Training Strategies.** In recent years more and more, research findings converge on the fact that education in awareness has a positive impact on all dimensions of human existence. Nevertheless, there is still a research gap regarding the pillars of awareness. The study of Drigas and Mitsea (2020) aims to propose a new model of consciousness, which will be based on the principles and mechanisms that govern metacognition. Each pillar of cognition consists of a range of techniques that contribute to the cultivation of certain cognitive abilities and qualities, leading step by step to higher levels of self-organization, intelligence and consciousness (Drigas & Mitsea, 2020).

The familiar model of consciousness is based on metacognition and specifically on the eight pillars of strategy and education of consciousness. These pillars are the following: 1) First pillar: Knowledge of what are the components of our existence physically, emotionally, mentally and spiritually. 2) Second pillar: Knowledge of what is the usual behavior of the components of our existence. Knowledge comes from conducting a SWOT analysis for a holistic and in-depth understanding of our situation. 3) Third pillar: Self - monitoring and monitoring of various emotional and mental movements in real time. We construct an internal observer. We rest in observation. We observe the thoughts, the feelings, the stress, the relaxation, the quietness and the calmness between the noises, in the emptiness and between the thoughts. We observe the observer! 4) Fourth pillar of self-regulation: The process of observation balances the function, facilitates thoughts and feelings, contributes to relaxation and observation acquires a clearer character. 5) Fifth pillar of adaptation: The body, emotional and mental functions acquire a more relaxed and adaptive character, at the same time breathing works smoothly and the individual relaxes and adapts to the present moment. Perception is deepened and anti-stress hormones are secreted as well as neurotransmitters that promote relaxed awareness. 6) Sixth pillar of recognition: The expansion of awareness and perception brings the recognition of details, as well as the totality of each situation. We in turn perceive multiplicity and unity at the same time. 7) Seventh pillar of distinctions: In this state of open recognition, we distinguish the various in forms, movements, situations and representations. We focus on the positive, on the beneficial, and divert our attention from the negative, so that the negative ceases to exist in our mental realm. 8) Eighth pillar of Memory: The state of awakening and full awareness. Memorial supports and guides all careful processes, keeps us in a conscious state, reminds us of the real existential dimensions and finally reminds us of the way back to evolution and to our realistic existential level (Drigas & Mitsea, 2020).

In general, any practice that enhances awareness skills such as meditation, yoga, martial arts, and other physical or mental exercises is a way to stimulate the development of new neurons (neurogenesis) and to create new connections between existing neurons. . Neural pathways and circuits become more passable, upgrading cognitive functions as well as metacognitive abilities, resulting in significant upgrades in monitoring, adjusting, and adapting to stress-related situations. Finally, consciousness is a process of reconnecting the brain, as we need to replace dysfunctional established habits with new, more useful and functional ones, and conscious practices help to improve our intelligence and self-awareness in a variety of ways (2020).

**A New Layered Model on Emotional Intelligence.** Emotional intelligence based on the pursuit of human cognitive abilities that transcends classical academic intelligence. It is also directly related to the theory of self-regulation and the theory of metacognition. Moreover, the

EI focuses on the character and aspects of self-control, such as the ability to delay pleasures, tolerance of frustrations, and proper management of impulses (Drigas & Papoutsi, 2018).

Knowledge includes processes such as attention, memory, assessment, language problem solving and perception. Metacognition is defined as the ability of the individual to monitor and reflect on his own performance and abilities during the learning process. Along with the primary emotion, the individual simultaneously develops thoughts and performs cognitive functions that evaluate the relationship between emotion and judgment. In this way the person can manage his emotional reaction and thus have better interpersonal interactions. So, applying metacognition in socio-emotional contexts can correct emotional mistakes (Drigas & Papoutsi, 2018).

The study of Drigas & Papoutsi (2018), below is the Pyramid of Emotional Intelligence, which develops from one level to another through metacognitive processes. It consists of a 9-level model:

Emotional unity (Pure Consciousness, Filling & Emptiness), Transcendence (Self-reflection, Transcendental Knowledge), Universality of Emotions, Self-Realization (Self-Perfection, Self-Achievement), Social Skills, Specialization in Emotion Review, Management), Social Awareness, Empathy ,Emotion Discernment (Awareness, Monitoring, Social Recognition & Flexibility), Self-management (Self-regulation, Flexibility, Self-control), Self-knowledge (Self-perception, Awareness, Self-observation), Recognition, Perception-Expression of Emotions (Memory, Perception, Recognition, Signaling of Emotions), Emotional stimuli (Coding of Emotional Senses, Attention).

**A meta-analytic review of emotional intelligence in gifted individuals.** According to a recent study, charismatic people scored higher on hyper-enthusiasm than non-charismatic people (Winkler & Voight, 2016 in Ogurlu, 2021). In general, this specific socio-emotional mode of operation of these individuals is able to affect up to the level of their emotional intelligence (Ogurlu, 2021).

**3. Emotional Intelligence in Autism.** Emotional intelligence (refers to the ability to evaluate and engage the emotions of ourselves, others, and groups (Mayer, 1997). The physical index hypothesis suggests that deficits in the functional emotional signaling system (physical states) lead to poor decision-making judgment, especially in the personal and social. This system is essential for facilitating social interaction, imaginative activities, and the use of emotions for social communication and is supposed to include a domain of social skills known as emotional intelligence world (Bar-On, Tranel, Denburg & Bechara, 2003).

People with ASD show social deficits that indicate impairment in two general areas (EI): intrapersonal and interpersonal skills. In addition, children with ASD show a deficit in the ability to distinguish between emotions, signal emotions, use emotions to guide their behaviors, and effectively control emotional range and intensity Also, children with ASD have difficulty properly expressing other people's feelings, intentions, and motivations, correctly recognizing personal characteristics in others (eg age, gender, and ethnicity) and influencing others to behave in desired ways. (Dalrymple, 1992).

Neurobiological and neuropsychological data suggest that the significant range of social deficits observed in people with ASD can be considered more effective as the abnormal development of a distinct functional brain system. Such a system includes the so-called executive functions that are believed to be retained by the frontal cortex and appear to be responsible for helping regulate the ability to initiate, maintain, and maintain targeted behaviors. Early work by Pennington and Ozonoff (1996) and others showed that people with ASD exhibit informal forms of EL regulation and suggested that disturbances or informal organization of

such functions could be responsible for impairment of social and behavioral function in people with ASD.

Although Executive Function (EF) has been extensively studied in people with ASD, there is still limited research in the field of SN and in people with ASD and even more sparse research examining the correlation between EF and EI. Currently, neurobiological and neuropsychological research supports the idea that EL and SN are linked through subcortical structures. In addition, it was found that compared to controls, patients with neural circuit damage allegedly involved in EF and EI had low EF and EI scores as assessed by standardized trials. Unfortunately, research examining the neural circuitry was limited to non-ASD individuals, suggesting the need for further research in this area with a developmentally delayed population (Lopez, Lincoln, Ozonoff, & Lai, 2005).

The AQ measure may be related to non-clinical socio-cognitive structures studied in basic personality studies, such as characteristic emotional intelligence (characteristic EI, also known as characteristic emotional self-efficacy; Petrides, 2009).

The characteristic EI is defined as a constellation of emotional perceptions found at the lowest levels of personality hierarchies. Many aspects of social and emotional functioning that appear to be impaired in ASD (i.e., adaptability, empathy, social sensitivity, and communication) are included in the EI characteristic. In addition, informal EI features have been documented among individuals with ASD (Montgomery Petrides 2011), and have further demonstrated that the EI feature can potentially provide important insights into the foundations of optimal social cognition. (e.g., the flexible application of complex emotions and social slogan expression). This suggests a significant overlap between the construction of the EI feature and our understanding of ASD damage (Petrides, Pita & Kokkinaki, 2007).

Some researchers suggest that deficits in executive functions, such as cognitive flexibility, may explain ASD-related socio-cognitive disorders (Ozonoff, 1997). Cognitive flexibility refers to the degree to which one can divert attention from a goal and turn to a different thought or action in response to changing environmental requirements. Failure to respond flexibly and adapt to new situations or changing environments manifests itself in persistent and rigid behavior (Schopler, Mesibov, & Kunce, 1998).

This is easily seen in ASDs, which are characterized by narrow interests, poor attention span, difficulty assimilating to change or innovation, and engaging in repetitive patterns of behavior (Baron - Cohen, 2008). Interestingly, failures in such processes are not only seen as the root of the repetitive and rigid behaviors that define ASDs, but are also suggested to support key deficits in social cognition (Yoshida et al., 2010). This may be due to the complex interaction between executive function and emotion. For example, it has been argued that emotional states enhance the flexibility with which information is processed and interpreted. Conversely, impaired cognitive flexibility can reduce a person's ability to effectively monitor, process, and use social and emotional information (Ashby, Isen, & Turken, 1999).

The literature has suggested that the ability to accurately process socio-emotional data from a flow of complex (either verbal, nonverbal, or contextual) information depends primarily on executive functions, such as cognitive flexibility. However, the nature of this relationship remains unclear in ASDs and is relatively unexplored in relation to the ASD characteristics below the threshold found in the general population. It is important to understand how these processes relate and the most appropriate approach to its assessment can be through tasks that provide the opportunity to simultaneously test the areas of executive function and social cognition (Bull, Phillips, & Conway, 2008).

In the following study, we first assessed the association of subject ASD traits with SN trait and empathy, and then examined performance in tasks that measure social cognition and

cognitive flexibility separately and simultaneously in a subgroup of participants with either high or low ASD characteristics.

It was observed that AQ scores were negatively correlated with the global EI characteristic and consistent wellness, self-control, emotionality and sociability factors (H1) and were negatively correlated with empathy scores (H2). In contrast, the EI characteristic was predicted to be positively correlated with empathy scores (H3).

**DSM-IV.** Autism is considered to be the most severe of all pervasive developmental disorders because it is characterized by a primary disorder in a person's ability to relate to other people, along with disabilities in language and cognitive development. The DSM-IV (1994) introduces the term 'autistic disorder' and the ICD-10 (1992) the term 'childhood autism', including in their primary diagnostic criteria for autism developmental disorders a) social transaction, b) and (c) limited, repetitive and stereotyped patterns of behavior, interests and activities beginning before the age of 3 (DSM-IV 1994).

**Kanner and Asperger.** Kanner realized that children seemed to have a good relationship with objects, often revealing an amazing skill in spinning things or completing puzzles (Kanner.1943). Both Leo Kanner and Hans Asperger recorded several cases of children with special characteristics. Leo Kanner American psychiatrist in 1943 describes the characteristics of 11 children who had excessive autistic loneliness

Autism is a relatively new diagnosis, although the disorder may have always existed. Were it not for Kanner to name the traits that a special group of children seem to have had, it is unlikely that there has been so much progress in the last fifty years. The child and adolescent with autism often have problems with emotion and behavior, mainly aggression (Kane & Mazurek 2011).

A Belgian cross-sectional study with questionnaires investigated the handling by mothers of behavioral problems in children with autism. The treatment of 552 children with autism was studied compared to 437 children without autism. (Maljaars 2014). The study showed that children with autism had more behavioral problems than the control group. However, the correlation of these problems with the ways of handling by mothers was statistically mild. Mothers adapted to the peculiarities of their children generally applied less rules and discipline at a young age, showed more parental support, provided stimuli and appropriate configuration of the environment.

Despite the generally mild handling of children, behavioral problems in children with autism as well as those in the control group tended to be associated with negative parenting behaviors e.g. rigor and discipline. The researchers note, however, that the association between parenting and behavioral problems in children could be more validly investigated in time studies. The prevalence of aggressive behavior in children with autism and risk factors was investigated by Kanner and Mazurek (2011). Aggressive behavior was extremely common and was positively related to the financial level of the family.

This finding was contrary to the hypothesis of the researchers who had hypothesized that the lower economic level was associated with increased aggression. It is alleged that the family with good financial resources, offering more and more pressing interventions, caused a strong feeling of frustration and aggression in the child. Other factors positively associated with aggression were younger children, severity of difficulty and repetitive behaviors, stereotyping and communication with the environment, and self-traumatic behavior, which may have been associated with emotional deregulation.

**Autism, Expression, and Understanding of Emotions: Literature Review.** Autism Spectrum Disorder is a lifelong developmental disorder that prevents people diagnosed with it from properly understanding reality, hearing and feeling. The consequence is that they are faced

with a wide range of problems related to their social relationships, communication and behavior. Familiar people have major difficulties in recognizing, understanding and expressing emotions, tend to avoid interpersonal relationships and do not want to communicate with other people. The aim of the research conducted by Haidi and Drigas (2020) is to investigate the way of expression and understanding of human emotions by people belonging to the spectrum, as well as to investigate the way of education of people with autism in terms of recognition, expression and understanding of emotions (Chaidi & Drigas, 2020).

More specifically, the researchers collected forty-eight relevant published studies and came to the following conclusions, through their study. First of all, there is an objective difficulty in understanding the emotions of people with autism, regardless of their age, IQ and other characteristics. Based on the observations of the researchers, issues are pending that need to be addressed immediately. That is, in the future, surveys with a larger number of samples should be designed and carried out, so that the results of these surveys are generalizable and at the same time valid and reliable. Another question they raise is: How long does it take people on the autism spectrum to recognize an emotion? Their biggest concern is that the degree of failure to recognize negative emotions by people with ASD is increasing, which is why they suggest exploring a wide range of emotions in large samples of participants and using brain imaging and visual coordination methods (Chaidi & Drigas, 2020).

In those studies, in which participants were children and toys were used as data collection tools, the researchers suggested investigating three additional features that are less commonly investigated, such as: attention span, the effect of reward on participants' behavior, and the emotions of the trainees during the conduct of the research procedures. Each game is completely different and is based mainly on the research criteria set by the authors - researchers. Also, no study has shown evidence of clinical significance which means that by playing with a serious game that focuses on social interaction skills, children did not appear to improve their clinical social image (Chaidi & Drigas, 2020).

**Mindfulness and Robots for Autism.** Autism is a complex neurobiological and at the same time multifactorial disorder, which is governed by specific cognitive deficits. The aim of the authors of the present study is to analyze the dysfunctions that characterize people with autism in both language and attention, but also in control and memory, based on scientific studies. The cognitive deficits that characterize people belonging to the autism spectrum are the following: Quality deficiencies in language and communication, and deficits in memory capacity. In addition to the cognitive deficits that are directly linked to autism, researchers are focusing on both the characteristics of these individuals and their functionality, and use robots as tools for intervention and treatment in people diagnosed with autism. Finally, the use of robots in the learning process has been shown to reduce the cognitive and sensory deficits of individuals with this disorder while enhancing the development of metacognitive skills (Mitsea, Akrivopoulou, Lytra & Drigas, 2020).

The fact that robots are so beneficial to people with autism suggests that familiar people actually prefer contact with robots to humans because robots are simpler, more predictable, and more repetitive. and robots should definitely mention the advantages that govern this process. These include enhancing imitation, attention, promoting communication skills, and encouraging social interaction. Art and play, as mentioned in the analysis of previous research, have proven to be very effective ways to promote the self-regulatory skills involved in learning (Mitsea, Akrivopoulou, Lytra & Drigas, 2020).

Continuing, activities based on consciousness promote executive functions, such as activating control mechanisms and controlling attention skills. Programmed robots contribute to the cultivation of the highest cognitive, social and emotional abilities. There is a lot of

research that has been used - and we could say it has been used - to explore issues related to autism spectrum disorder, such as whether people with autism can benefit from improved cognitive and metacognitive skills. Based on the results there are significant improvements (Mitsea, Akrivopoulou, Lytra & Drigas, 2020).

Based on the results of the relevant study, the metacognitive mechanism of autistic individuals who participated in the research process, when dysfunctional leads to deficits of an emotional and cognitive nature. In particular, control processes, such as behavior control, result in behaviors characterized by repetition, rigidity, and apathy. Deficiencies in control are interdependent and coexist with dysfunctions in memory and attention functions. The purpose of the study was to investigate (Mitsea, Akrivopoulou, Lytra & Drigas, 2020) The effectiveness of robots as tools for improving cognitive and metacognitive dysfunctions leading to new brain structures, higher levels of intelligence and higher states of consciousness. with autism prefer robots because of their appearance and the small range of emotions they are programmed to have. At the same time, it should be noted that the design of robots is always done according to the age, the real needs of children with autism who will participate in the respective research. In addition, they can be programmed in such a way as to "adopt" desirable behaviors such as imitation, attention, initiation of communication and interaction, and social behaviors (Mitsea, Akrivopoulou, Lytra & Drigas, 2020).

In the context of the relevant research process and in particular in the context of the search for interventions that enhance cognition in people with autism. In particular, robot-based art therapy has been shown to enhance the motivation, empathy and self-control of these individuals, as opposed to emotions such as fear and anger. In addition, attention, memory, and concentration appeared to improve. The children developed social skills and adopted more positive behaviors. They were able to adequately handle inhibitions and false beliefs when called upon to engage in problem-solving activities. Robots as consciousness trainers have been able to enhance subjects' self-observation and control processes, such as attention control that gradually leads to fewer negative emotions and depressive symptoms. Finally, programmable robots contribute to the development of higher cognitive skills such as problem solving, decision making, reasoning, abstract thinking and pattern recognition. At the same time, children with coding autism participated in group work activities that enhance higher social and emotional skills, such as conflict management and resilience (Mitsea, Akrivopoulou, Lytra & Drigas, 2020).

### **Conclusions**

In conclusion, unlike cognitive intelligence, which develops during the first years of a person's life, emotional intelligence can develop throughout its life. Emotional skills are largely shaped by the impact of the environment on the individual. The development and cultivation of emotional intelligence begins in the early stages of a person's life, continues to take shape during school age, while at older ages, building on the initial emotional skills continues. Perceived emotional intelligence of individuals typically increases during their lifetime, from early adulthood to middle age. However, adolescents' emotional intelligence does not change significantly between the ages of 12 and 16.

Different models of interpretation have been proposed, which try to explain the content of the concept of emotional intelligence based on what they focus on and thus are divided into three categories: a) competency models, b) personality framework models and c) competency models. According to another classification, the models are divided into two categories: a) aptitude models and b) mixed models. The most complete models regarding emotional intelligence are three and are presented below.

One of these models is that of Mayer & Salovey, who are American psychologists who were among the first to deal with the concept of emotional intelligence. Their model incorporates Gardner's theory of intrapersonal and interpersonal intelligence. They describe emotional intelligence as the ability to process information that is related to emotions and then to determine behavior.

According to this model, the person with high emotional intelligence is able to perceive emotions easily and accurately, to process them to think, perceive and manage them better compared to a person with low emotional intelligence. He may have better verbal communication, avoid self-destructive behaviors and may have strong emotional ties to his family.

Another of the most important models is that of Bar-On. Reuven Bar-On, a research fellow at the University of Texas, has been working on the concept of emotional intelligence since 1980. He was one of the pioneers in building a psychometric tool for measuring emotional intelligence. He also introduced the term "emotional quotient". The model he proposed deals with the identification and measurement of emotional and social intelligence. It consists of five categories of skills, each of which contains a number of individual skills. Therefore, based on this model, a person with high emotional intelligence is able to understand his own feelings and those of others, to express his feelings, to establish stable relationships but also to solve problems and make the right decisions.

The third model of emotional intelligence that needs to be mentioned in this paper is the one proposed by psychologist Daniel Goleman. In his work entitled "Emotional Intelligence" he argues that people have the ability to be smarter regardless of their IQ. Emotional intelligence is defined as the ability of the subject to recognize both his own feelings and the feelings of his fellow human beings, to motivate himself and to manage his emotions and relationships. Emotional intelligence is divided into four categories. These are:

Self-awareness: Consists of emotional awareness, self-esteem and self-confidence.

Self-management: Consists of emotional self-control, adaptability, goal orientation and positivity.

Social awareness: Includes empathy, awareness of the whole and the orientation to serve fellow human beings.

Relationship Management: Consists of leadership, motivation, the ability to develop third parties, dispute management, strengthening relationships, collaboration and teamwork.

Children manifest from a very young age, as it is essentially the first language of children. The emotional expressions of autistic children or adolescents are very different from those of typically developing children. The Yirmiya et al. (1989) videotaped the interactions of autistic and typically developing children with an unknown adult and found that autistic children often exhibited opposite charge emotion complexes. These children find it difficult to share their feelings with others. Autistic children also have deficiencies in understanding the feelings of others. Autistic children also have deficiencies in understanding the feelings of others. Recent research shows that problems in understanding the feelings of others are due to the general inability to process faces.

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