# Sensory integration therapy as enabler for developing emotional intelligence in children with autism spectrum disorder and the ICT's role

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**Abstract**

Sensory Integration Therapy (SIT) is a widely known and used intervention by a lot of professionals and practitioners in the field of special education as being an enabler of functionality of the child. Through intervention, the sensory processing components that have been affected are targeted. Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that is highly affected by sensory modulation disorder (SMD), a special subcategory of sensory processing disorder (SPD) that is expressed in various ways causing activation of Autonomic Nervous System (ANS) leading to biological and physiological stress. Emotional Intelligence (EI) is a complex set of skills that drive us to higher mental states. According to theorists the basis of these skills is the ability to manage and regulate stimulus. The purpose of this literature review is to investigate the connections between SIT and EI in children with ASD. In the introduction basic definitions and concepts of ASD and SIT are analyzed and in the main part correlations between EI and SMD are made, discussing the effectiveness of SIT in ASD children.

**Keywords:** SIT, sensory integration therapy, Emotional Intelligence, EI, autism, ICTs.

# A terapia de integração sensorial como facilitadora do desenvolvimento da inteligência emocional em crianças com perturbação do espectro autista e o papel das TIC

**Resumo**

A Terapia de Integração Sensorial (SIT) é uma intervenção amplamente conhecida e utilizada por muitos profissionais e praticantes no domínio da educação especial como facilitadora da funcionalidade da criança. Através da intervenção, os componentes do processamento sensorial que foram afetados são alvo de intervenção. A Perturbação do Espectro do Autismo (PEA) é uma perturbação do neurodesenvolvimento muito afetada pela perturbação da modulação sensorial (SMD), uma subcategoria especial da perturbação do processamento sensorial (SPD) que se exprime de várias formas, provocando a ativação do Sistema Nervoso Autónomo (SNA), o que leva a um stress biológico e fisiológico. A Inteligência Emocional (IE) é um conjunto complexo de competências que nos conduzem a estados mentais mais elevados. De acordo com os teóricos, a base destas competências é a capacidade de gerir e regular os estímulos. O objetivo desta revisão da literatura é investigar as ligações entre os SIT e a IE em crianças com PEA. Na introdução, são analisadas as definições e os conceitos básicos de PEA e de SIT e, na parte principal, são feitas correlações entre a IE e o SMD, discutindo-se a eficácia do SIT em crianças com PEA.

**Palavras-chave:** SIT, terapia de integração sensorial, Inteligência Emocional, IE, autismo, TICs.

## 1. Introduction

Individuals who exhibit a particular set of repetitive behaviors, severely limited interests, and/or sensory behaviors from childhood, as well as difficulty communicating in social situations, are classified as ASD. ASD is estimated to affect 1 in 36 children, according to the CDC's latest estimate, with boys experiencing it 4-fold more frequently. In Greece, the prevalence rate for children aged 10 to 11 is reported to be as 1.15 percent (Thomaidis et al., 2020).

Despite the fact that each person with ASD has unique characteristics, there are still some common features of the disorder. Anxiety, ADHD, DCD (Pergantis; Drigas, 2023) obsessive-compulsive disorder and mood disorders are among the many comorbid disorders that are highly prevalent in ASD. ASD is now characterized by sensory processing deficiencies, which are marked by hyper- or hyporeactivity to sensory input, as defined by the DSM-5 (Hollocks et al., 2018; Hodges et al., 2020).

SIT is a therapy that involves face-to-face interaction with play, sensory motor activities, and appropriate challenge from skilled and licensed occupational therapists and other health professions that can modify and reduce child distress levels, improve child coordination, adaptive responses, concentration skills or interpersonal interaction (Randell et al., 2019).

The theory of sensory integration is based on presuppositions that aim to explain observed phenomena. According to Ayres (1972a), sensory integration is the process of organizing sensory information for use. Our brains use sensory signals to interpret and receive information from their senses, which is a crucial aspect of our environment. Ayres (1972a) hypothesized that some children have difficulty with sensory integration, as evidenced by their struggle to engage in intentional behavior. Sensory integration dysfunction can hinder children's ability to learn new skills, organize their attention, participate in play or school activities, and have positive social interactions. Ayres and a multitude of scholars who have followed her, have utilized clinical and basic science research to demonstrate the validity of this theory.

SIT was first created to treat children with learning impairments who were previously identified with sensory integration dysfunction or sensory processing disorder. SIT is now a more frequently utilized occupational therapy facility for ASD children but it has also been investigated for a wide range of other conditions and populations, including developmental coordination disorder, institutionalized children, patients in nursing homes and people with dementia (Leong et al., 2015)

The primary element of SIT entails the carefully regulated delivery of sensory stimulation in order to elicit from the student what is known as an adaptive response. The adaptive response is considered to be a key sign of effective neuronal systems that process sensory information modification (Ayres, 1972b).

The foundations of the SIT are based on the following principles:

- Sensory Integration is considered to be a developmental process.
- Adaptive responses develop from successful organization and integration of sensory information.
- A sensory integration environment is created by the "just right challenge".
- Children naturally want to seek out meaningful experience's environment.
- Because of neuroplasticity, positive experiences alter the nervous system.
- The foundation for engaging in physical and social activities as well as routine daily tasks is sensory integration.

According to Ayres (1972a) Sensory integration is the term used to describe the neurological process of coordinating sensations within one's body and surroundings, which allows for optimal body use. Sensory integration, which involves the perception, modulation, and integration of sensory information, is used as a basis for engaging in activities across social, physical, educational, or daily living tasks.

Children with difficulties processing sensation are referred to as having sensory processing disorder (Miller et al. 2007). Miller and colleagues present a taxonomy of sensory processing disorders however, this terminology is not generally accepted as many therapists prefer to refer to children as having difficulty processing and integrating sensation.

Sensory modulation is the term for an excessive or insufficient reactivity to normal levels of sensation. Other terms, such as hyper- and hypo responsivity to sensation, sensory over- or under-responsivity and most recently, hyper- and hypo reactivity, have also been used (American Psychiatric Association 2013). The neurological process of sensory modulation involves identifying potential sensory stimuli and adjusting the nervous system's response to them.

Sensory discrimination is the process by which a person's nervous system learns about the specific properties and characteristics of sensations, including their temporal and spatial nature, and applies this knowledge to performing tasks.

Praxis, as defined by Ayres (1989), is the capacity to plan, coordinate, and execute a sequence of foreign, purposeful actions. According to Ayres (1972a), adaptive response is the ability to respond efficiently and productively to a task, sensory demand, or environmental demand.

The objective of this study is to investigate the impact of SIT in developing the emotional intelligence in ASD

children. This literature review attempts to present connections between sensory modulation disorder, a specific type of sensory processing disorder, and emotional intelligence through the scope of SIT and evaluate the effectiveness of this intervention in children with ASD.

## 2. Emotional Intelligence

Emotional intelligence (EI) was first introduced as a construct based on ability, much like general intelligence, in the 1990s. Over the past 30 years, two additional conceptually distinct types of EI have emerged, commonly referred to as "trait EI" and "mixed EI," along with numerous psychometric tools designed to measure these types (O'Connor et al., 2019).

The ability to accurately reason about emotions and the capacity to use emotions and emotional knowledge to improve thought are both components of emotional intelligence (EI) (Mayer et al., 2008). According to Salovey and Mayer (1990), emotional intelligence is a type of intelligence that "involves the ability to monitor one's own emotions and feelings and that of others, facilitates discrimination between them, and uses this information to control some situations or actions". It is the ability to recognize and effectively manage one's own emotions in relation to one's own goals (career, family, education, etc.).

When we possess emotional intelligence, it is possible to acknowledge and manage the emotions of others, as well as our own. After gaining insight into ourselves, we begin to comprehend other individuals and we develop a stronger aptitude for social interaction. With emotional intelligence, we can exhibit resilience, manage our emotions, thrive in challenging circumstances, feel hope, and have empathy.

Several theorists have different interpretations of emotional intelligence, and while some like Bar-On, Goleman or Petrides believed that it was purely non-cognitive, literature has shown that there are three distinct models of emotion. The ability model, the mixed model and trait model. According to the current models, emotional intelligence can be classified as either personal or social. Personal emotional competence includes self-recognition and control of emotions, as well as social competence including responsibility for one's own feelings (Kanesan; Fauzan, 2019).

The 9 layered model was introduced by Drigas & Papoutsi, (2018). This model portraited and included aspects from both EI model and Trait EI in a more hierarchical manner. The ability level encompasses management and self-awareness and the level of trait includes mood associated with emotions and the tendency to behave in a particular way in emotional states. The Gardner concepts of intrapersonal and interpersonal intelligences serve as another foundation for this EI pyramid.

### *2.1. Emotional Intelligence in children*

Emotional intelligence according to several theorists and researchers includes a various set of skills. These skills develop through different stages in child development. These includes the ability to self-regulate, to express language and being able to have general knowledge about emotions. All the above skills continue to develop in parity with other fundamental cognitive skills, like executive functions and metacognition.

When a child develops emotional intelligence through neuropsychological methods, their brains are morpho functionally prepared for adequate and thorough world knowledge and learning through a system of emotional attitudes in the process of awareness of real-world cognitive situations in conjunction with the development of higher mental functions.

According to Derevyanko (2016) who describes the age-specific characteristics of the development of the emotional sphere of the child's personality. Up to the age of 10, there is a relatively low level of arbitrary regulation of emotions, the capacity to manage emotions in a way that is socially acceptable develops gradually, under the influence of socio-cultural environment. At this age, emotion control primarily takes the following two forms, control of expression and psychological protection. Age-related characteristics of the emergence of the capacity for emotional connection range from birth to five years, while the emergence of the need for emotional connection occurs between 7 and 8 years of age.

Stoica & Roco (2012) studied the relationship between the emotional development and emotional intelligence in kindergarten children. The study included 80 children between the ages of 72 to 86 months (n = 40 male and n = 40 female) which belonged to all social categories. The children were split into two groups: the experimental group, which consisted of 40 kids, and the control group, which consisted of 40 children. The results showed that the environmental family atmosphere was essential to the development of the four categories that were measured (family atmosphere, expressing emotions, identifying emotions and empathy).

Other studies tried to correlate EI with different types of academic performance in children, showcasing that lower

levels in EI drives to lower performance in school engagement and success. More specifically the study of Angol et al. (2012) studied in Italian school-age children 8–11 years old (n = 352) the predictive value in their academic performance through cognitive ability and EI. The findings revealed that a positive correlation was observed between language performance, the ability to identify emotions, and trait EI in math. There was no apparent connection between recognition ability and trait EI.

EI can even affect motor performance and competence. Orangi et al. (2023) in a more recent study found correlations between EI and Motor competence. For the purpose of this study 540 children, teens, and young adults were categorized into three groups based on their emotional intelligence using the Schutte Self-Report Emotional Intelligence Scale. Motor Competence underwent testing with the BOTMP-2SF. The results of the study indicated that participants with higher EI performed better than those with average and low EI in all age groups in motor competence.

### *2.2. Emotional Intelligence and ASD*

According to the 9 layered model (Drigas; Papoutsi, 2018) the basis of the pyramid that leads to higher mental states of EI is emotional stimuli. This translates to several physiological states of the nervous system that enables us to homeostatically be able to perceive and process the necessary information to be able to interact with the needs of the environment and others. Phenomena like ANS activation without the presence of life-threatening situations in a daily frequency and inadequate ability to modulate the input can seriously affect the mechanisms of EI. Moreover, selective attention supports emotionally enhanced memory functions which allow for the connection of emotional stimuli to new memories and the recall of previous ones. Emotions stimulate the development of memory, with the amygdala and the inner temporal lobe's memory regions being particularly involved in this process.

All these processes which are the basis of being able to perceive, regulate and process stimulus are in the most of cases in ASD populations seriously altered. According to ANS activation there a lot of studies that investigating the correlation between them in ASD populations and found significant higher activation between ASD and typically developing peers (Spratt et al., 2012; Kushi et al., 2013, Hollocks et al., 2014, Van der Linden et al., 2022, Makris et al., 2022, Chiu et al., 2023).

In addition, the emotional intelligence skills of people with ASD are found to be lacking. These deficiencies are associated with challenges in comprehending, expressing, and regulating their emotions, as well as in comprehending the emotions and feelings of others and displaying empathy. Along with these issues, weak integration of social-emotional behaviors is also present, as well as challenges with social interaction and communication. Both children and adults with ASD have emotional intelligence deficits, including the crucial emotional intelligence skill of facial emotion recognition. ASD patients also have difficulties encoding social and emotional cues from facial stimuli. Although most studies have concentrated on face stimuli, surveys suggest that abnormalities in emotion processing may also be present in other kinds of visual stimuli, such as body movement (Papoutsi et al., 2018).

## 3. Sensory Modulation Disorder (SMD) and Emotional Intelligence in ASD

The complex process of perceiving sensory information and producing responses that are appropriately graded to, or congruent with the circumstance is referred to as sensory modulation. This term describes the capacity to control and plan responses to sensory input, block irrelevant stimuli, and focus on important stimuli while preserving an ideal level of arousal. This ability is an essential part of human functioning that has an impact on how effectively one interacts with their physical and social environment, their capacity to overcome obstacles in everyday life, and their overall quality of life.

In terms of behavior, abnormal external responses linked to SMD have typically been classified as either hyper- or over-responsive or hypo- or under-responsive in comparison to expected response intensity. Ayres made early observations that suggested children's sensory over-responsivity disruptions were manifestations of "fight-or-flight" reactions from the autonomic nervous system (ANS) to common, non-aversive stimulation, suggesting a link between physiological arousal and behavior.

The term "physiological arousal" simply refers to the continuum of alertness states that are reflected throughout the sleep-wake cycle. In a more refined way, it can be described as a quality that spans the autonomic, sensory, emotional, and motor domains. With the latter definition, arousal and sensory responsiveness concepts can be integrated in a multi-dimensional, non-linear way. SMD can be viewed as an essential aspect of the physiology of the stress response, providing a key dimension for connection to other categorical diagnostic entities previously considered separately. (Christensen et al., 2020).

Those with SMD frequently display excessively protective and avoidant behaviors, as well as inappropriate responses to benign sensory input. These behaviors are often not in line with the demands and expectations of the environment. Studies conducted on children with SMD have revealed that the presentation of sensory stimuli in a lab setting affects their sympathetic and parasympathetic nervous system from purely physiological aspects.

Individuals with SMD may exhibit a wide range of peculiar behaviors, including being overly sensitive to sensory stimuli and/or actively seeking sensation. The unpleasant, painful or irritating sensations experienced with harmless sensory stimuli may lead to defensive responses or withdrawal from certain daily activities and increased stress levels. Passivity, apathy, or lethargy are other ways that SMD can manifest itself. It can also manifest as delayed reactions to environmental stimuli of normal intensity. As a result, it is evident that SMD can adversely impact functional and developmental abilities which obstructs effective participation (Bar-Shalita et al., 2008; Schoen et al., 2009).

Neurophysiological changes translate biologically based states known as emotions into thoughts, feelings, and behavioral responses. Since emotions guide our behavior and thought processes, they are especially helpful when a quick response is needed to sudden and important situations. Emotions also help with interpersonal and intrapersonal relationships, situational management, and the capacity to deal with challenges in life. Emotional intelligence is the capacity to understand, assess, and regulate one's own emotions as well as those of others and of group members.

One of the fundamental manifestations of emotional intelligence has been identified as the capacity to voluntarily understand, control, regulate, and modulate emotional responses to meet situational demands. In order to be able to comprehend what is being presented to us emotionally we need to have emotional regulation as a primary agent. People with high EI can control and manage their emotions more skillfully in a variety of situations and settings. Studies demonstrate how Emotional regulation strategies shield people from unhealthy emotional coping mechanisms. The majority of hypotheses for the aforementioned findings are physiological (Zysberg; Raz, 2018).

SMD has been identified a lot in the bibliography among the ASD population and has been recognized as one of the main problems associated to sensory processing. More specifically the research of Schoen et al, (2009) tried to distinguish the sensory processing disorder in ASD population and compare it with the SMD population as two different categories. The research participants were 38 children with ASD (5-15 ages), 31 children with SMD difficulties (5-13) and 33 typically developing children (4-12 ages). The researchers in a lab environment studied and measured the arousal and reactivity of the subjects. The findings pointed that there were differences between the two clinical groups.

When presented with a laboratory paradigm of sensory challenges, children with ASD displayed lower baseline arousal and lower reactivity. The ASD and SMD clinical groups demonstrated significantly higher atypical sensory-related behaviors compared to typically developing kids, and they differed in three aspects: the former had more symptoms of taste and smell over-responsivity, the latter showed more sensory seeking behaviors, while the ASD group had greater displays of sensory underreaction in vestibular and proprioceptive behaviors.

Further findings added by the study of Fernandez-Andres, et al, (2015) who compared the sensory processing, social participation, and praxis in a group of 79 children aged 5 to 8 (M = 6.09), 65 males and 14 females, divided into two groups: the ASD Group (n = 41) and the Comparison Group (n = 38). Researchers assessed the children's sensory profiles using a sensory processing measure (SPM). Parents and teachers both provided information about the characteristics of their changes in the home and in the classroom, respectively. With the biggest differences found on the social participation and praxis variables, the ASD Group obtained scores that indicate higher levels of dysfunction on all the assessed measures in both environments. In the group of people with ASD, hearing and touch were the sensory modalities that were most impacted.

Others investigated the oral sensitivity and food selectivity to SMD. In the research by Chistol et al. (2018) children aged 3 to 11 with (n = 53) and without (n = 58) ASD were compared in terms of their oral sensory processing. Additionally, the researchers investigated food in children with ASD according to preferences, atypical oral sensory processing, and consumption of fruits and vegetables and how all relate to one another. They discovered that compared to children without ASD, more children with ASD displayed atypical sensory processing. Compared to children with typical oral sensory sensitivity, those with atypical oral sensory sensitivity among children with ASD rejected more foods and consumed fewer vegetables.

More recent research found correlations between the SMD and social difficulties. The research of Kojovic et al. (2019) studied the link between sensory difficulties and social and adaptive functioning in ASD children. In a group of preschoolers with ASD, the researchers examined the relationships between sensory processing abnormalities and social skill deficits, impaired social cognition, and general adaptive functioning. In this study, 36 peers with similar ages who were typically developing and 64 ASD children aged 3 to 6 were compared. For every child, measures of sensory processing, social challenges, and general adaptive functioning were gathered

from the parents. The results of the study showed greater sensory issues (related to SMD) in the group of ASD kids were linked to more pronounced social difficulties and poorer adaptive functioning.

Further findings regarding social participation added by the study of Loh et al. (2021) when they examined the sensory information processing and participation in childhood activities of ASD children (6 to 10 years old) compared with those who were age and gender matched typically developing children. Data from 93 parents of ASD children and 95 parents of typically developing children were gathered from hospitals, schools, and daycare facilities.

The measures used were Sensory Processing (SSP) and Participation of childhood-occupation (PICO). 74% (n = 72) of the participants in this study were men (4:1 male to female ratio) in the autism group. The results concluded that specific childhood participation restrictions were associated with sensory processing difficulties. Compared to other kids their age, ASD children participated less in terms of frequency, level, and enjoyment. Children with ASD experienced sensory-processing difficulties at a rate of 68.8%, which was significantly higher than the typical group (n = 95) at 21.5% (p 0.28).

In a more recent study emphasis was given in variability of symptoms. The objectives of Narzisi et al. (2022) were to compare the sensory processing of school-aged ASD children with typically developing (TD) peers and determine whether, in the ASD sample, cognitive ability and reported sensory symptoms account for the results of the Sensory Processing Measure (SPM-2) test.

The test was given to the parents of the two groups (n=105 ASD children and n=70 TD children) and the groups divided later to high and low functioning. The results showed that the SPM-2's overall score and subscales were higher for children with ASD. The hearing, social participation and balance and motion subscales of the SPM-2 showed a significant difference between high functioning and low functioning children within ASD, despite the fact that the total SPM-2 score did not differ between the two groups of kids. This research highlights that variety of sensory patterns are connected to either high or low cognitive functioning.

## 4. Effectiveness of Sensory Integration Therapy

Sensory integration Therapy is a very popular and highly criticized frame of reference that has its own theory, evaluation and intervention. As an intervention it has been used by specialists and therapists across the world (especially occupational therapists) for many years as a fundamental tool to improve several conditions related to sensory processing issues using a bottom-up strategy in order to support body functions (WHO, 2001) that are related with specific problems that disables the person to engage in meaningful activities that are essential in their lives.

The meta-analytic systematic review of Lang et al., (2012) investigated the use of SIT in ASD populations 25 studies were summarized in terms of participant characteristics, assessments used to determine sensory deficits or behavioral functions, dependent variables, intervention procedures, intervention outcomes, and confidence in the evidence.

From the 25 studies included 3 of the reviewed studies indicated that SIT was effective, 8 of the studies produced inconsistent findings, and 14 of the studies found no benefits associated with SIT. The study found that there were serious methodological flaws in a large number of the reviewed studies, including the three studies that reported positive results. The results showed that the evidence did not support the use of SIT in the instruction and care of kids with ASD.

The findings of the systematic review of Leong et al. (2015) investigating the effectiveness of SIT in individuals in single case studies design also yielded negative results about the method. More specifically results from 17 single case design studies on sensory integration therapy for people with developmental or learning disabilities, disorders, or delays underwent systematic analysis. According to a review of the study's methodology quality, the majority of them had weak designs and poor methodology, and higher-quality studies tended to have unfavorable findings. It also presented result that found SIT to be less effective than functional analysis-based interventions for challenging behavior, according to the limited comparative evidence.

Also, the systematic review of Novak & Honan (2019) found SIT to be inadequate to deliver positive results to many of the populations that was observed. The researchers of this study analyzed 129 articles that met the inclusion criteria and examined the effectiveness of a multitude of pediatric occupational therapy interventions in children with disabilities.

On the contrary there are many other researchers that disagreed with these assumptions and tried to justify the negative results as to many of these methods and interventions (that have been examined and included) to these studies of not being SIT and not following the fidelity criteria (several criteria that needs to be met in order the treatment to qualify as SIT in research and be differentiated from sensory-based protocols) (Parham et al., 2007,

2011; May-Benson et al., 2014).

In ASD population there are many studies showcasing the effectiveness of the method. More specifically the objectives of the pilot study of Pfeifer et al. (2011) were to establish a structure for randomized controlled trials, identify appropriate outcome indicators, and evaluate the effectiveness of sensory integration interventions for children with ASD. A total of 32 boys and 5 girls included in the study aged 6-12 and the participants were randomly putted in to two groups the SI group (n = 20) and the Fine motor one (n = 17). Both the pre and post-test evaluations analyzed social awareness, sensory processing, functional motor skills, and social-emotional components. According to the findings, both groups noticed significant enhancements in their Goal Attainment Scaling scores, with the SI group exhibiting more marked changes and a sharp decline in autistic traits.

In the systematic review by Schoen et al, (2019) with the purpose of evaluating the Ayres Sensory Integration (ASI) in ASD children the researchers reviewed the bibliography though 2006 and 2017. The selection made in three stages using the CEC standards of analysis. The results revealed that for ages 4-12 years old ASI was regarded as an evidence-based practice according to CEC standards.

Further findings supporting the SIT found in another study by Hemati Alamdarloo & Mradi (2020). The results showed that sensory integration interventions improved emotional–behavioral problems and its subscales. For the purpose of this research 30 children 6-11 years old were randomly selected and divided in two groups of 15. While the control group did not receive this intervention, the experimental group's children did receive a 14-session course on sensory integration. The Behavior Assessment System for Children-Second Edition was used to assess emotional-behavioral issues. ANCOVA and MANCOVA tests were employed to analyze the data.

Finally, a more recent study that showed effectiveness of ASI is the randomized control trial of Omairi et al. (2022) in order to investigate the effectiveness of Occupational Therapy using ASI. The participants of the study consisted by 17 children with ASD (5-8 years of age) and were divided into two groups the intervention (n=9) and the usual care (n = 8). The Pediatric Evaluation of Disability Inventory and individual goal ratings were used to assess self-care and socialization before and after treatment. Self-care ($p = .046$, rb = .57), social function ($p = .036$, rb = .61), and parent-identified goal attainment ($p < 0.001$, rb .94). Outcome measures were all significantly higher for participants in the intervention group.

## 5. Conclusion

The main purpose of this article was to investigate and find connections between sensory modulation and EI as well as to explore the effectiveness of the SIT through the scope of EI. The results of these study found that positive correlations can be found across the literature in the terms of sensory modulation and EI. More specifically Sensory modulation is an important ability and attribute we have as biological beings in order to being able to successfully regulate ourselves and perceive and process the stimuli we take from the environment as they really presented. EI as construct is a variety set of skills we possess that enables us to self-regulate, feel emotions, have empathy and reach in higher mental states the leads to success in life.

ASD presents a vast variety of symptoms but most of this population is lacking in most of these sets of skills and abilities. SIT is an all-around frame of reference (theory, evaluation, intervention) that one of the main parts of its intervention is to facilitate and ultimately learn the person to regulate and to reach the optimal level of arousal for being able to learn, engage, socialize, and be independent and successful in life. Therefore, SIT can be considered as a primary enabler for developing EI as the fundamental basis of EI (emotional stimuli) in children with ASD.

Moreover, in recent decades, significant social changes have been observed, which are related to the role of A.I. and technology in people's daily lives. The most important of them concern communication, diffusion and management information’s and in the ability to assimilate and utilize the produced new knowledge. We have to underline that the role of Digital Technologies in emotional education domain and Sensory Integration Training, as well as in all the aspects of everyday life, are very productive and successful, facilitate and improve the assessment, the intervention, decision making, the educational procedures and all the scientific and productive procedures via Mobiles (Stathopoulou et al., 2018, 2019; Kokkalia. et al., 2016; Drigas et al., 2015, 2020, 2022, 2022; Vlachou et al., 2017; Papoutsi et al., 2018, 2021; Alexopoulou et al., 2020, Stavridis et al., 2020), various ICTs applications (Drigas et al., 2005, 2010, 2013, 2014, 2017, 2018, 2019, 2020, 2021, 2022; Pappas & Drigas, 2015; Papoutsiet al., 2018, 2021; Kokkalia et al., 2016; Karyotaki et al., 2016, 2022; Bravou et al., 2022; Lytra et al., 2021), via AI Robotics & STEM (Drigas et al., 2005, 2014; Lytra et al., 2021; Pappas & Drigas, 2016; Mitsea et al., 2020; Chaidi et al., 2021), and games (Chaidiet al., 2021; Kokkalia et al., 2016; Drigas et al., 2021).

The New Technologies (NT) and more specifically Digital Technologies provide the tools for access, the analysis and transfer of information and for its management and utilization new knowledge. Information and Communication Technologies (ICT), unprecedented technological capabilities of man, have a catalytic effect,

create the new social reality and shape the Information Society (Pappas & Drigas 2015; Bakola et al., 2020, 2022; Drigas & Politi-Georgousi, 2019; Karyotaki et al., 2022). Moreover, games and gamification techniques and practices within general and special education improves the emotional educational procedures and environment, making them more friendly and enjoyable (Drigas et al., 2014; Kokkalia et al., 2016; Doulou et al., 2022; Chaidi et al., 2021; Kefalis et al., 2020; Papoutsi et al., 2018).

Concluding, it's necessary to refer that the combination of ICTs with theories and models of metacognition, mindfulness, meditation and emotional intelligence cultivation accelerates and improves more over the educational, productive, and decision- making practices and results (Drigas & Karyotaki, 2014; Drigas et al., 2017; Drigas & Papoutsi, 2018; Drigas & Karyotaki 2019; Drigas et al., 2020, 2021, 2022; Kokkaliaet al.,, 2016; Pappas & Drigas , 2015; Papoutsi et al., 2018, 2021; Karyotaki & Drigas, 2016; Karyotaki et al., 2022; Chaidi et al., 2020, 2021; Chaidi & Drigas, 2022; Mitsea et al., , 2020, 2022; Kapsi et al., 2020; Galitskaya et al., 2021; Bakola & Drigas., 2020; Bakola et al., 2022; Bamicha et al., 2022).

## 6. Authors' Contributions

*Pantelis Pergantis*: study design, research, writing, scientific reading, submission and publication. *Athanasios Drigas*: scientific writing, textual review, contextualization and final writing.

## 7. Conflicts of Interest

No conflicts of interest.

## 8. Ethics Approval

Not applicable.

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