A longitudinal study on the relationship between socio-communicative skills and narrative competence in school-age autistic children

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*A chi ogni giorno si impegna
nel costruire un mondo più equo e inclusivo.
Per rendere più accessibili i sogni,
tanto quanto la realtà.
Affinché un giorno tutti sappiano riconoscere,
che nella diversità di ciascuno
sta il dovere di difendere
pari diritti e pari opportunità.*

Summary

Abstract

The thesis, presented as a collection of three studies, explores the relationship between socio-communicative skills and narrative abilities in autistic school-aged children. Autism Spectrum Disorders are neurodevelopmental conditions characterized by an impairment of social communication, accompanied by restricted and repetitive behaviors and interests. The growing evidence regarding the prevalence of this diagnosis and its impact on individuals' quality of life underscores the urgent need to investigate the phenotypic characteristics of the disorder. The ability of autistic individuals to form meaningful social relationships with their peers is often hindered by difficulties in social communication. This deficit can impact the development of language and expressive skills in autistic children from an early age.

School-aged children with social communication impairments produce less complex and coherent stories than their neurotypical peers. However, narrative competence is a crucial aspect of identity development and impacts the ability to form relationships with others through storytelling. Consequently, this research project seeks to examine the relationship between various dimensions of social competence and the narrative abilities exhibited by autistic children in a storytelling task. The study aims to explore the evolution of narrative performance over time and identify potential predictors for developing narrative skills.

The participants are autistic children and adolescents involved in psycho-educational projects conducted in small groups at the Mafalda Luce Center for Autism and Developmental Age, in Milan. The longitudinal study involved children, parents, and educators (reference professionals of each psychoeducational project) for two years of rehabilitation, from October 2022 to May 2024. At the beginning and end of each rehabilitation year, an assessment battery was administered to monitor the evolution of social skills and narrative abilities. Children's narrative performance was assessed through the Narrative Competence Task, which aimed to evaluate the production of a story supported by pictures. At the same time, parents and educators filled out two questionnaires to profile the children's social skills: Autism Spectrum Disorders Behavior Inventory and Stanford Social Dimensions Scale.

The results confirmed the significant correlation between different dimensional aspects of social skills and the ability to tell a story. In particular, autistic children with higher social skills showed better narrative performance. In addition, the stories supported by images have been significantly enriched during a year of rehabilitation. This result was achieved regardless of the child's level of functioning, with a positive evolution in narrative performance for both high and low-functioning children.

Finally, mastering social communication and reducing the behaviors linked to rituals and stereotypes are significant predictors of creating more complex and coherent stories.

The study confirms the close correlation between social skills and narrative performance. The results suggest that the clinical approach should be oriented towards strengthening the social dimensions predictive of a possible improvement in narrative skills. In particular, the development trajectories that emerged validate the choice to include verbal autistic children with different levels of functioning in treatments aimed at developing socio-communicative skills. Future studies should focus on verifying effective intervention models to enhance the development of narrative skills.

KEYWORDS: Autism, Socio-communication, Narrative, Longitudinal Study, Children.

Riassunto

La tesi, presentata come una raccolta di tre studi, ha lo scopo di indagare la relazione tra competenze sociocomunicative e abilità narrative in bambini autistici di età scolare.

I Disturbi dello Spettro Autistico (ASD) sono un insieme di condizioni neuroevolutive caratterizzate da difficoltà nella comunicazione sociale accompagnate da attività ed interessi ristretti e ripetitivi. I dati crescenti rispetto alla prevalenza della diagnosi e il suo impatto sulla qualità di vita evidenziano l'urgenza di indagare le caratteristiche fenotipiche di tale disturbo. Infatti, la possibilità di persone autistiche di instaurare soddisfacenti relazioni sociali con i pari è compromessa dalle loro difficoltà sociocomunicative. Tale deficit si riflette sul potenziale sviluppo delle capacità linguistiche ed espressive del bambino autistico dai primi anni di vita.

In età scolare la compromissione della comunicazione sociale si riscontra nella produzione di racconti meno complessi e coerenti rispetto ai pari neurotipici. Tuttavia, la competenza narrativa è un elemento fondamentale per lo sviluppo identitario e ha ricadute sulla possibilità di instaurare una relazione con l'altro a partire dalla capacità di raccontare. Pertanto, questo progetto di ricerca si propone di analizzare la relazione tra le diverse dimensioni del costrutto di competenza sociale e le capacità narrative dimostrate dal bambino autistico in un compito di storytelling. Lo studio è finalizzato a indagare l'evoluzione delle performance narrative nel tempo e individuare i possibili predittori dello sviluppo delle competenze narrative.

I partecipanti sono bambini autistici di età scolare inseriti in progetti psicoeducativi realizzati in piccolo gruppo presso il Centro Mafalda Luce per l'Autismo e l'Età Evolutiva, a Milano. Lo studio longitudinale ha coinvolto bambini, genitori e educatori (professionisti di riferimento dei progetti psicoeducativi) per due anni riabilitativi. È stata somministrata all'inizio e al termine di ogni anno riabilitativo la batteria di valutazioni finalizzata a monitorare l'evoluzione delle competenze sociali e delle capacità narrative. Le performance narrative dei bambini sono state valutate attraverso il Narrative Competence Task con la somministrazione di un compito di storytelling supportato da immagini. Parallelamente, genitori e educatori hanno compilato i questionari finalizzati a individuare le competenze sociali dei bambini: ASD Behavior Inventory e Stanford Social Dimensions Scale.

I risultati hanno confermato la significativa correlazione tra diversi aspetti dimensionali delle competenze sociali e la capacità di raccontare una storia. In particolare, i bambini autistici con maggiori competenze sociali hanno dimostrato migliori performance narrative. Inoltre, i racconti supportati da immagini si sono arricchiti significativamente nel corso di un anno riabilitativo. Tale risultato è stato raggiunto indipendentemente dal livello di funzionamento dei bambini, con

un'evoluzione positiva della performance narrativa sia per bambini con alto che con basso funzionamento. Infine, sono emersi come significativi predittori del racconto di storie più complesse e coerenti una maggior padronanza della componente di comunicazione sociale e la riduzione delle manifestazioni comportamentali associate all'attuazione di rituali e stereotipie.

Lo studio conferma la stretta correlazione tra competenze sociali e performance narrative. I risultati suggeriscono di orientare l'approccio clinico verso il rinforzo delle dimensioni sociali predittive di un possibile miglioramento nelle capacità narrative. In particolare, le traiettorie di sviluppo emerse convalidano la scelta di includere bambini autistici verbali con diversi livelli di funzionamento in trattamenti mirati allo sviluppo delle competenze sociocomunicative. Studi futuri dovrebbero focalizzarsi sulla verifica di modelli di intervento efficaci nel favorire lo sviluppo delle competenze narrative.

PAROLE CHIAVE: Autismo, Socio comunicazione, Narrazione, Studio Longitudinale, Bambini.

FIRST CHAPTER

1. Research Project Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by persistent difficulties in communication and social interaction, accompanied by repetitive, stereotyped behaviors and restricted interests (American Psychiatric Association, 2013). The increasing cultural, scientific, and media interest emphasizes the importance of dealing with the issue. The diagnostic criteria indicate that difficulties in social interactions can hinder autistic individuals from forming satisfying social relationships with peers. Therefore, studying the autistic phenotype and developing evidence-based clinical interventions for autistic children and adolescents is essential for enhancing their quality of life.

Among the various treatment options suggested, small-group therapy has been widely utilized in clinical practice to improve the social skills of children and adolescents on the Autism Spectrum (Olsson et al., 2016). Social skills refer to a child's ability to effectively utilize social competencies to achieve interpersonal goals, establish positive relationships, and adopt appropriate behaviors by integrating them into different social contexts (Rose-Krasnor, 1997). Several studies have shown promising evidence indicating improved social skills in autistic children who participate in small therapy groups, according to reports from their parents (Kylliäinen et al., 2020). However, due to the varied functioning profiles of autistic children (Vivanti & Messinger, 2021), the literature review suggests that to ensure the intervention's effectiveness, clinicians should follow standardized criteria when forming small therapy groups (Chang & Locke, 2016). Based on the literature, treatment group participants are usually selected considering age, intellectual level, and functioning identified by clinicians.

The primary focus of small therapy groups for autistic children is to improve and enhance their social skills. Therefore, identifying groups of children with similar competencies would help establish common goals for intervention. The experimental design involves a longitudinal study to analyze socio-communicative and narrative skills and their relationship and evolution over time. Indeed, a better understanding of these aspects could help identify better criteria, rather than age and intellectual functioning, to select the children to be included in the different therapy groups.

1.1 Methods

The study used direct evaluation methods and indirect questionnaires administered to caregivers to analyze the evolution of social and narrative skills. In particular, a multi-informant approach was adopted; in fact, the questionnaires were filled out by parents and educators (reference professionals of each psychoeducational project) to assess behavior contextual variations and collect different views.

Indirect Evaluation

Caregivers administered a battery of questionnaires to monitor the development of socio-communicative and adaptive skills:

1. Stanford Social Dimensions Scale (SSDS) (Phillips et al., 2019)
2. Autism Spectrum Disorders Behavior Inventory (ASDBI) (Cohen & Sudhalter, 2014)

Direct Evaluation

Simultaneously, a series of tests were conducted to monitor any changes in the child's functioning across narrative skills and fluid intelligence:

1. Narrative Competence Task (NCT) (Zanchi & Zampini, 2021)
2. Raven Matrices (CPM) (Raven, 2003)

This battery of tests was administered in three phases:

T1.   To assess children's social skills in existing therapeutic groups at the start of the rehabilitation process, October 2022.

T2.   To track the progress of the child's functioning after nine months, at the end of the rehabilitation year, July 2023.

T3.   To evaluate the progress of rehabilitation treatment in small groups after ten months, at the end of the rehabilitation year, May 2024.

The research project was conducted at the Mafalda Luce Center for Autism and the Developmental Age in Milan, an offer unit managed by the Renato Piatti Onlus Foundation. One of the methodologies proposed by the Semi-Residential Therapeutic Center is working in small groups as an intervention approach for children with a diagnosis of Autism Spectrum Disorders.

The research project, approved by the clinical leaders, was introduced to the team of healthcare professionals during team meetings. The educators responsible for the children involved in the small group therapy project were directly engaged in the study, and the objectives and methods were

explained. In addition, the reference educators involved parents by sharing the objectives and methods of the research. The tests involving autistic children were conducted during group therapy hours. The multidisciplinary team regularly received updates on the research project's results and progress. At the end of the evaluation process, the results of the questionnaires from educators and parents were stored in medical records to help the clinical team identify the child's personalized rehabilitation objectives.

The sample for the research project (*Table 1*) consists of all children diagnosed with ASD who participated in small group therapy projects at the Mafalda Luce Center for Autism and the Developmental Age in Milan.

Table 1: Sample from the Longitudinal Study in the three-phase of data collection

	Sex			*Age*			*Non-Verbal IQ*		
	N	*F*	*M*	*M*	*DS*	*Range*	*M*	*DS*	*Range*
T1	49	12	37	9.81	2.22	7.00-15.40	90.08	28.50	22-155
T2	62	15	47	9.90	2.40	6.50-16.20	91.20	24.60	29-155
T3	50	9	41	10.50	2.28	7.30-17.00	93.50	24.60	29-155

2. Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by deficits in social communication and interaction, as well as restricted and repetitive behaviour patterns or interests. These characteristics can vary in severity among individuals along a continuum. (Lai, Lombardo, & Baron-Cohen, 2014).

The autistic individual displays unusual behaviors in social interaction, communication, and flexibility of thinking. This fundamental pattern of behaviour can vary between individuals regarding the severity of symptoms and the specific ways these symptoms are expressed (Vivanti & Messinger, 2021). Autism is considered a disability that accompanies individuals throughout their lives. While the condition's impact on social functioning may vary, the neurodevelopmental disorder has a lasting functional impact. As a result, the individual's functioning and adaptation may vary at different stages of life due to changes in the severity of the condition (Lord et al., 2015).

2.1 Diagnosis

Over time, a specific category of mental health conditions has been identified and defined by the American Psychiatric Association (APA) in the Diagnostic and Statistical Manual of Mental

Disorders (DSM). The current fifth edition (DSM-5) outlines two main diagnostic criteria for these neurodevelopmental disorders:

A. The socio-communication impairment includes deficits in three main areas:
- o Social-emotional reciprocity. This ranges from an atypical social approach and difficulty initiating or responding to social interaction to reduced sharing of interest, emotions, or affect.
- o Nonverbal communicative behaviors. This ranges from poorly integrated verbal and nonverbal communication or abnormalities in eye contact, body language, and gestures to a total lack of facial expressions and nonverbal communication.
- o Developing, maintaining, and understanding relationships. This includes difficulties adjusting behaviour to suit different social contexts, struggling to share imaginative play or make friends, and a lack of interest in peers.

B. The severity of the disorders is specified based on social communication impairments and restricted repetitive patterns of behavior, as manifested by at least two of the following:
- o Stereotyped or repetitive motor movements, use of objects or speech;
- o Insistence on sameness, inflexible adherence to routines, ritualized patterns, or verbal nonverbal behavior;
- o Highly restricted, fixated interests that are abnormal in intensity or focus;
- o Hyper or hypo reactivity to sensory input or unusual interest in sensory aspects of the environment.

C. Symptoms must be present in the early developmental period but may not fully manifest until social demands exceed limited capacities.

D. Symptoms cause clinically significant impairment in social, occupational, or other areas of functioning.

E. These deficits are not better explained by intellectual disability or global developmental delay.

All criteria must be met for the diagnosis to be made. In diagnosis, the severity of symptoms (request for care / substantial assistance / very substantial assistance) must be indicated. Other clinical features should be shown: with or without accompanying intellectual impairment; with or without accompanying language impairment; associated with another neurodevelopmental, mental, or behavioral disorder; associated with a known medical or genetic condition or environmental factor.

As reported in the DSM-5, the diagnosis of Autism Spectrum Disorders refers to a Spectrum of symptomatology that allows the recognition of different levels of severity based on the functioning profile of the individual. This refers to a dimension-based diagnostic method whereby the symptoms of the diagnosis are located along a continuum of severity.

2.2 Epidemiology

In line with previous literature, recent studies have reported an increased measured prevalence over time. The progress achieved in raising autism awareness worldwide has allowed for the attainment of more objective indicators of the impact of autism, including estimates of cases. In response to the need for an updated global esteem of ASD prevalence, the Zeidan et al. review (2022) revealed a worldwide median prevalence of 65/10,000 instead of 62/10,000 in the previous review: the median male-to-female ratio was 4.2; the median percentage of autism cases with co-occurring intellectual disability was 33.0% (Zeidan et al., 2022). Their findings showed an increase in autism prevalence globally, reflecting the combined effects of multiple factors. Factors known to account for the rise in prevalence include the increase in community awareness and public health and the progress in case identification and definition.

In Italy, according to data from the National Observatory for the Monitoring of Autism Spectrum Disorders, 1 in 77 children has Autism Spectrum Disorder, with a higher prevalence in males, who are affected 4.4 times more than females (Scattoni et al., 2023).

The numbers highlight the necessity for health, educational, and social policies to enhance services and streamline resources to assist families. The interventions advanced by the Istituto Superiore di Sanità aim to provide health protection, enhance living conditions, and promote inclusion in the social lives of individuals on the Autism Spectrum (Istituto Superiore di Sanità, 2015).

2.3 Etiology

Autism Spectrum Disorder is considered a behavioral syndrome: the clinical diagnosis is made if deficits are observed in the two symptomatic domains described by DSM-5 (Association American Psychiatric, 2013). The scientific literature has highlighted heterogeneity and complexity in genetic etiology, failing to identify one or more responsible and specific biomarkers (Rastegari et al., 2023). Numerous studies in recent years (Bölte et al., 2019; Taylor et al., 2020) have also focused on environmental factors: the environment gene interaction (with particular attention to critical periods of neurodevelopment) and the study of the brain (primarily through neuroimaging techniques, both structural and functional) (Hodges et al., 2020). However, recognizing a common etiological basis valid for all individuals with this neurodevelopmental disorder has not yet been possible (Warrier et al., 2022).

Today, we have only hypotheses on the disorder's origin, which leads to considering plausible an extreme heterogeneity of causes. This could partly explain the wide phenotypic variability resulting

from the interaction between genes and the environment and between multiple genes within an individual's genome (Tordjman et al., 2014). It is, therefore, a common opinion that there is no single cause: many environmental factors are more likely to be involved, interacting with different genetic factors and early social experiences that would otherwise not or less affect the individual's development (Strathearn et al., 2023).

2.4 Social Skills

Difficulties in social functioning, such as the ability to engage, coordinate, and maintain activities and reciprocal relationships with others, are critical characteristics of Autism Spectrum Disorder (Bottema-Beutel et al., 2019). When it comes to impairment in social interaction, the typical traits of the disorder develop as the individual grows (Vannucchi et al., 2014).

The features of the disorder concerning its clinical expression in childhood highlight the presence of early signs manifesting from the child's first year (Hodges et al., 2020). Neurotypical children tend to direct their attention preferentially toward social stimuli, such as people, faces, and body movements (Gliga & Csibra, 2007). However, autistic individuals seem to have a compromised attentional bias towards the social world (Chita-Tegmark, 2016). The impairment of social interaction arises from a deficit in the primary communication channel during this developmental phase: the reciprocal gaze. This can occasionally be evoked, but rarely and not initiated spontaneously (Murias et al., 2018). In addition, there are difficulties with body postures, which indicate a disturbance in tonal organization and a lack of tolerance for physical contact (Gundogdu et al., 2023). Furthermore, early communicative signals such as crying are morphologically and structurally altered, serving as preadaptive functions for social interaction (Esposito & Venuti, 2009). There are also anomalies in facial expressions, both quantitatively, showing poor mimicry and absence of a smile, and qualitatively, with expressions that do not align with the context (Liu et al., 2023).

By the end of the first year, children should start developing secondary intersubjectivity (Trevarthen & Hubley, 1978), which involves the ability to manifest and share goals, desires, experiences, and interests with another person. This ability is known as joint attention and encompasses behaviors that enable two individuals (in this case, a child and an adult) to communicate about a third element in the context (object or event) or to focus attention on something together using looks, gestures, sounds, or words (Carpenter & Call, 2013). This competence appears to be a predictor of the social and linguistic development of autistic children (Bottema-Beutel et al., 2019). Several studies suggest that joint attention begins with the ability to spontaneously share an experience or direct the attention of a partner using gaze, gestures, or vocalizations (Mundy, 2018). The ability to respond to requests for joint attention, such as following someone's look, gesture, or verbal request to pay attention to

something, is closely linked to social functioning (Mundy et al., 2009). In children with ASD, the deficit in sharing attention has a profound social impact, compromising the ability to maintain focus in social situations, especially on the speaking subject and facial mimicry (Yoshimura et al., 2015).

The communication and social interaction impairment advances as the disorder develops, leading to increasingly explicit behavioral manifestations (Szatmari et al., 2015). In preschool, usually, the autistic child primarily uses others to fulfill their needs. While the child may engage in interpersonal relationships, these interactions usually revolve around making requests rather than sharing (Mundy P., 2018). The child's disinterest and inability to form age-appropriate relationships are evident within and outside the family environment. During this stage of development, some explicit behaviors include not responding to one's name (Wang et al., 2021), isolating oneself, not seeking participation from others in activities, and having difficulty developing cooperative communication patterns (Coussens et al., 2020). Even when the person seeks contact with others, their behaviour may be atypical, with attitudes that violate social norms (Morrison et al., 2020).

As individuals grow, the most severe cases may exhibit anomalies in behaviors that regulate social interaction. This can be characterized by reduced or absent use of gaze and gestures for communication and a lack of spontaneous sharing of experiences and thoughts (Hodges et al., 2020). Furthermore, there is an increasing absence of social and emotional reciprocity, which refers to the tendency to react, positively or negatively, to the actions of another person towards oneself (Surian, 2021). In many cases, interpersonal relationships are present but limited to asking for something rather than sharing thoughts and emotions. This highlights the challenges in the social relationship of autism, as building a sense of connection with others relies on sharing and exchanging social information (Milton, 2012). When it is challenging to coordinate attention with those around you, the ability to share experiences with others loses its importance and uniqueness (Mundy, 2018).

During adolescence, the expression of the disorder's symptoms varies depending on their severity: those with severe impairment tend to withdraw from relationships and passively conform to their surroundings; on the other hand, individuals with milder traits may show an unusual and strong interest in social interactions associated with increased risk of adverse health and social outcomes (Ly et al., 2023).

2.5 Communicative Skills

Communication involves verbal, intentional, and reciprocal behavior. In autistic individuals, the communication deficit affects both the receptive and expressive sides: the child fails to understand what others want to say and, at the same time, often fails to be understood by those around him (Muès

et al., 2024). In neuroatypical individuals, there is often difficulty in using appropriate communication codes that impact language reciprocity (Lacroix et al., 2016). The codes mentioned encompass not just spoken language but also the postural and kinetic aspects of communication (such as posture, gaze, facial expressions, and gestures) and non-verbal elements of language (like intonation, rhythm, and pauses). These codes often carry significant communicative meaning, sometimes more than the words used in sentences. It is important to note that other forms of non-verbal communication cannot compensate for the verbal deficit. The peculiarity of communicative fatigue in Autism Spectrum Disorder is that intention and reciprocity may appear lacking (Kjelgaard & Tager-Flusberg, 2001).

Although delays or deficits in language are not explicitly included in the diagnostic criteria, they appear to be one of the initial reasons for a diagnosis (Richards et al., 2016). They are an essential warning signal in identifying and subsequently diagnosing this disorder. Regarding communication impairment in preschool-aged children, the deficit of language acquisition presents a clear symptom of atypical development to the parents (Tager-Flusberg et al., 2009). Parents of autistic children often report that they first noticed either a lack of language or a halt in its development in the second year of life, after it had already started to emerge (Ozonoff et al., 2008). While only 25% of individuals with this disorder struggle to acquire verbal language, numerous studies have demonstrated that language difficulties are present to some extent in all autistic people (Eigsti et al., 2011). In many cases, autistic individuals may have language access, but it is often of poor quality (Pickles et al., 2014).

Previous studies analyzing communication skills have concluded that autistic children have difficulties in all areas of language (Kissine et al., 2023). This includes pragmatics (concrete and social use), prosody (rhythm and intonation of speech), syntax (combination of words to form sentences), morphology (morphemic development and understanding), semantics (meaning of words), and phonology (sound organization of a language). Some argue that these language and voice anomalies reflect the fact that autistic individuals pay little attention to what others say and how things are said and, on the other hand, do not worry about adapting to the social environment that surrounds them (Surian, 2021).

During school age, the level of communication and social interaction deficit differ significantly from person to person, depending on the severity of the disorder. In the most severe cases, there is a lack of interest in forming relationships and focusing on one's activities, often accompanied by the absence of verbal language. In milder cases, a child may be able to form interpersonal connections by showing openness in relationships. However, even in high-functioning individuals, language impairment is visible, particularly in non-verbal communication and pragmatics (Lacroix et al., 2016). It is also

possible to identify specific linguistic characteristics in autistic children, including repetitive, stereotyped, atypical, and idiosyncratic language (Shriberg et al., 2001).

3. Treatment

The main goal of treatments for autistic children is to reduce the severity of autistic symptoms. This includes improving social interaction and communication, reducing restricted or repetitive behaviors, and addressing associated conditions. Initially, intervention focuses on basic social skills and performance, such as making eye contact when asking another child questions (Hyman et al., 2020). As the intervention progresses, the goals become more advanced, aiming to increase social adaptation. All activities are planned to promote progress and achieve specific social competency objectives. The intervention's objectives are tailored to develop different social skills based on each child's functioning profile.

The main goals of an intervention program are to enhance functional independence by helping individuals learn and develop adaptive skills and reduce or eliminate problem behaviors that may damage functional skills. As previously mentioned, treatments should be intensive and individualized. Quantitative assessments should be incorporated to track, evaluate, and adjust the intervention (Vivanti & Messinger, 2021).

According to a review by Magiati and colleagues (2014), individuals with severe autism symptoms can maintain consistent language and cognitive skills deficits while showing improvements in adaptive functioning and socialization through specialized treatments starting in early childhood. Personalized treatments for Autism Spectrum Disorders must focus on social engagement, interests, and reciprocity in early childhood, emphasizing autonomy and communication skills. Parent training can be included in the rehabilitation project to promote skills development and learning generalization (Istituto Superiore di Sanità, 2015). During adolescence, interventions target sensory and social interactions to address developmental and puberty-related imbalances (Brosnan et al., 2014).

3.1 Small-group psychoeducational treatment

Psychoeducational group interventions are commonly used to improve the social skills of autistic school-age individuals. Interventions for autistic youth differ significantly in their content, format, structure, and therapeutic goals. Social skills group training programs often focus on verbal autistic children and adolescents. These programs typically involve small groups of 4 to 8 participants. They are led by health professionals that provide training on cognitive and behavioural strategies to address the social, communication, and other behavioural needs of autistic youth (Ke et al., 2018). The interventions usually begin with clearly defining and explaining individuals' social rules to adapt

effectively to the context (McMahon et al., 2013). Exploration of these experiences revealed high satisfaction levels with the program and improvements in participants' social communication and interaction skills, self-confidence, and independence in everyday life (Choque et al., 2016).

In a rehabilitation project focused on learning social skills, one main goal is establishing and maintaining friendly relationships. This is crucial for evaluating the quality of life of autistic individuals. Research indicates that autistic people typically have a smaller network of friends compared to their typically developing peers. Furthermore, these friendships may be characterized by mutual insecurity and a lower level of help and support in times of need (Sterrett et al., 2017). Autistic children may struggle to engage socially and are at a higher risk of being excluded due to their difficulties understanding and forming mutual friendships (Bauminger & Kasari, 2000), so building friendships is often an important goal for children and families. In fact, it has been observed that peer relationships can significantly contribute to the social and cognitive development of autistic individuals. This improvement can lead to better school performance, reduced bullying and victimization, and expanded prosocial behaviors (Rodda & Estes, 2018).

According to the "Double Empathy Problem" theory (Milton, 2012), it is essential to create interventions to improve mutual understanding and communication between autistic individuals and their neurotypical peers. This can help promote more interactions and friendships. Additionally, providing inclusive therapy space in specialized settings, such as therapy groups with individuals of similar functioning, is crucial. This can be a safe space (Crompton et al., 2020) where autistic children can be encouraged to use and learn strategies needed for reinforcing social skills, which are helpful in everyday peer relationships (Gates et al., 2017). These psychoeducational group interventions focused on reinforcing social skills should enhance: social communication, social motivation, inclusion, and peer group response. By doing so, they foster the possibility of better mutual understanding in favor of the opportunity to make friends with peers (Rodda & Estes, 2018). In this regard, it is essential to gather information about what occurs outside of therapy sessions and to possibly encourage any spontaneous interactions that can be observed without the involvement of an adult. This information, gathered during the treatment process, is helpful to identify the social skills profile of the subject (Gates et al., 2017).

In order to improve the quality of life for autistic people, it is essential to validate rehabilitation projects that focus on developing their social skills. In 2017, Gates and colleagues demonstrated how group interventions effectively enhance the social and cognitive abilities of autistic individuals, addressing a range of objectives. Firstly, through age-appropriate psychoeducation treatments, neuroatypical children and adolescents can improve their social skills starting from the shared

exercise of basic competencies. In various social settings, social performance can be enhanced through group sessions aimed at helping participants adjust their behaviour to different social situations. Since social skills reflect behaviours valued in a culture, role-playing and social stories can assist autistic children in navigating social situations and effectively performing interpersonal tasks (Henning et al., 2024).

Regarding social adaptation, supporting individuals in meeting social expectations related to their roles can be achieved by working directly on their self-esteem and self-awareness. This can be reached by creating social scenarios where participants learn to recognize and manage their emotions and anxiety during social interactions (Kylliäinen et al., 2020).

Therefore, one of the primary objectives of psychoeducational group therapy is to improve social skills and achieve social adjustment. This involves close cooperation between health professionals, parents, and teachers who should collaborate to set individual goals and apply small accomplishments to the child's everyday life (Jonsson et al., 2016).

4. Presentation of the studies reported in the doctoral thesis

The doctoral thesis is presented as a collection of three studies that explore the relationship between socio-communicative skills and narrative abilities in school-aged children with autism. The data for these studies were collected during the research project outlined at the beginning of this chapter.

The first study reported in the *second chapter* is a cross-sectional study based on the data collected at Time Point 1 in October 2022. The study considers several factors, including social skills evaluated by educators, narrative competencies, and IQ. Its aim is to explore the relationship between narrative performance and the social skills profiles of children participating in small-group treatment. The guiding hypothesis is that autistic children with more developed social skills can produce more complex and elaborate narratives than those with lower social skills.

The second study, *chapter three*, is a longitudinal study based on the data collected at T2 in July 2023 and T3 in May 2024, taking narrative competence into account. This study aims to analyze the evolution of narrative performance in a group of autistic children involved in the small group therapy intervention focused on developing social skills. The hypothesis is that an improvement in narrative skills at the micro- and macro-linguistic levels would be noted in both high and low-functioning children after a rehabilitative year.

The third study, detailed in the *fourth chapter*, is a longitudinal study relying on data collected at two points: T1 and T3. At T1, age, gender, IQ, and social skills based on evaluations by parents and

educators were assessed. At T3, narrative performance was evaluated. The aim is to examine early factors that can explain individual variability in children's narrative competence. The guiding hypothesis of this study is that well-developed social skills and increased age can predict the ability to create more complex and elaborate narratives. Furthermore, the hypothesis suggests that autistic girls are more likely to use internal state words compared to boys.

SECOND CHAPTER

1. Relationship between socio-communicative competencies and narrative skills in autistic children

1.1 Background

Deficits in social communication and interaction are one of the two main diagnostic symptoms of Autism Spectrum Disorders (ASD), as presented in the DSM-5 (Association of American Psychiatric, 2013). The term social competence refers to the ability of the child to effectively use social skills to achieve interpersonal goals, establish positive relationships, and adopt appropriate behaviours by integrating them into different social contexts (Golson et al., 2022; Rose-Krasnor, 1997). Socio-communicative competencies need the use and integration of nonverbal and verbal skills, including receptive and expressive language, for social interaction (Mitchell, et al., 2006). Diagnostic criteria show how difficulties in social interactions can compromise effective communication: autistic children may have difficulties in making and maintaining friends, can be subjected to bullying and peer exclusion (Schroeder et al., 2014), and have an increased risk for depression and social anxiety (Gotham et al., 2015).

A key element for successful communication is the development of narrative skills (Kenan et al., 2019). Narrative competence refers to the ability to understand and produce stories. The communicative exchanges present in the narrative are a tool to organize and share meaningful experiences with others, imposing a temporal and causal order to events (Bruner, 2004). To this end, pragmatic competence is essential and defines how the social context influences the linguistic modality adopted (Kimhi, 2014). On a pragmatic level, narrative competence requires introducing a story, providing the correct contextual and referential information, monitoring the understanding, and maintaining the involvement and interest of the listener (Losh & Capps, 2003). Practical language skills that use social context to facilitate effective communication are important for storytelling. Given this important pragmatic dimension to storytelling, it is unsurprising that narrative competence is closely related to social ability (Buck et al., 2014; Volden, et al., 2017).

It is therefore deduced how autistic individuals, due to communicative, social, and pragmatic deficits, can frequently have difficulties in producing a narrative that follows the principles of clarity, sequentiality, and causality that allow inserting in the story the intentions, objectives, emotions and mental states of the characters involved (Mar, 2004). Consequently, investigating the narrative competence of autistic children can lead to implementing and disseminating tools and interventions

that may produce significant improvements in different areas by focusing on the specific difficulties experienced by these children (Siller et al., 2014).

1.2 Aims

Given the close relationship between narrative competence and social skills, the present study aims to investigate these two aspects in autistic children involved in psychoeducational rehabilitation treatment focused on developing social skills.

First, the research aims to investigate the correlation between two questionnaires used in the clinical field to assess the social skills profile of children with ASD. In particular, this study wants to verify the construct validity of an innovative tool, such as the Stanford Social Dimension Scale, compared to the well-known ASD Behavior Inventory questionnaire.

Secondly, this study aims to examine the relationship between narrative performance and the social skills profile of children involved in small group treatment, a widely applied mode of intervention in clinical practice to improve the social skills of autistic children and adolescents (Olsson et al., 2016). Previous studies have shown encouraging evidence of improved social skills in autistic children treated in small therapy groups, as reported by their parents (Kylliäinen, et al., 2020). However, despite the difficulties in the narrative field constitute a central feature of this disorder (Losh & Capps, 2003), and several studies have focused on its analysis in this population, this area has not been investigated in relation to the functional social profile of autistic children. The hypothesis that has guided the study is that autistic children who have more developed social skills can produce more complex and elaborate narratives than children with lower social skills.

2. Methods

This study was conducted under the protocol approved by the Ethical Committee of the University of Milano-Bicocca. The start of the study included informing parents about the research objectives and asking for their consent for the participation of children. At the same time, the educators signed an informed consent form before being included in the study.

2.1 Participants

Forty-nine autistic children aged 7-16 (M = 9.81; SD = 2.22) participated in the study, of which 37 males and 12 females: this data is representative of the epidemiology of the disorder compared to the general population, which is higher in male individuals (Kodak & Bergmann, S, 2020). Children have a wide range of IQs, often evaluated through different diagnostic tools due to the challenges of testing autistic children: their non-verbal IQ is between 22 and 155 (M = 90.08; SD = 28.50). This

wide range reflects the manifestation of this disorder, characterized by variability and heterogeneity along the continuum.

The inclusion criteria were: ASD diagnosis certified by the Autism Diagnostic Observation Schedule-Second Edition (ADOS-2) and being a verbal child or adolescent involved in a small group therapy project. The exclusion criterion was having a social skills profile that was too low to interact with other children with the same diagnosis.

Participants were also the children's educators. Fifteen educators engaged in the project, with a mean age of 32.50 years (*SD*=7.74; range = 23 - 47) and a mean of 8.53 years of experience in ASD treatment (SD =6.88; range = 1 - 20). The educators filled out questionnaires for the children in their treatment group to allow an adequate collection of information based on direct knowledge and observation of their social behaviour during working hours in the small rehabilitation group. Educators are the professional figures responsible for managing the individual rehabilitation project of the child in the path of taking care through treatment in small groups; they meet the children three times per week, spending 6 hours weekly with them.

2.2 Procedure

Each child involved in a small group therapy project was engaged in the study by the reference educator of the rehabilitation project. For each participant, the assessment consisted of a part of an indirect evaluation, conducted by the educators who filled out questionnaires, and a direct part in which a psychologist individually administered the tests.

Indirect evaluation:

ASD Behavior Inventory (ASDBI)

ASDBI is a short protocol of 180 items for evaluating behaviours typical of Autism Spectrum Disorders (Cohen & Sudhalter, 2014). ASDBI has been designed to assess the response to therapy quantitatively and therefore allows the measurement of the deviation of the child's behaviour compared to what is typically observed in ASD.

In this study, reference has been made to the composite scores of the ASDBI:

- The composite score of the problems of repetitiveness, ritualistic, and pragmatic (RIPRIT/C), i.e., the sum of the indices of problems of contact/isolation. Higher scores indicate a higher level of severity and impairment of the disorder.
- The composite score of the expressive skills of social communication (AECS/C), i.e., the sum of the indices of receptive/expressive social communication skills. Higher scores correspond to higher levels of competence.

This division is highly functional as it refers to the two symptomatologic domains of ASD in the DSM-5: behaviour patterns, narrow and repetitive interests or activities, and deficits in communication and social interaction. Therefore, the ASDBI is a tool that measures the child's behavioural problems and social communication skills. It has been standardized and validated for use with males and females aged between 1 year and six months and 12 years and five months. Given the sample's age and related cognitive impairment, reference was made to the raw scores.

Stanford Social Dimensions Scale (SSDS)

The SSDS is a 71-item questionnaire (Phillips, et al., 2019). The SSDS is a dimensional, quantitative measure designed to capture, in both normative and clinical populations, individual differences in:

- Social motivation, e.g., "In a social situation, attempts to play with other children instead of avoiding the group."
- Social affiliation, e.g., "Will try to get my attention or interact with me, without being reminded to do so."
- Social communication, e.g., "When a familiar person tries to engage with my child, she/he responds positively and appropriately by smiling, saying hello, etc."
- Social recognition, e.g., "Understands complex nonverbal gestures used by another person."
- Unusual approach, e.g., "Begins interactions/conversations in ways that seem unusual to others."

High scores on the SSDS test indicate higher competence, and lower scores indicate a higher severity level. The raw scores obtained in each subscale of the questionnaire were considered for the data analysis.

Direct evaluation:

Colored Progressive Matrices Standard (CPM)

Raven's Progressive Matrices (Raven, 2003) consists of 60 items and measure nonverbal intelligence throughout intellectual development, from childhood to maturity, regardless of cultural level. The simplified CPM version color is designed to be administered to children between 3 and 11.6 years and those with language difficulties, hearing impairments, or intellectual disabilities. Given the sample's age and related cognitive impairment, reference was made to standardization for the highest age threshold for children over 11 years.

Narrative Competence Task (NCT)

The NCT is a tool for assessing the production aspect of narrative competence through a storytelling task (Zanchi & Zampini, 2021). The task consists of an 18-picture storybook: participants were asked to tell the story in their own words while browsing the pages from the beginning to the end of the

book. The stories were audio-recorded using a digital voice recorder, and the narratives were transcribed in CHAT format (MacWhinney, 2000) and then coded at macro and microstructural levels.

Macrostructural measures:

- Events, the number of things that happened in the story (raw score ranging from 0 to 49).
- Structure, the ability to tell a well-structured story, was assessed by considering how many of the story's key passages the child could tell (i.e., 1. the beginning; 2. the problem; 3–6. the four attempts to solve the problem; 7. the solution; 8. the story conclusion) (raw score ranging from 0 to 8).
- Psychological lexicon, this measure reflects the child's ability to assume a character's point of view. It has no fixed range of scores because 1 point is given every time a child uses a different mental state word (e.g., emotional, cognitive, moral words).

Microstructural measures:

- Tokens, the total number of words uttered by the children in their storytelling.
- Mean length of utterances (MLU), this measure was calculated by dividing the tokens by the total number of utterances. A prosodic criterion (i.e., a change in intonation) was used to fragment the story into utterances.

To assess inter-coder reliability, 10% of the narratives were independently coded by two experts. We used intra-class correlation coefficients (ICC) to assess reliability (95% confidence interval in brackets). The ICC was 0.99 (0.89 - 0.99) for events, 0.99 (0.87 − 0.99) for structure, and 0.96 (0.63 - 0.99) for psychological lexicon. Disagreements were resolved by consensus between the coders.

Since NCT is standardized for children aged 3 to 8 years (i.e., younger than the participants), raw scores were considered in data analysis.

2.3 Data Analysis

The data analysis used Jamovi program Version 2.3 (The Jamovi Project, 2022). Given the small number of participants, non-parametric statistics were used for data analysis.

The first objective was to verify whether the evaluation conducted through the compilation of the ASDBI and the SSDS allowed a consistent identification of children with more or less developed socio-communicative competence, for which the non-parametric correlation was calculated (Spearman's Rho) among the indexes collected by the questionnaires.

Secondly, it was examined whether there was a correlation (Spearman's Rho) between the narratives produced by children and their socio-communicative profile, returned by ASDBI and SSDS, to highlight which social components influenced the involvement of children during the tests. The data

analysis was done through non-parametric partial correlations, keeping the participants' age and performance to Raven matrices as control variables because children were quite different in age and cognitive level.

Finally, the children were divided into two groups for each of the five measures of the SSDS, depending on whether their score was higher or lower than the median value. In this way, for each scale, two groups were obtained, one with higher and one with lower social functioning. Therefore, the Mann-Whitney test was used to compare children's narrative skills between these subgroups. The age variable was also included in the analysis to ensure that the effect of age does not affect the division above or below the median.

3. Results

3.1 Relationships between age and non-verbal intelligence and socio-communicative and narrative skills

Preliminary analyses were first conducted using non-parametric correlations between the age of the children and the questionnaires filled in by the educators (i.e., ASDBI and SSDS), reported in *Table* 1, and the task administered to children (i.e., CMP and NCT), reported in *Table* 2.

It should be noted that the CPM was considered valid for 44 out of 49 children and the NCT for 41 out of 49 children because some refused to complete the tasks or their language was not intelligible.

Regarding social skills, the analysis in *Table* 1 showed that age did not correlate with the SSDS questionnaire but instead correlated negatively with the RIPRIT/C scale of the ASDBI; therefore, older children would show less repetitive and ritualized behaviour. Also, non-parametric correlations between the CPM score and that of the ASDBI and SSDS showed that performance at Raven Matrices did not correlate with the SSDS but correlated negatively with the ASDBI scale RIPRIT/C; therefore, children with a better level of intellectual functioning would exhibit less repetitive and ritualized behaviour.

Table 1 Correlation (Spearman's Rho) between age and nonverbal intelligence and socio-communicative skills measured by ASDBI and SSDS

	ASDBI_ RIPRIT/C	ASDBI_ AECS/C	SSDS_ social_motiv	SSDS_ affiliation	SSDS_ communication	SSDS_ recognition	SSDS_ unusual_appr
Age	-0.30*	-0.14	0.22	-0.01	0.10	0.03	0.07
CPM_IQ	-0.35*	0.10	-0.00	-0.14	-0.25	-0.29	0.22

*p < 0.05

In contrast, concerning narrative competence (see *Table* 2), age was significantly and positively correlated with almost all the NCT macrostructural and microstructural measures, except the psychological lexicon. Correlations were subsequently computed regarding the CPM test, and the performance at Raven Matrices was significantly and positively correlated with all NCT measures.

Table 2 Correlation (Spearman's Rho) between age and nonverbal intelligence and narrative competence

	NCT_events	NCT_structure	NCT_psychological_lexicon	NCT_tokens	NCT_MLU
Age	0.40 **	0.40**	0.24	0.37*	0.44**
CPM_IQ	0.66***	0.60***	0.41**	0.42**	0.51***

*$p < 0.05$; ** $p < 0.01$;***$p < 0.001$.

Age did not correlate with non-verbal IQ (r=0.00; p=0.98).

3.2 Relationships between socio-communicative skills assessed by ASDBI and SSDS

To verify the validity of the SSDS to measure social skills, we investigated the correlation between the social functioning profiles that emerged from this questionnaire and those obtained from the ASDBI reference scale. Since age and non-verbal reasoning were correlated with socio-communicative skills, the correlation between the tools used to evaluate social skills in these children was computed controlling for these variables (see *Table* 3).

RIPRIT/C, the measure of ASDBI that refers to the problems of repetitiveness, ritualism, and pragmatism, correlated negatively with the scale Unusual Approach of the SSDS, which describes the presence of unusual and bizarre behavior. Whereas, the AECS/C, which considers the expressive skills of social communication, correlated positively with the measures of the SSDS: social motivation (how much the child actively interacts with others), social affiliation (how much the child searches and shares attention with others), social communication (how much the child communicates, verbally and non-verbally with others) and social recognition (how much the child feels empathy and understands the emotions of others).

Table 3: Partial correlation (Spearman's Rho) between ASDBI and SSDS composites controlling for age and non-verbal IQ

	SSDS_ social_motiv	SSDS_ affiliation	SSDS_ communication	SSDS_ recognition	SSDS_ unusual_appr
ASDBI_ RIPRIT/C	-0.14	-0.02	0.20	0.03	-0.59***
ASDBI_ AECS/C	0.55***	0.69***	0.48***	0.59***	0.13

*$p < 0.05$; ** $p < 0.01$;***$p < 0.001$.

3.3 Relationships between socio-communicative functioning and narrative competence

To assess the relationships between socio-communicative skills and narrative competence, the social functioning profile returned by the SSDS (see *Table* 4) and the ASDBI composites (see *Table* 5) were correlated to macro and microstructural indices derived from the administration of NCT.

As for the correlations that emerged between narrative ability and socio-communicative skills, the scale of social motivation appeared to correlate more with macrostructural aspects (event and structure). The social recognition scale, which focuses on the child's ability to feel empathy and understand the emotions of others, correlated positively with macrostructural components (events and structure) and microstructural components (tokens and MLU). Social affiliation, which refers to the child's search for attention and interaction with the adult, correlates significantly with all macrostructural measures (events, structure, and lexical state of mind) and with the MLU.

Table 4: Partial correlation (Spearman's Rho) between NCT indices and SSDS composites controlling for age and non-verbal IQ

	NCT_events	NCT_structure	NCT_psychological_lexicon	NCT_tokens	NCT_MLU
SSDS_ social_motiv	0.38*	0.49**	0.15	0.19	0.28
SSDS_ affiliation	0.51***	0.65***	0.33*	0.30	0.38*
SSDS_ communication	0.20	0.25	0.64	0.13	0.30
SSDS_recognition	0.42**	0.44**	0.20	0.33*	0.38*
SSDS_unusual_appr	0.26	0.27	0.05	0.12	0.17

*$p < 0.05$; ** $p < 0.01$; ***$p < 0.001$.

The results in *Table* 5 also showed a strong relationship between narrative performance and the composites of the ASDBI, confirmed by the significant correlation between the AECS/C and all the indices of the narrative task.

Table 5: Partial correlation (Spearman's Rho) between NCT indices and ASDBI composites controlling for age and non-verbal IQ

	NCT_events	NCT_structure	NCT_psychological_lexicon	NCT_tokens	NCT_MLU
ASDBI_ RIPRIT/C	-0.22	-0.13	-0.17	-0.31	-0.12
ASDBI_ AECS/C	0.65 ***	0.70 ***	0.33 *	0.44 **	0.47 **

*$p < 0.05$; ** $p < 0.01$; ***$p < 0.001$.

To further assess the relationships between the socio-communicative functioning profile and the participants' narrative skills, the children were divided into two groups for each of the five measures of the SSDS, depending on whether their score was higher or lower than the median value.

The results, reported in *Table* 6 and *Table* 7, showed that children with values above the median for motivation, affiliation, and social communication scales showed better narrative performance. On the contrary, there was no significant difference in the stories comparing children with high or low scores in social recognition and unusual approach scales. The motivation and social affiliation scales differed, especially for the narrative components related to the macrostructure. In contrast, the measure of social communication better explained the differences in narrative competence regarding the microstructural aspects and the psychological lexicon.

Table 6: Comparison value of NCT indices for participants with values above/below the median of each SSDS scale

		N	NCT_ events	NCT_ structure	NCT_psychol ogical_lexicon	NCT _tokens	NCT _MLU
SSDS_ social_motiv	Above median	24	17.13	4.79	4.21	164.42	7.05
	Below median	17	11.06	2.71	5.06	124.41	5.34
SSDS_ affiliation	Above median	26	16.62	4.65	5.62	165.42	7.00
	Below median	15	11.13	2.67	2.73	117.33	5.19
SSDS_ communication	Above median	31	16.10	4.39	5.35	164.16	6.96
	Below median	10	10.00	2.50	2.10	97.20	4.41
SSDS_recognition	Above median	29	15.66	4.34	3.90	156.31	6.77
	Below median	12	12.08	2.92	6.17	127.33	5.30
SSDS_unusual_appr	Above median	27	16.15	4.37	5.22	154.15	6.68
	Below median	14	11.64	3.07	3.29	135.64	5.67

Table 7: Comparison (Wilcoxon-Mann-Whitney) of NCT indices for participants with values above/below the median of each SSDS scale

		NCT_ events	NCT_ structure	NCT_ psycological_lexicon	NCT _tokens	NCT _MLU
SSDS_ social_motiv	Mann-Whitney U	128.500*	113.000*	157.000	151.000	133.000
SSDS_ affiliation	Mann-Whitney U	132.000	111.000*	129.000	117.500*	126.000
SSDS_ communication	Mann-Whitney U	100.000	95.000	79.000*	72.500*	72.000*
SSDS_recognition	Mann-Whitney U	137.5000	121.500	147.000	124.500	119.000
SSDS_unusual_appr	Mann-Whitney U	138.500	132.500	153.500	145.000	151.500

*$p < 0.05$

Data analysis also considered the children's age in *Table* 8. Age was not significantly different for all the scales of the SSDS considered.

Table 8: Comparison (Wilcoxon-Mann-Whitney) of Age for participants with values above/below the median of each SSDS scale

		N	Age
SSDS_ social_motiv	Above median	25	10.60
	Below median	24	9.25
SSDS_ affiliation	Above median	28	10.07
	Below median	21	9.76
SSDS_ communication	Above median	34	10.18
	Below median	15	9.40
SSDS_recognition	Above median	30	10.03
	Below median	19	9.79
SSDS_unusual_appr	Above median	29	9.72
	Below median	20	10.25

4. Discussion

This study aimed to evaluate whether there is a relationship between autistic children's socio-communicative competence and the ability to tell a more or less structured and elaborate story. It was chosen to investigate these two areas because they are considered impaired in most autistic individuals, as closely interconnected since producing a story requires multiple pragmatic and social skills (Siller et al., 2014).

The preliminary analyses were conducted to verify whether there were correlations between the children's age and the skills measured in the study. The negative correlation between age and the composite inherent in repetitive, ritualistic, and pragmatic problems represents how the older the children are, the fewer stereotypes they present. In contrast, the positive correlation between age and macro- and microstructural indices in the narrative task indicates how narrative performance improves with increasing age. This positive development is understandable because these children are exposed daily to narrative episodes (in the family, at school, etc.). However, the use of the psychological lexicon does not improve with increasing age. This result is reflected in the literature that identifies this aspect as particularly critical in most autistic individuals and not easily modifiable (Rumpf et al., 2012). The correlation between age and socio-communicative profile, returned by SSDS, and between age and the level of nonverbal intelligence obtained through CPM, on the contrary, indicates how these aspects are more challenging to increase during development. If, in fact, as far as narrative skills are concerned, several studies have shown the positive effects of narrative training on story production, this benefit does not necessarily seem to generalize to social and behavioural skills (Kokina & Kern, 2010).

The fact that non-verbal intelligence does not appear to be related to socio-communicative skills (see Table 1) is consistent with what is reported in the literature, namely that the visuospatial environment is less compromised in autistic individuals and is, therefore, detached from socio-communicative deficits. The positive correlation between non-verbal IQ and all the narrative measures (see *Table* 2), however, appears highly representative of the participation and involvement of children in the study. In this sense, the negative correlation between nonverbal intelligence and the composite of repetitive problems can be interpreted as a suggestion that if the stereotypical behaviour of children during the testing phase is lower, their performance is better.

As regards the first research question, however, it was found whether two instruments providing a measure of children's social skills, namely SSDS and ASDBI, reflected a homogeneous functioning profile. The correlation between SSDS and the composite score of the social skills of the Social Responsiveness Scale -2 (SRS-2) has already been investigated in the literature. The results show that the SSDS subscale could better capture individual differences in social motivation and other key social dimensions (Phillips et al., 2019). The SSDS is a tool translated through back translation but is not yet standardized and validated in Italian. Hence, the study aims to verify whether the evaluation conducted through the compilation of this scale and the ASDBI allowed a consistent identification of the children's social skills profile. The choice of taking as reference the two overall scales of the ASDBI, and not the individual measures, is achieved by the fact that these indices return an image of the participants about the two main diagnostic symptoms presented in the DSM-5.

The negative correlation between the repetitive problem composite and the unusual approach scale of the SSDS is consistent with what can be expected since they assess more or less the same aspects (with the difference that in the ASDBI: the higher the score obtained by the individual, the more frequent is the implementation of repetitive and stereotypical behaviours; while in the SSDS: to a higher value corresponds a less compromised functioning).

Moreover, the measure inherent in expressive skills and social communication correlates positively with all the corresponding scales of the SSDS since, in this case, a higher score corresponds to better social functioning for both questionnaires. As a result, it can be argued that both tools describe the participants' social and communicative skills in a unified manner.

The second research hypothesis is that children with higher socio-communicative skills produce better narratives, evaluated through the NCT.

As for the correlations that emerged between narrative ability and socio-communicative skills, the scale of social motivation correlates most with both macrostructural aspects (events and structure) and microstructural aspects (MLU). The fact that the scale of social affiliation, which refers to the

search for attention and interaction with the adult by the child, correlates with the index of the structure, events, and psychological lexicon is in line with the skills that this measure requires: narrate a story following a precise script, focusing on how to make the listener understand the story (Norbury & Bishop, 2003).

However, the communication and social recognition scales do not correlate with the narrative performance. For the measure of social communication, we can assume that this result can partly be achieved by the fact that some aspects evaluated by this index, such as eye contact, smiles, and orientation of the child during the test, have not been included in the assessment of the narrative performance that has referred more to the content and structure of the narratives than to the behaviour of the child during the task. However, the unusual approach scale correlates with events and structure: participants who exhibit fewer stereotypical and repetitive behaviours remained more focused on storytelling and produced better stories. The same result is confirmed by the negative correlation between the composite of the problems of repetitiveness, ritualistic, and pragmatic and all the measures of the NCT.

The relationship between narrative competence and socio-communicative skills is also confirmed by the correlation between the composite of social communication skills at ASDBI and all the indices of the NCT.

Finally, by dividing children by level of social skills, it can be seen whether a higher level of these skills corresponds to even better narrative skills and vice versa. For each SSDS scale, participants were divided into two groups, depending on whether their score was above or below the median. The age of children was also taken into account in this analysis: the fact that this variable appears, for all SSDS scales, significantly not different between the two groups indicates that the socio-communicative skills and stereotyped behaviour measured by the SSDS do not depend on the age of the participants, but solely on their functioning profile.

Considering the results, we note that children with values above the median for motivation, affiliation, and social communication scales show better narrative performances. On the contrary, there is no significant difference in the stories produced by participants with higher or lower scores in the social recognition and unusual approach scales. The motivation and social affiliation scales differ mainly for the narrative components related to the macrostructure. In contrast, the measure of social communication explains better the differences in narrative competence regarding the microstructural aspects and psychological lexicon. In this sense, the scale of social communication of SSDS precisely investigates the ability of the child to interact verbally and through visual contact and orientation of the body with the other. It can be assumed, therefore, that a better ability in social communication scale can also reflect a more remarkable ability in one of the aspects considered to be most impaired

in autistic individuals: being able to maintain the attention of the listener, considering him as someone to involve and entertain (Barnes & Baron-Cohen, 2011) and also making greater use of psychological language, a further aspect that is usually compromised in this population (Lee et al., 2018).

However, in this study, the aspects investigated by the scale of unusual approach and social recognition, which refers to the ability to understand the emotions of the other and show empathy, do not seem to have a discriminating impact.

In interpreting the results of this study, some limitations should be considered. One main limitation is related to the small sample sizes of participant groups. The participants are all children treated at the same rehabilitation center, so the skills analyzed are undoubtedly affected by the methodology and the therapeutic approach adopted.

A further limitation is the fact that the narrative skills of the participants were evaluated only through a storytelling task with images. According to the literature, using images to support the narration can facilitate the task, reducing the complexity of social and cognitive terms that characterize daily interactions (Lee, et al., 2018). However, other authors believe that such a storytelling procedure is very functional, as it would allow the child to reduce the cognitive load required by the task by focusing only on narrating the story through representations and then returning to a performance that reflects his narrative competence (D'Amico et al., 2008).

Finally, a problem arose in the distribution of participants in two groups, above and below the median, since most children had a score equal to the central or higher value; therefore, the division made cannot be considered homogeneous in number between the two groups.

However, this study is part of a larger project for autistic children and adolescents, which proposes to analyze socio-communicative and narrative skills and their relationship and evolution over time. Therefore, broader and generalizable results, which will allow a more comprehensive view of clinical limitations and implications, can be obtained by future studies.

5. Conclusion

The social functioning profiles reported by the educators through the two proposed questionnaires, SSDS and ASDBI, were consistent. In particular, the Stanford Social Dimensions Scale allowed us to analyze the different components of the social functioning of an autistic child.

The results showed a significant correlation between social skills and narrative competence in autistic children with different functioning profiles: children with more developed social skills can produce more complex and elaborate narratives than children with lower social skills. This evidence would lead to the differentiation of various functioning profiles based on the social and communicative

competencies of autistic children and give a chance to create intervention groups with children with more homogeneous competence. Taking these aspects into account would lead to a most accessible identification of the common objectives of the rehabilitation group and could maximize the effectiveness of the rehabilitation intervention.

THIRD CHAPTER

1. A longitudinal study on the evolution of narrative competence in autistic children involved in a small-group rehabilitation project

1.1 Background

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by deficits in social and communication skills (DSM-5; American Psychiatric Association, 2013). This impairment also affects the ability to use language appropriately in different situations, known as the communicative-pragmatic domain (Baixauli-Fortea et al., 2019).

Narrative competence consists of the ability to describe real life: it is a tool to organize and share meaningful experiences with others, imposing a temporal and causal order to events (Bruner, 2004). Daily storytelling is a principal component of communal living, and narrative skills represent a fundamental aspect of developing personal identity from late childhood to adolescence (Steiner et al., 2019). In addition, the quality of narratives is considered an important predictor of educational achievement (Jones et al., 2018) and psychological and mental well-being (Shiner et al., 2021).

Producing a coherent narrative is a complex task that involves multiple linguistic, cognitive, and social skills (De Marchena & Eigsti, 2016).

Scientific literature indicates lower narrative abilities in autistic children (Carlsson et al., 2020). In particular, the narratives of autistic children differ from typically developing peers (Baixauli-Fortea et al., 2019) in impoverished event explanations (King et al., 2014), reduced story structure complexity (Peristeri et al., 2017), lower coherence (Losh & Gordon, 2014), reduced syntactic complexity, poorer inferencing, and a tendency to include extraneous information (Mäkinen et al., 2014). Because individuals with ASD narrate in a way that is unique to their diagnostic group (Boorse et al., 2019), storytelling tasks could be a particularly suitable clinical measure of language use in ASD individuals (Manolitsi & Botting, 2011).

In assessing narrative competence, two levels of analysis are usually considered: microstructure and macrostructure (Zanchi & Zampini, 2021). Macrostructure refers to global narrative characteristics that generate coherent episodes within a discourse. The level of macrostructure is impaired in autistic individuals, who seem less capable of maintaining global coherence in their narratives than their peers. This difficulty surfaces especially due to the reduced use of cohesive linguistics and poor story organization (Losh & Capps, 2003; Westerveld & Roberts, 2017). In fact, concerning macrostructure, several studies have found that autistic individuals tend to produce shorter (King et al., 2014; Siller et al., 2014) and more simplistic narrative accounts (Banney et al., 2015). Autistic groups have

frequently been found to use less causal language to link story events (Hilvert et al., 2016; Sah & Torng, 2015) and fewer cohesive devices (Hilvert et al., 2016). Furthermore, regarding variables related to internal state language, ASD individuals include significantly fewer elements of psychological lexicon than control groups (Baixauli et al., 2016). Microstructure refers to the language used in narration at the lexical and sentence levels. Only some studies found group differences by assigning shorter and syntactically less complex narratives to autistic children (Geelhand et al., 2020). However, in terms of microstructure, findings have included reduced use of complex syntax (Banney et al., 2015; Losh & Capps, 2003), difficulties with referential language and pronouns (Novogrodsky, 2013), and reduced vocabulary (King & Palikara, 2018).

The meta-analysis by Baixauli et al. (2016) suggests that narrative difficulties in ASD will remain constant from childhood through adolescence. The impact of narrative impairment on everyday communicative interactions has encouraged the development of training programs devoted to improving such difficulties. There are few examples of specific interventions for narrative abilities in autistic children and adolescents (Hilviu et al., 2023). General communicative training programs for autistic children use various strategies of intervention, including peer-mediated conversational programs (Thomas & Bambara, 2020), social skills group training (Dekker et al., 2019), and training focused on communicative-pragmatic abilities (Gabbatore et al., 2021). However, little attention has been directed to describing the training-related improvement of narrative production in autistic school-aged children and adolescents (Hilviu et al., 2023). In addition, research analyzing the linguistic development of children with autism has often focused on high-functioning individuals rather than including verbal children with varying severity levels in the sample (Baixauli et al., 2016).

1.2 Aims

Considering the importance of narrative development for the psychosocial outcome of the individual, this study aims to analyze the evolution of narrative competence in a group of autistic children involved in the small group therapy intervention focused on developing social skills. Furthermore, the longitudinal study aims to investigate differences in narrative competence evolution between low- and high-functioning autistic individuals by including children with diverse profiles falling within the diagnostic spectrum.

The hypothesis is that an improvement in narrative skills at the micro- and macro-linguistic levels would be noted in the study sample after a year of small-group therapy intervention to enhance social skills. Some studies relate IQ to narrative ability in autistic children (Berman & Slobin, 2013; Hogan-Brown et al., 2013); however, the literature suggests that the acquisition of narrative competence depends on factors external to general cognition (Tuller et al., 2017), reporting examples of autistic subgroups with high non-verbal IQ associated with language impairment (Wittke et al., 2017).

Considering the complex and unclear interplay of cognitive functions and narrative ability in typical and atypical development (Matthews et al., 2018), the hypothesis is that non-verbal IQ level does not affect the development of narrative performance in verbal autistic children and adolescents.

2. Methods

This study used a longitudinal descriptive design to evaluate the narrative skills development of autistic children involved in a small-group rehabilitation project. The study was conducted under the protocol approved by the Ethical Committee of the University of Milano-Bicocca. The beginning of the study included informing parents about the research objectives and asking for their consent for their children's participation.

2.1 Participants

Participants in the longitudinal study were recruited at the Center Mafalda Luce for Autism and Developmental Age, by Fondazione Piatti Onlus in Milan.

This analysis was conducted on Time Point 2 (T2, July 2023) and Time Point 3 (T3, May 2024) of the PhD thesis longitudinal project to assess changes over a year of small-group therapy.

A total of 48 children participated (39 males and 9 females) who at entry to the study: (a) were aged between 6 and 16 years old, (b) had a documented diagnosis of Autism Spectrum Disorder, and (c) were involved in small group psychoeducational project to enhance their social skills.

A description of the participants is provided in *Table 1*.

Table 1: Descriptions of participants

	Age		
	M	*DS*	Range
T2	9.63	2.27	6.50-16.20
T3	10.50	2.30	7.30-17.00

The non-verbal IQs of the children involved were available from the clinical assessment data, often evaluated through different diagnostic tools due to the challenges of testing autistic children. The non-verbal IQ ranges between 29 and 155 (*M*=92.9; *DS*=24.6), and these scores provide further descriptive data on the participants in this study and highlight the heterogeneity in our cohort.

2.2 Procedure

To evaluate narrative competence, participants completed the Narrative Competence Task (NCT), the same storytelling task presented in the first study (see *Chapter 2*) (Zanchi & Zampini, 2021). The NCT is developed with respect to a typical story, and the described situation is familiar to children. Assessment measures were completed at Time 2 and 10 months later, at the end of the year of the small group rehabilitation project, Time 3.

All the NCT assessment sessions were audio-recorded. The narratives were transcribed in CHAT format (MacWhinney, 2000) using the Child Language Data Exchange System. The transcripts were segmented into utterances and then coded at macro and microstructural levels. The prosodic criterion was used to fragment the story into utterances so that an utterance was terminated when the listener could perceive a declination in the intonation (Zanchi & Zampini, 2021).

Below is a summary of the measures used in this study.

Macrostructural measures:

- Events, the number of things that happened in the story, raw score ranging from 0 to 49.

- Structure, the ability to tell a well-structured story, was assessed by considering how many of the story's key passages the child could tell (i.e., 1. the beginning; 2. the problem; 3–6. the four attempts to solve the problem; 7. the solution; 8. the story conclusion), a raw score ranging from 0 to 8.

- Agents: number of agents performing actions within the story. For each character the child mentions, 1 point is awarded; the maximum raw score in the Agents index is 7.

- Anaphoric use of the article: the change from the initial use of the indefinite article to mention a character or object in the story for the first time to the use of the definite article to refer to it later. Each correct passage from the indeterminate article to the determinative is assigned 1 point, with a raw score ranging from 0 to 8.

- Psychological lexicon: this measure reflects the child's ability to assume a character's point of view. It has no fixed range of scores because 1 point is given every time a child uses a different mental state word (e.g., emotional, cognitive, moral words).

Microstructural measures:

- Utterances: number of utterances in which the narrative is subdivided. A prosodic criterion (i.e., a change in intonation) was used to fragment the story into utterances.

- Types: number of different words used by the child.

- Tokens: the total number of words produced during the storytelling.

- Types/Tokens Ratio (TTR): this measure is calculated by dividing the types by the total number of tokens.

- Mean length of utterances (MLU): value computed by considering the mean number of words per utterance (MLU = tokens/ total number of utterances).

Independent observers assessed the intercoder reliability in 30% of the narratives (n = 28). We used intra-class correlation coefficients (ICC) to assess reliability. The ICC was 0.98 (with a 95% confidence interval from 0.95 to 0.99) for events, 0.94 (with a 95% confidence interval from 0.88 to 0.97) for structure, 0.78 (with a 95% confidence interval from -0.08 to 0.93) for agents, 0.82 (with a 95% confidence interval from 0.60 to 0.92) for anaphoric article, and 0.95 (with a 95% confidence interval from 0.90 to 0.98) for psychological lexicon. The ICC was 0.99 (with a 95% confidence interval from 0.97 to 0.99) for utterances, 1.00 (with a 95% confidence interval from 1.00 to 1.00) for types, 1.00 (with a 95% confidence interval from 1.00 to 1.00) for tokens, and 1.00 (with a 95% confidence interval from 0.99 to 1.00) for Mean Length of Utterance (MLU).

Since NCT is standardized for children aged 3 to 8 years (i.e., younger than the participants), raw scores were considered in data analysis.

2.3 Data Analysis

The data analysis used the SPSS program Version 28 (IBM Corp, 2021).

Descriptive analysis included each measure's mean, standard deviation, and range at the two time points. To investigate differences in narrative competence evolution, the sample of autistic children was divided into two groups: high-functioning (non-verbal IQ>85) and low-functioning (non-verbal IQ<85). In order to balance the two groups divided by function, we included both autistic children with intellectual disability (IQ<70) and those with borderline intellectual functioning (70 <IQ<85) in the low-functioning category. Descriptive analysis was repeated on the two groups.

To analyze the evolution of narrative competence over time, the two groups of autistic children and adolescents were tested using Factorial 2x2 ANOVA.

3. Results

Preliminary analyses were first conducted to report the general descriptives for each NCT measure of the whole sample in the two time points (see *Table 2*).

It should be noted that the NCT was considered valid for 45 out of 48 children because some refused to complete the tasks or their language was not intelligible.

Table 2: Descriptive statistics for each NCT measure in the two-time point

	Time 2				Time 3			
	M	SD	Min	Max	M	SD	Min	Max
Macrostructure								
Events	15.56	7.68	0.00	34.00	17.87	6.98	4.00	36.00
Structure	4.49	2.42	0.00	8.00	4.58	2.11	1.00	8.00
Agents	5.27	1.62	1.00	7.00	5.76	1.33	0.00	7.00
Anaphoric use of the article	1.38	1.63	0.00	6.00	1.84	1.64	0.00	5.00
Psychological lexicon	4.00	2.30	0.00	10.00	4.47	3.05	0.00	16.00
Microstructure								
Utterances	31.89	10.70	10.00	57.00	31.98	10.44	18.00	60.00
Types	70.78	25.62	16.00	123.00	78.02	24.85	30.00	143.00
Tokens	160.56	68.09	21.00	300.00	186.36	66.42	47.00	372.00
TTR	0.47	0.10	0.24	0.76	0.43	0.08	0.28	0.64
MLU	5.05	1.71	1.92	9.31	5.98	1.77	2.24	9.92

After dividing the sample into two groups based on the non-verbal IQ low-functioning and high-functioning criteria, the general descriptives for each NCT measure in the two time points were reported in *Table 3*.

Table 3: Descriptive statistics for low and high-functioning groups on each NCT measure in the two-time point

	Time 2				Time 3			
	Low functioning (n=13)		High functioning (n=32)		Low functioning (n=13)		High functioning (n=32)	
	M	SD	M	SD	M	SD	M	SD
Macrostructure								
Events	11.00	5.42	17.41	7.76	14.38	7.02	19.28	6.55
Structure	3.08	1.50	5.06	2.50	3.69	1.89	4.94	2.11
Agents	5.23	1.36	5.28	1.73	5.62	2.18	5.81	0.82
Anaphoric use of the article	0.15	0.56	1.88	1.66	1.08	1.80	2.16	1.48
Psychological lexicon	3.62	2.29	4.16	2.32	3.54	2.03	4.84	3.33
Microstructure								
Utterances	31.69	8.60	31.97	11.56	32.54	8.33	31.75	11.30
Types	63.77	17.42	73.63	28.03	67.85	20.26	82.16	25.62
Tokens	165.08	72.96	158.72	67.14	177.69	67.09	189.88	66.89
TTR	0.41	0.08	0.49	0.10	0.41	0.10	0.44	0.06
MLU	5.17	1.56	5.00	1.79	5.53	1.97	6.17	1.68

To analyze the evolution of narrative competence in the two functioning groups of autistic children involved in the longitudinal study, the factorial 2x2 ANOVA was performed on each measure of the Narrative Competence Task.

Below, we present the results of the two levels of analysis as reported in the literature: macrostructure and microstructure.

3.1 Macrostructure

NCT Events

When conducting a 2x2 factorial ANOVA on NCT Events (see *Figure 1*), a significant main effect of time ($F = 11.47$, $p = 0.00$) and a significant main effect of group ($F = 6.94$, $p = 0.01$) were found. However, no significant interaction effect emerged between time and group (time*group) ($F = 0.94$, $p = 0.34$).
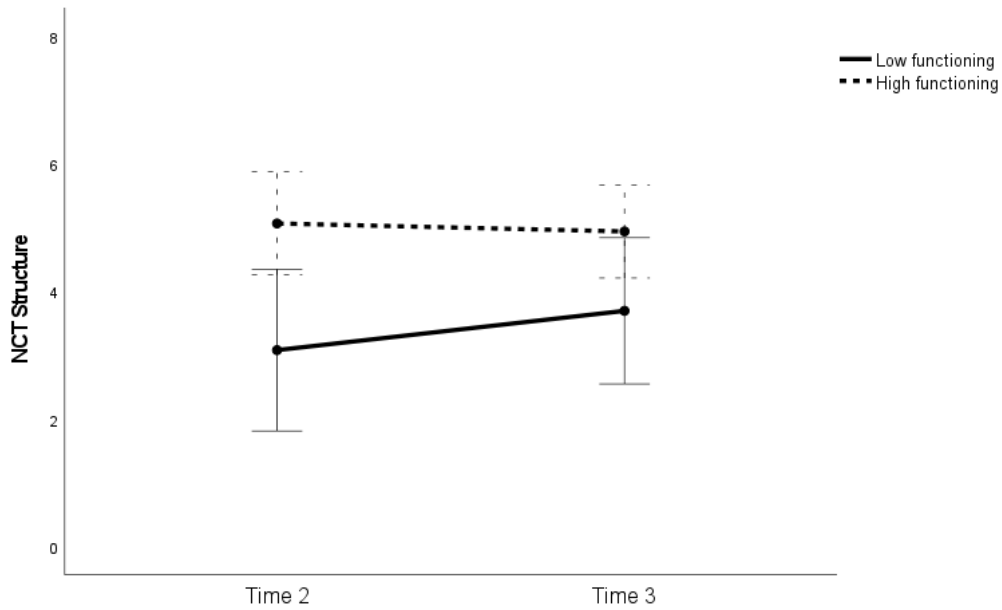
Figure 1: 2x2 Factorial ANOVA on NCT Events
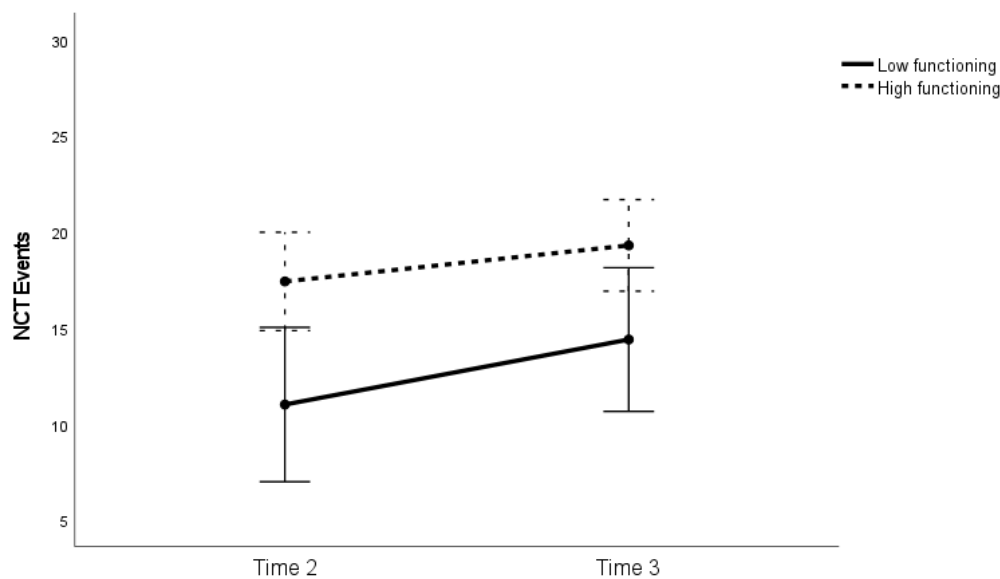
NCT Structure

When conducting a 2x2 factorial ANOVA on the NCT Structure (see *Figure 2*), a significant main effect of the group ($F = 5.86$, $p = 0.02$) was found. However, no significant main effect of time ($F = 1.01$, $p = 0.32$) and no significant interaction effect between time and group (time*group) ($F = 2.30$, $p = 0.14$) emerged.
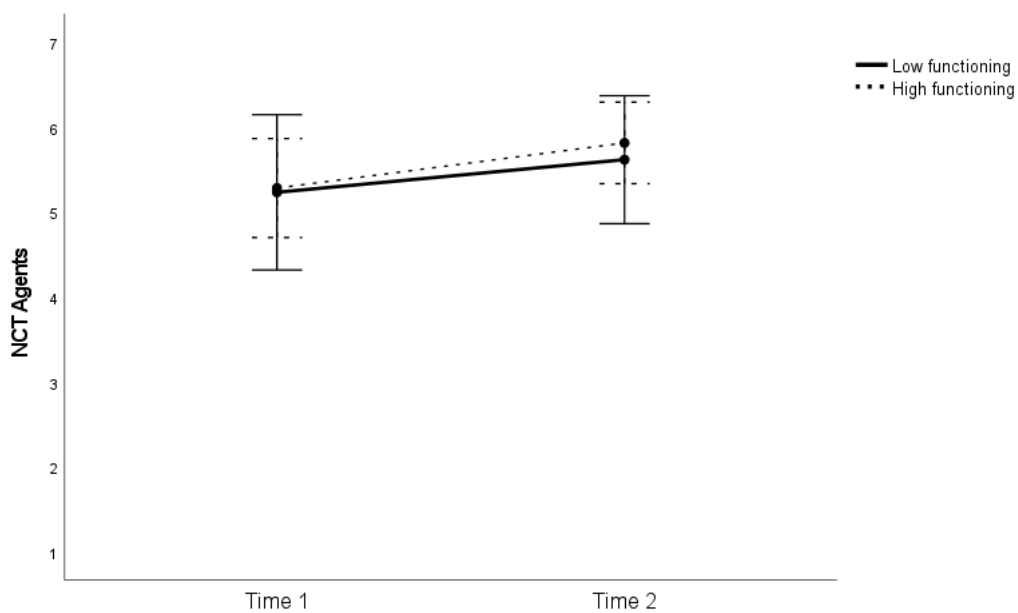
Figure 2: 2x2 Factorial ANOVA on NCT Structure

NCT Agents

When conducting a 2x2 factorial ANOVA on the NCT Agents (see *Figure 3*), no significant main effect of time (F = 3.06, p = 0.09) and no significant main effect of group (F = 0.88, p = 0.77) was found. No significant interaction effect emerged between time and group (time*group) (*F* = 0.08, *p* = 0.78).

Figure 3: 2x2 Factorial ANOVA on NCT Agents

NCT Anaphoric use of the article

When conducting a 2x2 factorial ANOVA on the NCT Anaphoric use of the article (see *Figure 4*), a significant main effect of time ($F = 5.80$, $p = 0.02$) and a significant main effect of group ($F = 10.63$, $p = 0.00$) was found. However, no significant interaction effect emerged between time and group (time*group) ($F = 0.94$, $p = 0.21$).

Figure 4: 2x2 Factorial ANOVA on NCT Anaphoric use of the article
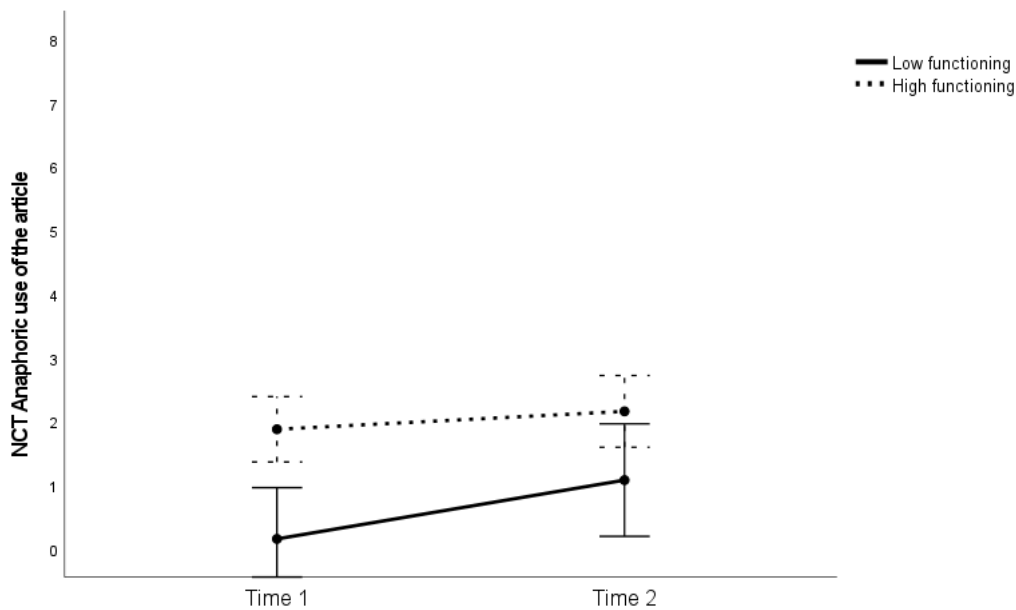
NCT Psychological lexicon

When conducting a 2x2 factorial ANOVA on the NCT Psychological lexicon (see *Figure 5*), no significant main effect of time ($F = 0.31$, $p = 0.58$) and no significant main effect of group ($F = 1.76$, $p = 0.19$) was found. No significant interaction effect emerged between time and group (time*group) ($F = 0.49$, $p = 0.49$).

Figure 5: 2x2 Factorial ANOVA on NCT Psychological lexicon

3.2 Microstructure

NCT Utterances

When conducting a 2x2 factorial ANOVA (time x group) on the NCT Utterances (see *Figure 6*), no significant main effect of time ($F = 0.02$, $p = 0.88$) and no significant main effect of group ($F = 1.76$, $p = 0.80$) was found. No significant interaction effect emerged between time and group (time*group) ($F = 0.01$, $p = 0.93$)
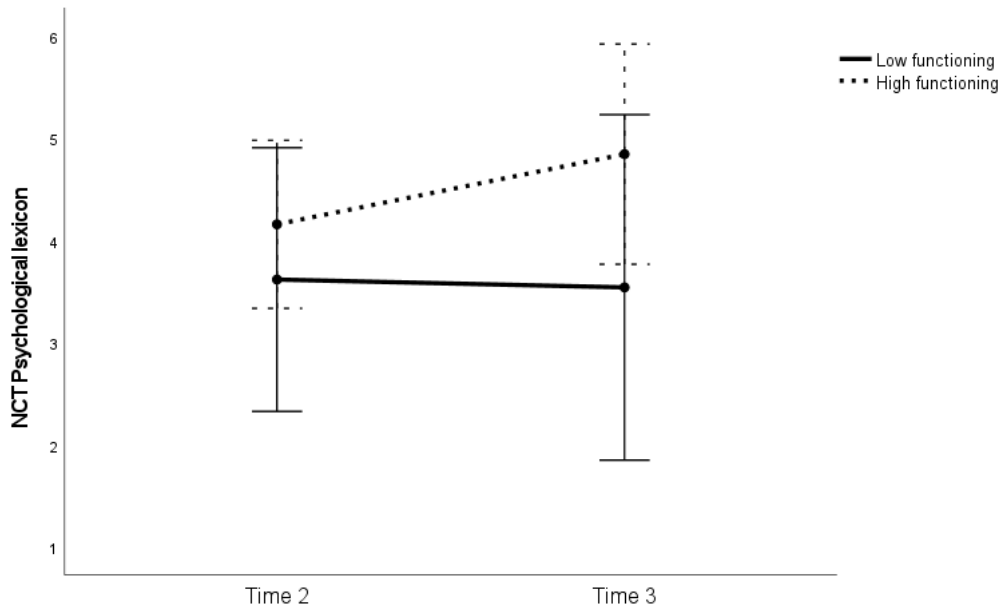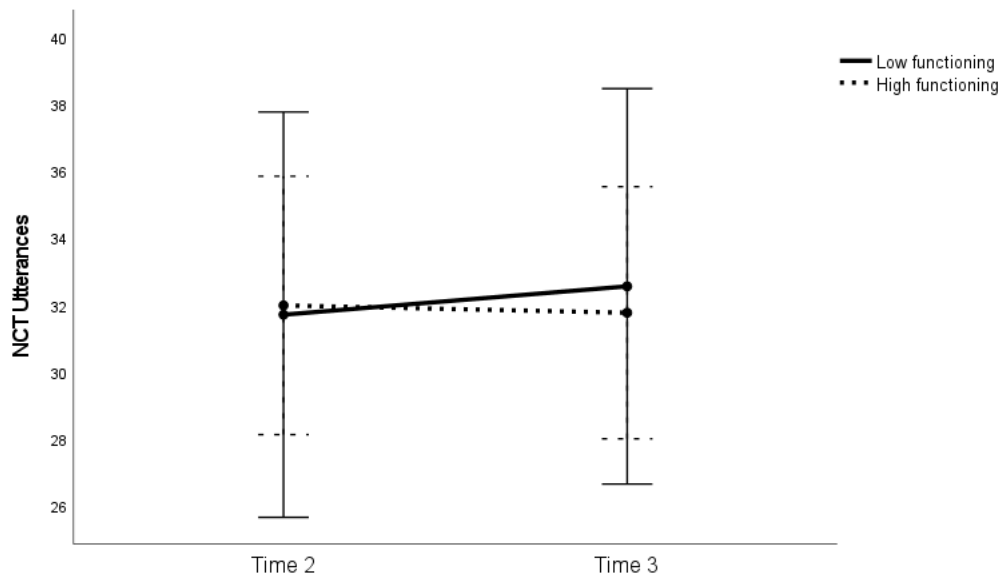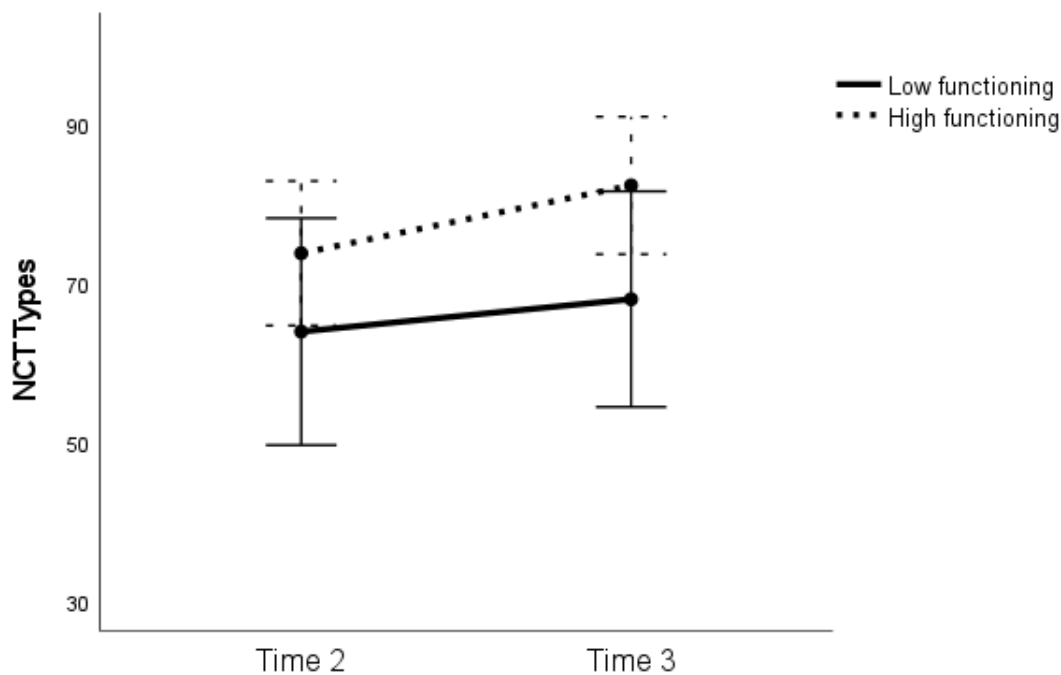
Figure 6: 2x2 Factorial ANOVA on NCT Utterances

NCT Types

When conducting a 2x2 factorial ANOVA (time x group) on the NCT Types (see *Figure 7*), no significant main effect of time, even if it is tendentially significant at a 10% level ($F = 3.64$, $p = 0.06$), and no significant main effect of group ($F = 2.60$, $p = 0.11$) was found. No significant interaction effect emerged between time and group (time*group) ($F = 0.45$, $p = 0.50$).

Figure 7: 2x2 Factorial ANOVA on NCT Types

NCT Tokens

When conducting a 2x2 factorial ANOVA (time x group) on the NCT Tokens (see *Figure 8*), a significant main effect of time ($F = 4.58$, $p = 0.04$) was found. However, no significant main effect of group ($F = 0.02$, $p = 0.88$) and no significant interaction effect between time and group (time*group) ($F = 0.82$, $p = 0.37$) emerged.

Figure 8: 2x2 Factorial ANOVA on NCT Tokens

NCT TTR

When conducting a 2x2 factorial ANOVA (time x group) on the NCT TTR (see *Figure 9*), a significant main effect of the group ($F = 6.67$, $p = 0.01$) was found. However, no significant main effect of time ($F = 2.86$, $p = 0.10$) and no significant interaction effect between time and group (time*group) ($F = 1.82$, p = 0.18) emerged.

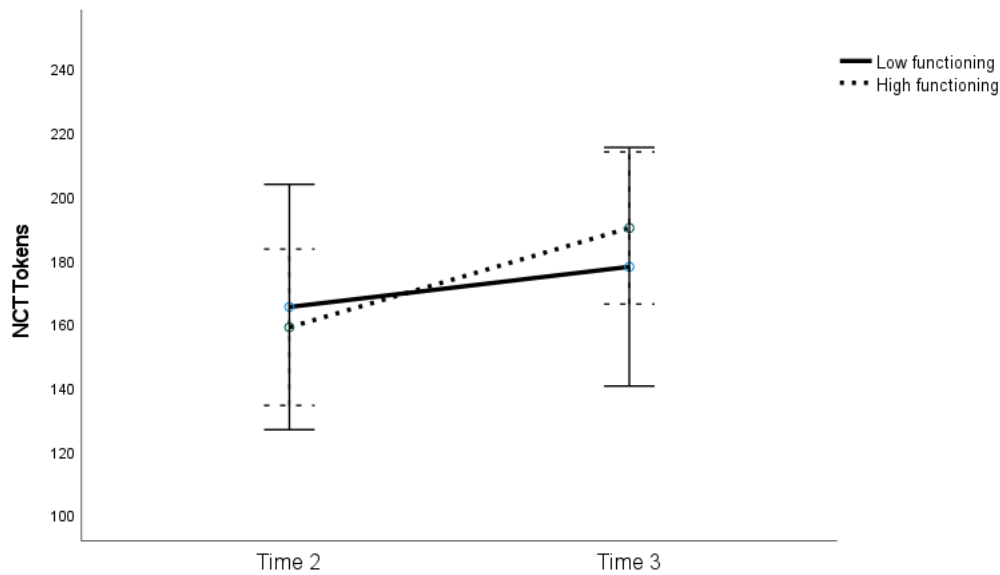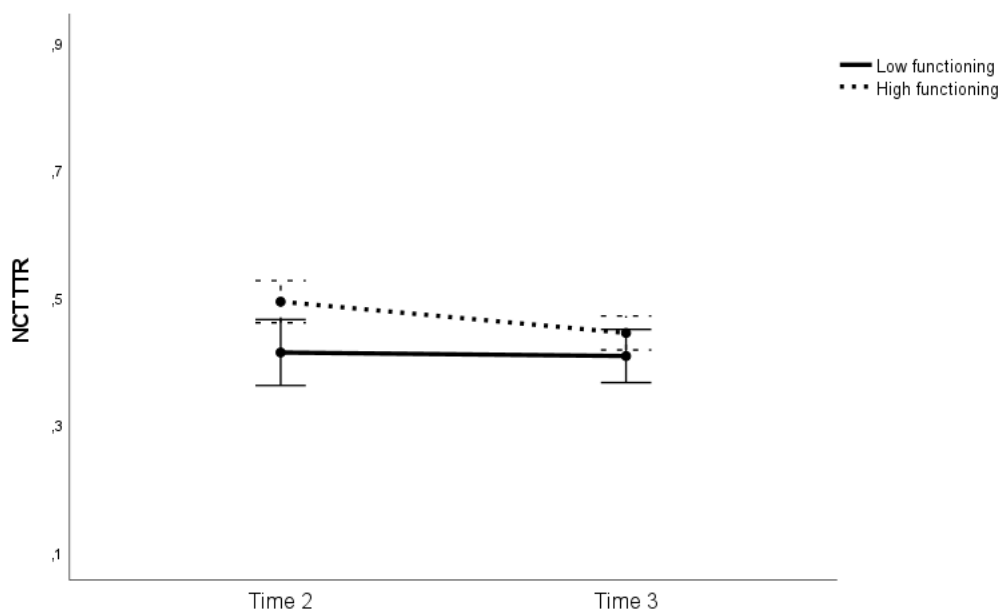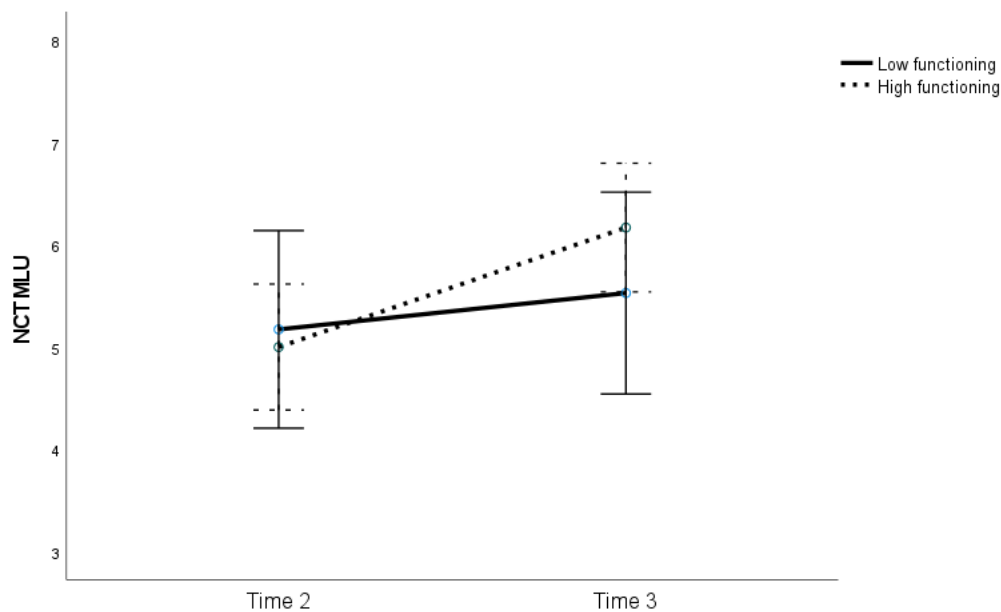*Figure 9: 2x2 Factorial ANOVA on NCT TTR*

NCT MLU

When conducting a 2x2 factorial ANOVA (time x group) on the NCT MLU (see *Figure 10*), a significant main effect of time ($F = 12.06$, $p = 0.00$) was found. No significant main effect of group ($F = 1.01$, $p = 0.66$) and no significant (at 5% level) interaction effect between time and group (time*group) ($F = 3.43$, $p = 0.07$) emerged.

Figure 10: Factorial ANOVA on NCT

4. Discussion

The longitudinal study aims to investigate how narrative skills develop in autistic children with different levels of functioning, as defined by a diagnosis that characterizes traits as varying in severity along a continuum (Lai et al., 2014). This study uses the nonverbal IQ score as descriptive data to examine differences in the development of narrative competence between low- and high-functioning autistic individuals. Nonverbal IQ is increasingly used instead of Full-Scale IQ in autism research (Bal et al., 2016). It is well established in autism research that there are peaks of abilities on nonverbal subscales and lower performances on verbal subscales, making the interpretation of the global score less relevant (Nader et al., 2015). Using intellectual assessment tools that rely less on language, and more on perception and logical reasoning may help access a more accurate portrait of cognitive abilities in autistic children, particularly minimally verbal ones.

Narrative ability is essential for everyday life as it increases social inclusion and promotes professional attainments; therefore, research in this field greatly impacts the personal well-being of individuals with impairment of this competence (Hilviu et al., 2023). Research into the spoken

language skills of autistic people has investigated a range of narrative features, with structural abilities typically examined at two levels: macrostructure and microstructure. This longitudinal study introduces the assessment of narrative production at the beginning (T2) and after (T3) a year of small group intervention focused on enhancing social skills. The within-group analyses showed a significant post-training improvement in some of the indexes of the narrative performance. Of course, we cannot say that the improvement in the children's skills is due to the training and not simply to the passage of time, as this would require a randomized controlled trial with a control group. However, involving autistic children in group rehabilitation activities helps them practice their storytelling skills. In fact, the focus on improving social skills includes working on language as a key element to enhance their communication skills. Therefore, the results will be discussed in light of previous studies on language development and functioning in autistic individuals.

As previously reported, the macrostructural analysis considers the overall organization of the narrative (Heilmann et al., 2010). Existing evidence appears to indicate that although autistic individuals can perform similarly to non-autistic participants on many microstructural measures, they tend to have more difficulties with macrostructure, resulting in less coherent spoken narratives (Conlon, et al., 2019; Hewitt, 2019).

The results show that the autistic children, after 10 months of small-group therapy focused on enhancing social skills, improved in the organization of the story content, mentioning in the storytelling task an increased number of events and using more properly the anaphoric use of the article. Significant differences emerged between the low and high-functioning groups in the measures of Events, Structure, and Anaphoric use of the article, indicating more difficulties for low-functioning autistic children in narrative performance.

In assessing the extent of different information incorporated by the narrator to enrich the story, the NCT evaluates Events and Agents, which are key elements in the narrative. The Events measure reports a significant change in this measure between T2 and T3. In particular, there are significant differences between the low and high-functioning groups, with lower performance in the former.

The macrostructural analysis also emphasizes respecting the characteristic structure that unites a story's narrative. Generally, a story opens with the presentation of the main characters and locations, the so-called initial situation. The occurrence of the problem-event follows the description of the initial situation, an adverse event involving the main character of the story, and around which will wind up the subsequent events, attempts to solve the problem. Finally, a story usually ends with the problem-event being solved and the protagonist's initial situation restored (Norbury & Bishop, 2003). At this structural level, data reports significant differences between the low and high-functioning groups on this measure, with significantly lower performance in the former.

A story is considered coherent when its various parts are not contradictory. The cohesion between the story's different parts comes from the events' coherence. The narrator can express this through various linguistic indicators, such as temporal and causal connectives and anaphora, to refer to elements already presented within the story (e.g., Norbury and Bishop, 2003). There is a significant change in the Anaphoric use of the article between T2 and T3 and a significant difference between the low and high functioning, with lower performance in the former.

Furthermore, a story can be enhanced by evaluative comments, words, and phrases that allow us to observe the narrator's ability to take on the characters' point of view. There has been a specific focus on psychological vocabulary within the narratives, which refers to words that describe the characters' mental states. Regarding the Psychological lexicon, the data analysis shows no significant change in this measure after the year of rehabilitation and no significant difference between the results in these measures of low and high-functioning groups of autistic children. This result is in line with the reported evidence in the literature about significant difficulties for autistic children, compared to their peers, in developing recognition and verbal identification of internal states (Baixauli et al., 2016).

The microstructural analysis tends to focus on linguistic form and content at the level of individual utterances. After 10 months of small-group therapy, the results reported a significant improvement for the autistic children in the NCT's tokens and MLU measures. These data align with previous studies that suggest improvements in the use of grammar in autistic children and adolescents attending narrative treatment sessions focused on story structure (Hilviu et al., 2023).

Among the indices generally used to describe the microstructural level of narratives, we find indicators related to the "quantity" of stories told. Examples are the total number of utterances and the number of words (Tokens) used to produce the narrative. The only significant result from the NCT measures related to the quantity index is the change in the number of Tokens performed between time 2 and 3.

Another widely used microstructural index in the literature is lexical variety, such as the number of unique words the child uses in their narration (Type) and the ratio between the number of different words used and the number of total words produced during the storytelling (TTR). At this level, the 2x2 factorial ANOVA only reported a significant difference in the TTR between the low and high-functioning groups, showing less lexical variety in autistic children with a non-verbal IQ impairment. Finally, the microstructural level can be traced back to the syntactic complexity of the utterances produced by the child. The index is the Mean Length of Utterance (MLU), usually calculated in Italian as the mean number of words per utterance. The MLU measures grammatical complexity (Rice et al., 2006) based on evidence that more morphosyntactically complex sentences are generally longer than simple ones. There is a significant difference in this MLU between times 2 and 3. The impact of the

group remains consistent across different times, and vice versa. However, a trend towards significance was observed ($p = 0.07$). Additionally, the plot indicates an interaction, as the gap between groups widens at Time 3.

The absence of interactions between low- and high-functioning groups indicates that both groups gradually increase in most macrostructural and microstructural narrative skills. These findings align with the initial hypothesis and address the need highlighted in the literature for longitudinal studies to draw more accurate conclusions about whether autistic children with different nonverbal IQs acquire language in distinct ways. By including verbal autistic children participating in small-group therapy, regardless of their nonverbal IQ level, this study aims to better represent the heterogeneity within the functioning spectrum of Autism. Narrative performance was assessed through a storytelling task that utilized images to respect and reflect the clinical complexity of this diagnostic category in rehabilitation and evaluation. In fact, this approach reduces the child's cognitive load (D'Amico et al., 2008) and makes the test more accessible.

In conclusion, the similarities in developmental trajectories between the two groups suggest that small-group intervention may be implemented for autistic children and adolescents at varying levels of functioning.

In interpreting the results of this study, some limitations should be considered. First, we did not compare our sample's performance to a control group of autistic children and adolescents who were not involved in small-group therapy. Future studies should include a control group to evaluate the efficacy of the proposed rehabilitation project. Second, normative data regarding narrative analysis for this age group are unavailable. Third, a problem arose in the distribution of participants in two groups, low and high functioning, since most children had a non-verbal IQ score equal to a higher value; therefore, the division made cannot be considered homogeneous in number between the two groups. Finally, it should be noted that the sample size could have impacted on the results. However, the difficulty in recruiting participants with the required demographic and clinical characteristics is a known limitation in the field, often resulting in reduced sample sizes that do not ensure sufficient statistical power (Tager-Flusberg, 2004).

This study is part of a larger project for autistic children and adolescents, which proposes to analyze socio-communicative and narrative skills and their relationship and evolution over time.

Given the need for training programs to enhance the narrative storytelling skills of autistic children and adolescents, future studies should aim to produce more generalizable results. This will provide a comprehensive understanding of the clinical limitations and implications.

5. Conclusion

In conclusion, this study focuses on the improvement of narrative skills in autistic children and adolescents who are in treatment through small-group rehabilitation projects to enhance social skills. This contributes to filling an important gap in literature with potential impact on the clinical approach, considering the importance of narrative skills for children and teenagers' educational achievement and psychosocial outcomes. Since narrative skills are used daily in everyday interactions and experiences, accurate assessment of narrative ability may be essential for the diagnostic process and intervention planning.

Literature suggests that narrative difficulties may persist in autism during adolescence and that a pragmatically oriented training program, such as small-group therapy, could be useful in improving narrative performance. This research into the spoken language skills of autistic people reported significant results obtained in the two levels of analysis, macrostructure and microstructure, after 10 months of small-group therapy. The study also showed differences in some of the NCT measures of the narrative performance between low and high-functioning autistic children and adolescents, with significantly lower performance in the former. However, there are no differences between the two groups in potential improvement, as their growth patterns are similar.

The encouraging results indicate a need for training programs to enhance the ability of autistic children and adolescents of different functioning levels to effectively plan, monitor, and produce coherent and communicatively appropriate narrative discourse that is well-received by their conversational partners.

FOURTH CHAPTER

1. Investigating the predictor of autistic children's narrative skills

1.1 Background

Autism Spectrum Disorder is a neurodevelopmental condition defined by persisting challenges in social communication and interaction across multiple contexts (Association American Psychiatric, 2013). Monitoring the acquisition of socio-communicative skills in rehabilitation projects proposed for autistic children helps track developmental gains in adaptive behaviour and identify appropriate educational and habilitative goals (Tassé et al., 2012). The multi-informant assessment approach is the most common strategy for assessing behaviour contextual variations (Kraemer et al., 2003). For children, these informants most often include parents, teachers, therapists, and, when possible, themselves (Hunsley & Mash, 2007). By considering reports from informants who vary among each other in the specific contexts in which they observe children's behavior, clinicians may understand how consistently or inconsistently patients display socio-communicative skills across different contexts (Dirks et al., 2012). In addition to differences between children's behaviors at home or the clinical center, parent and professional perspectives differ with respect to what is noticed, remembered, and deemed to be of concern (Lee, 2024). Data from distinct kinds of informants can provide potentially valuable information about variations in how socio-communicative competencies are perceived (Castagna & Waschbusch, 2023), consistent with the idea that some aspects of situational specificity influences informant ratings made based on different contexts (De Los Reyes, et al., 2013). Moreover, clinicians' views of children's problems may be affected by their professional mindsets and what they observe in clinical settings, which can differ from what occurs at home (De Los Reyes, et al., 2015). Clinicians may use informants' reports to decide and plan treatment (Hawley & Weisz, 2003) because such measures could be more representative of the child's potential, but they are inherently subjective and often reduce variability to a few categories on an ordinal scale (Trayvick, et al., 2024). Therefore, to deepen the knowledge of the socio-communicative skills of autistic children and adolescents, it is useful to consider other aspects that complement the indirect contextual evaluation. An approach that considers the combination of parent or clinical reported measure and observation-based evaluation allows a better understanding of several aspects of social and communicative function. Clinical evaluations of the communicative competencies for verbal autistic children and adolescents include language-based testing, covering domains like receptive language, syntax, language acquisition, and pragmatic language. Oral narrative is a complex form of discourse in which the speaker recalls a series of events to an audience, drawing upon a range of linguistic, cognitive, and pragmatic abilities (Norbury et al., 2014). Narrative skills are fundamental to daily

communication, social development, and learning (Petersen et al., 2014). However, the pragmatic use of language in social contexts can be a pervasive challenge for autistic individuals (Rapin & Dunn, 2003). Previous research highlighted that narrative tasks can reveal higher-order difficulties with extended discourse that may not be apparent when traditional language assessments are used (Volden, et al., 2017). Spoken narrative generation is therefore considered to be both a more sensitive and ecologically valid form of assessment for autistic individuals, also when they demonstrate language abilities in the typical range (Volden et al., 2017). Furthermore, narrative production presents several methodological advantages: it is a particularly useful tool for eliciting sequences of utterances from a relatively naturalistic and fluent speech sample (Stirling et al., 2014). Based on audio recordings of the participant's performance, narratives can be transcribed verbatim, converting them into a format that can be used for subsequent assessment. Specifically, the transcripts can then be coded for different features of interest, such as using references and including story grammar elements. Another methodological advantage is that narrative elicitation tasks can be structured to collect comparable speech samples across participants (Stirling et al., 2014). For example, wordless picture books are often used to elicit narratives, with all participants seeing the same pictures and having to interpret them (Geelhand et al., 2020).

Participants' characteristics, such as nonverbal cognitive ability, have been found to strongly predict later language acquisition (Thurm et al., 2007). However, high language ability in autism does not always relate to better narrative performance (Peristeri et al., 2017). In fact, the literature suggests that the acquisition of narrative competence depends also on factors external to language ability (Tuller et al., 2017; Wittke et al., 2017). However, previous studies have differed in whether they matched the groups on verbal and nonverbal abilities and/or age (Greco et al., 2023).

Consistent with research in neurotypical children indicating that children's narratives improve with age (Johnston, 2008), previous studies reported improvement in their basic macro-structure narrative with growing age (McIntyre et al., 2020).

Emerging evidence reported gender differences in narrative ability between girls and boys, finding that autistic girls were more likely to use internal state words or describe intentions than autistic boys (Boorse et al., 2019; Conlon et al., 2019). Nevertheless, gender has not often been considered in earlier studies on narrative ability in ASD.

It is still open the question of whether ASD children would exhibit differences in narrative skills depending on non-verbal IQ and sex (Greco et al., 2023). Furthermore, an investigation of the characteristics of autistic children and their social skills, which effectively predict linguistic outcomes, is needed. Increased clinical awareness of the factors influencing the development of

narrative competence could lead to more targeted and effective early interventions in the development of social communicative capacities of autistic children.

1.2 Aims

The ability to tell stories plays a crucial role in our daily social interactions. Stories help us make sense of our experiences and communicate them to others. When a child has difficulty with storytelling, it can affect their social interactions and communication skills. Understanding a child's narrative abilities can provide insights into their language, cognitive, and social-cognitive skills. Therefore, it is particularly important to conduct studies to understand the factors influencing narrative performance in children with autism, who experience challenges in the socio-communicative domain.

The aim of this longitudinal study is to examine early factors that can explain individual variability in children's narrative competence. Specifically, the study seeks to determine whether assessments of social skills by reference educators and parents, age, non-verbal IQ, or the gender of autistic children can predict the future development of their narrative competence.

The guiding hypothesis of this study is that well-developed social skills and increased age can predict the ability to create more complex and elaborate narratives. However, gender may serve as a predictor of the Psychological Lexicon score at the macrostructural level. In fact, the hypothesis suggests that autistic girls are more likely to use internal state words compared to boys.

By examining these elements, the goal is to understand how these variables contribute to shaping narrative competencies in this population.

2. Methods

This study used a longitudinal descriptive design to identify predictors of narrative skills development of autistic children involved in small-group rehabilitation projects. This research was conducted under the protocol approved by the Ethical Committee of the University of Milano-Bicocca. The beginning of the study included informing parents about the research objectives and asking for their consent for the participation of children. At the same time, parents and educators signed an informed consent form before being included in the study.

2.2 Participants

Participants in the longitudinal study were recruited at the Center Mafalda Luce for Autism and Developmental Age, by Fondazione Piatti Onlus in Milan.

A total of 35 children participated (28 males and 7 females) who at entry to the study: (a) were aged between 7 and 15 years old, (b) had a documented diagnosis of Autism Spectrum Disorder, and (c) engaged in small group psychoeducational project to enhance the social skills.

A description of the participants is provided in *Table 1*.

Table 1: Descriptions of participants

	Age		
	M	*DS*	Range
T1	9.48	2.22	7.00-15.40
T3	11.10	2.25	8.60-17.00

The non-verbal IQs of the children involved were available from the clinical assessment data and evaluated through different diagnostic tools due to the challenges of testing autistic children. The non-verbal IQ is between 29 and 155 (*M*=94.3; *DS*=24.5); these scores provide further descriptive data on the participants in this study, highlighting the heterogeneity in our cohort.

The assessment battery includes direct and indirect evaluation, which involves reference educators and parents of the autistic children involved in the study.

Fifteen educators engaged in the project. The group of professionals at the entry of the study had a mean age of 32.50 years (*SD*=7.74; range = 23 - 47) and a mean of 8.53 years of experience in ASD treatment (SD =6.88; range = 1 - 20). The educators filled out questionnaires for the children in their treatment group to allow an adequate collection of information based on direct knowledge and observation of their social behaviour during working hours in the small rehabilitation group. Educators are the professional figures responsible for managing the individual rehabilitation project of the child in the path of taking charge through treatment in small groups; they meet the children three times per week, spending 6 hours weekly with them.

The assessment of the indirect evaluation at Timpe point 1 involved the parents of 35 autistic children. The parents involved were: 22.9% both Italian, 65.7% both foreigners and 11.4% one Italian and one foreign. Given the socio-demographic characteristics, they were requested to complete the questionnaire in person at the center. This approach allowed them to receive assistance from a psychologist, if required, due to their diverse backgrounds and varying language proficiency.

2.3 Procedure

The educators were involved in the research through the study presentation during the multidisciplinary healthcare team meetings. Then, each child involved in a small group therapy project was engaged in the study by the reference educator of the rehabilitation project. For each participant, the assessment consisted of a part of an indirect evaluation, carried out by the educators who filled out questionnaires, and a direct part in which a psychologist individually administered tests.

Through the University of Milano Bicocca license, Qualtrics XM was used to distribute the questionnaires, allowing the creation of unique survey links to be sent to the educators of the children involved.

Due to the various backgrounds of the families of the children involved, the parents were asked to complete questionnaires in person. Appointments were scheduled with each parent so they could stay at the center during their children's therapy time and fill out the paper questionnaires. By doing so, a psychologist offered them personal assistance if they had any doubts or needed clarification on the request.

Educators and Parents completed the Stanford Social Dimension Scale (SSDS) and the ASD Behavior Inventory questionnaires, while participants completed the storytelling test Narrative Competence Task (see *Chapter* 2).

For this longitudinal study, indirect questionnaires evaluating the social skills of autistic children were completed at Time 1 (T1) at the beginning of the small-group rehabilitation project in October 2022. The assessment of the narrative performance was in Time 3 (T3) after 19 months and at the end of the second year of small-group intervention, May 2024.

Indirect evaluation:

ASD Behavior Inventory (ASDBI)

ASDBI is a short protocol to evaluate behaviours typical of Autism Spectrum Disorders (Cohen & Sudhalter, 2014) in different contexts of children's daily lives. ASDBI has been designed to quantitatively assess the response to therapy, considering the perspectives of different caregivers.

In this study, reference has been made to the composite scores of the ASDBI:

- The composite score of the problems of repetitiveness, ritualistic, and pragmatic (RIPRIT/C), i.e., the sum of the indices of problems of contact/isolation. Higher scores indicate a higher level of severity and impairment of the disorder.

- The composite score of the expressive skills of social communication (AECS/C), i.e., the sum of the indices of receptive/expressive social communication skills. Higher scores correspond to higher levels of competence.

ASDBI is a tool that measures the child's behavioural problems and social communication skills. It has been standardized and validated for use with males and females aged between 1 year and six months and 12 years and five months. Given the sample's age and related cognitive impairment, reference was made to the raw scores.

Stanford Social Dimensions Scale (SSDS)

The SSDS is a dimensional, quantitative measure (Phillips, et al., 2019) designed to capture, in both normative and clinical populations, individual differences in:

- Social motivation, e.g., "In a social situation, attempts to play with other children instead of avoiding the group."
- Social affiliation, e.g., "Will try to get my attention or interact with me, without being reminded to do so."
- Social communication, e.g., "When a familiar person tries to engage with my child, she/he responds positively and appropriately by smiling, saying hello etc."
- Social recognition, e.g., "Understands complex nonverbal gestures used by another person."
- Unusual approach, e.g., "Begins interactions/conversations in ways that seem unusual to others."

High scores on the SSDS test indicate higher competence, and lower scores indicate a higher severity level. The raw scores obtained in each subscale of the questionnaire were considered for the data analysis since the questionnaire is not yet standardized on the Italian population.

Direct evaluation:

Narrative Competence Task (NCT)

The NCT is a tool for assessing the production aspect of narrative competence through a storytelling task (Zanchi & Zampini, 2021). The stories were audio-recorded using a digital voice recorder, and the narratives were transcribed in CHAT format (MacWhinney, 2000) and then coded at macro and microstructural levels.

Macrostructural measures:

- Events, the number of things that happened in the story.
- Structure, the ability to tell a well-structured story, was assessed by considering how many of the story's key passages the child could tell.

- Agents: number of agents performing actions within the story.

- Anaphoric use of the article: the change from the initial use of the indefinite article to mention a character or object in the story for the first time to the use of the definite article to refer to it later.

- Psychological lexicon: this measure reflects the child's ability to assume a character's point of view.

Microstructural measures:

- Utterances: number of utterances in which the narrative is subdivided. A prosodic criterion (i.e., a change in intonation) was used to fragment the story into utterances.

- Types: number of different words used by the child.

- Tokens: the total number of words produced during the storytelling.

- Types/tokens Ratio (TTR): this measure is calculated by dividing the types by the total number of tokens.

- Mean length of utterances (MLU): value computed by considering the mean number of words per utterance (MLU = tokens/ total number of utterances).

Independent observers assessed the intercoder reliability in 30% of the sessions (n = 28). We used intra-class correlation coefficients (ICC) to assess reliability. The ICC was 0.98 (with a 95% confidence interval from 0.95 to 0.99) for events, 0.94 (with a 95% confidence interval from 0.88 to 0.97) for structure, 0.78 (with a 95% confidence interval from -0.08 to 0.93) for agents, 0.82 (with a 95% confidence interval from 0.60 to 0.92) for anaphoric article, and 0.95 (with a 95% confidence interval from 0.90 to 0.98) for psychological lexicon. The ICC was 0.99 (with a 95% confidence interval from 0.97 to 0.99) for utterances, 1.00 (with a 95% confidence interval from 1.00 to 1.00) for types, 1.00 with a 95% confidence interval from 1.00 to 1.00) for tokens, and 1.00 (with a 95% confidence interval from 0.99 to 1.00) for Mean Length of Utterance (MLU).

Since NCT is standardized for children aged 3 to 8 years (i.e., younger than the participants), raw scores were considered in data analysis.

2.4 Data Analysis

The data analysis used the SPSS program Version 28 (IBM Corp, 2021).

Preliminary analyses were first conducted to verify the consistency between educators' and parents' assessment of the child's social skills, the correlation (Pearson) was calculated among the questionnaire indexes.

Multiple linear regression models were performed to examine early factors that can predict narrative abilities. Bivariate correlational analyses were conducted before performing regression models. Once

key variables were identified, predictive models were developed. All multiple linear regression analyses were performed using the stepwise method, ensuring that only variables with the highest explanatory value remained as predictors. In each model, only those variables that showed a significant correlation in the bivariate analysis were entered as candidate independent variables.

The sample size used in each analysis varied according to the completeness of the data for the variables entered in each model and was a minimum of 35.

A predictive model was developed for each NCT measure to determine which early variables (measured at T1) better predict narrative competence after 19 months of small-group therapy.

Therefore, 10 predictive models were computed: Model 1, predicting Events; Model 2, predicting Structure; Model 3, predicting Agents; Model 4, predicting Anaphoric use of the article; Model 5, predicting Psychological Lexicon; Model 6, predicting Utterances; Model 7, predicting Types; Model 8, predicting Tokens; Model 9, predicting TTR; Model 10, predicting MLU.

Each model's percentage of variability is explained according to the corrected r-squared, and the estimated regression coefficients are reported.

3. Results

3.1 Correlations between informants

A preliminary analysis was conducted using Pearson correlations to compare the results of the questionnaire filled out by educators and parents who assessed the child's social skills. *Table 2* presents the correlations for all SSDS questionnaire subscales; notably, no significant results were found.

Table 2: Correlation (Pearson) between Educators' and Parents' SSDS measures

	Parents				
	SSDS_ social_motiv	SSDS_ affiliation	SSDS_ communication	SSDS_ recognition	SSDS_ unusual_appr
Educators					
SSDS_ social_motiv	0.09	0.17	0.10	0.14	0.17
SSDS_ affiliation	0.18	0.25	0.14	0.20	0.25
SSDS_ communication	0.04	0.08	0.09	0.11	0.18
SSDS_ recognition	0.07	0.16	0.08	0.11	0.19
SSDS_ unusual_appr	0.20	0.23	0.09	0.19	0.09

*p < 0.05

The correlation results between educators' and parents' scores on the ASDBI composite are presented in *Table* 3. There is a significant correlation between the responses of the two informants regarding the composite score for expressive skills in social communication. The results indicate a significant negative correlation between the expressive skills in social communication reported by educators and the repetitiveness, ritualistic behaviors, and pragmatic issues observed by parents. Additionally, there is a tendency toward significance in the composite score for issues related to repetitiveness, ritualistic behaviors, and pragmatics ($p = 0.07$).

Table 3: Correlation (Pearson) between Educators' and Parents' ASDBI measures

	Parents	
	ASDBI_ RIPRIT/C	ASDBI_ AECS/C
Educators		
ASDBI_ RIPRIT/C	0,305	-0,283
ASDBI_ AECS/C	**-,399***	**,684****

*$p < 0.05$; ** $p < 0.01$

3.2 Bivariate Correlations

The first step to developing predictive models of NCT at Time 3 is to analyze the bivariate relationships to identify potential predictors. Thus, we examined the correlation of narrative competence measures at T3 with T1 measures, considering social skills measured by parents' and educators' SSDS and ASDBI questionnaires (*Table 4*), age, gender, and non-verbal IQ (*Table 5*).

Table 4: Correlation between NCT at time 3, and social skills at T1

	Narrative Competence at Time 3									
	Events	Structure	Agents	Anaphoric use of the Article	Psychological Lexicon	Utterances	Types	Tokens	TTR	MLU
Social skills at T1										
SSDS_social_motiv (Educators)	-0.15	0.06	-0.03	0.27	-0.14	-0.03	0.03	0.04	-0.02	0.08
SSDS_affiliation (Educators)	-0.02	-0.02	0.12	0.25	-0.12	0.13	0.11	0.19	-0.22	0.11
SSDS_communication (Educators)	-0.02	0.02	0.21	0.03	-0.13	0.23	0.07	0.24	**0.35***	0.06
SSDS_recognition (Educators)	0.03	0.04	**0.34***	0.07	-0.01	0.29	0.12	0.24	-0.24	0.03
SSDS_unusual_appr (Educators)	0.24	0.21	0.17	**0.45****	0.00	0.02	0.32	0.14	0.23	0.18
SSDS_social_motiv (Parents)	0.11	0.06	-0.11	**0.36***	0.27	0.15	0.18	0.19	-0.06	0.04
SSDS_affiliation (Parents)	0.12	0.01	0.01	0.29	0.30	0.17	0.18	0.19	-0.07	0.02
SSDS_communication (Parents)	-0.03	0.01	-0.18	0.25	0.19	0.08	0.02	0.06	-0.03	-0.07
SSDS_recognition (Parents)	-0.02	0.00	-0.21	0.24	0.19	0.08	0.02	0.05	0.01	-0.10
SSDS_unusual_appr (Parents)	0.14	0.11	-0.01	**0.36***	0.20	0.10	0.18	0.22	-0.10	0.12
ASDBI_RIPRIT/C (Educators)	**-0.39***	**-0.44****	-0.29	**-0.56****	-0.18	-0.15	**-0.46****	-0.31	-0.04	-0.30
ASDBI_AECS/C (Educators)	**0.36***	0.33	**0.55****	**0.43****	0.12	0.19	**0.35***	**0.34***	-0.18	0.32
ASDBI_RIPRIT/C (Parents)	-0.08	-0.14	-0.10	-0.26	0.25	0.27	0.06	0.08	-0.11	-0.15
ASDBI_AECS/C (Parents)	0.20	0.23	0.33	0.13	-0.25	-0.14	-0.09	-0.08	0.04	0.05

** $p < 0.01$ (1%); *$p < 0.05$ (5%).

Table 5: Correlation between NCT at time 3, and sex, age, and IQ

	T1		
	Sex	Age	Non-verbal IQ
Narrative competence at Time 3			
Events	-0.01	0.24	**0.32***
Structure	0.04	0.33	**0.33***
Agents	0.19	0.27	0.11
Anaphoric use of the Article	-0.06	0.10	**0.34***
Psychological Lexicon	0.00	-0.20	0.13
Utterances	0.04	-0.16	-0.19
Types	-0.03	0.06	0.19
Tokens	-0.05	0.21	-0.01
TTR	0.03	**-0.43****	0.25
MLU	-0.09	**0.49****	0.23

** $p < 0.01$ (1%); *p <0.05 (5%).

3.3 Multiple linear regression models

After identifying potential predictor variables in the bivariate analysis, a predictive model was conducted for each narrative competence measure at T3. The following describes which variables were entered as candidate independent variables in each model, and which variables were entered in the resulting model. The variability explained by each model according to the corrected r-squared (r^2) is also detailed.

Table 6 presents the r^2 gain contributed by each variable introduced and the regression coefficients of each model.

3.3.1 Macrostructural models:

- For Model 1 predicting NCT Events at T3, the following independent variables were considered: Composite score for Problems of repetitiveness, ritualistic and pragmatic (according to Educators), Composite score for Social communication skills (according to Educators) and Nonverbal IQ. The other variables were not considered because they did not show a significant bivariate correlation. After stepwise estimation, the resulting Model 1 identified only ASDBI RIPRIT/C (Educators) as a significant predictor, explaining 13.1% of the variability observed in NCT Events at T3.

- For Model 2 predicting NCT Structure at T3, the following independent variables were considered: Composite score for Problems of repetitiveness, ritualistic and pragmatic

(according to Educators) and Nonverbal IQ. The other variables were not considered because they did not show a significant bivariate correlation. After stepwise estimation, the resulting Model 2 identified only ASDBI RIPRIT/C (Educators) as a significant predictor, explaining 17.1% of the variability observed in NCT Structure at T3.

- For Model 3 predicting NCT Agents at T3, the following independent variables were considered: Social Recognition (Educators) and Composite score for Social communication skills (according to Educators). The other variables were not considered because they did not show a significant bivariate correlation. After stepwise estimation, the resulting Model 3 identified only Social communication skills (Educators) as a relevant predictor, explaining 28% of the variability observed in NCT Agents at T3.

- For Model 4 predicting NCT Anaphoric use of the article at T3, the following independent variables were considered: Unusual Approach (Educators), Social Motivation (Parents), Unusual Approach (Parents), Composite score for Problems of repetitiveness, ritualistic and pragmatic (Educators), Composite score for Social Communication Skills (Educators) and Non-verbal IQ. After stepwise estimation, the resulting Model 4 identified as significant predictors: ASDBI RIPRIT/C (Educators) and Unusual Approach (Parents), which together explain 40.5% of the variability observed in NCT Anaphoric use of the article at T3.

- Model 5 predicting NCT Psychological lexicon at T3 could not be estimated since no time 1 measure presented a significant bivariate correlation.

3.3.2 Microstructural Models:

- Model 6 predicting NCT Utterances at T3 could not be estimated since no time 1 measure presented a significant bivariate correlation.

- For Model 7 predicting NCT Types at T3, the following independent variables were entered: Composite score for Problems of repetitiveness, ritualistic and pragmatic (Educators), Composite score for Social communication skills (Educators). After stepwise estimation, the resulting Model 7 identified only ASDBI RIPRIT/C (Educators) as a relevant predictor, explaining by itself 18.7% of the variability observed in NCT Types at T3.

- For Model 8 predicting NCT Tokens at T3, only the Composite score for Social communication skills (Educators) was considered as independent variable. After stepwise estimation, the resulting Model 8 identified that Social communication skills (according to Educators) explain 9.2% of the variability observed in NCT Tokens at T3.

- For Model 9 predicting NCT TTR at T3, the following independent variables were entered: Age and Social Communication (Educators). After stepwise estimation, the resulting Model

9 identified only Age as a relevant predictor of the TTR at T3, explaining 16.5% of the variability observed in NCT TTR at T3.

- For Model 10 predicting NCT MLU at T3, only Age was considered as independent variable. After stepwise estimation, the resulting Model 10 identified that Age predicts 21.4% of the variability observed in NCT MLU at T3.

Table 6: Predictive models of Narrative competence at T3 based on T1 measures

Model	Dependent variable	Entered variables	r^2 change	Total adjusted r^2	Model coefficients
1	Events	1. Problems of repetitiveness, ritualistic and pragmatic (Educators)	r^2= .156	r^2=.131	Constant=23.325 B_1= -0.095
2	Structure	1. Problems of repetitiveness, ritualistic and pragmatic (Educators)	r^2=.195	r^2=.171	Constant= 6.372 B_1= -0.034
3	Agents	1.Social communication skills (Educators)	r^2=.301	r^2=.280	Constant= - 0.158 B_1= 0.039
4	Anaphoric use of the Article	1. Problems of repetitiveness, ritualistic and pragmatic (Educators) 2. Unusual Approach (Parents)	r^2=.290 r^2=.443	r^2=.405	Constant= 2.207 B_1= -0.031 B_2= 0.108
5	Psychological Lexicon	None	None	None	None
6	Utterances	None	None	None	None
7	Types	1. Problems of repetitiveness, ritualistic and pragmatic (Educators)	r^2=.210	r^2=.187	Constant= 100.608 B_1= -0.427
8	Tokens	1.Social communication skills (Educators)	r^2=.118	r^2=.092	Constant= 7.042 B_1= 1.233
9	TTR	1. Age	r^2=.190	r^2=.165	Constant= 0.596 B_1= -0.016
10	MLU	1. Age	r^2=.237	r^2=.214	Constant= 2.423 B_1= 0.373

The candidate variables that do not appear were excluded from the model because they did not contribute a significant gain (p > .05). Entered variables are reported in the order of entry, i.e., from the one with the highest predictive weight to the one with the lowest. Adjusted r2 = adjusted r squared. All coefficients were significant (at least p < .05).

4. Discussion

This longitudinal study investigates the variables influencing narrative performance in autistic children who participate in small-group therapy to enhance social skills. Storytelling is a critical aspect of social interaction, as it is through narrative practices that children make sense of their world and communicate their experiences with others. Hence, impairments in narrative competence can greatly affect children's social interactions. Therefore, clinicians should consider narrative impairments in assessment and treatment plans for neuroatypical children. Early detection and

intervention for children with language impairment can be extremely relevant if we consider the potential effects of linguistic difficulties on later life.

This study explored how social skills in autistic children, as evaluated by educators and parents, could predict the children's narrative performance after two years of psychoeducational treatment. Given the variety of findings in existing literature, this study also aims to analyze how variables such as age, non-verbal IQ, and gender may influence the development of narrative skills in autistic children and adolescents after 19 months of small-group therapy.

The multi-informant approach used in the study highlights the importance of gathering insights from various informants to gain a comprehensive understanding of children's competencies. The results from the ASDBI indicate a significant correlation between reports from parents and educators regarding the assessment of socio-communicative skills. There is also a trend towards significance concerning the observation of behavioral problems. Additionally, when educators identify stronger social and communicative skills in children, this is correlated with fewer behavioral issues observed at home. In contrast, the SSDS questionnaire does not show a significant correlation between the responses provided by parents and educators in assessing different dimensions of social competence. This discrepancy may be due to the different structure of ASDBI's questionnaires. In fact, this tool developed distinct protocols for parents and professionals to make them more suitable for detecting particular behaviors in different contexts (home and school or clinic). The SSDS, on the other hand, consists of a single questionnaire designed for parents of children with autism. Additionally, SSDS is significantly shorter, leading to more general and less specific items than those found in the ASDBI. This lack of specificity allows for greater interpretation, potentially influenced by the varying roles and competencies of the two informants. Moreover, the use of more general items may create comprehension difficulties for many parents involved, particularly for those who are not native Italian speakers.

The data analysis considered the two levels of analysis for assessing children's narrative competence: macrostructure and microstructure.

Macrostructure refers to the ability to produce a well-structured, coherent, and cohesive story. The results show that at the macro-structural level, the narrative performance of autistic children is predicted by variables such as Composite score for Problems of repetitiveness, ritualistic and pragmatic (Educators), Social communication skills (Educators) and Unusual Approach (Parents).

Microstructure focuses on the linguistic features used in the narration, including lexical variety, mean length of utterance, and syntactic complexity. The results show that at the micro-structural level, the narrative performance of autistic children is predicted by variables such as Composite score for

Problems of repetitiveness, ritualistic and pragmatic (Educators), Social communication skills (Educators) and Age.

The issues related to repetitiveness, ritualistic behavior, and pragmatic difficulties encompass a range of factors, including sensory and perceptual engagement, resistance to change, social challenges, and semantic and pragmatic obstacles. In this case, the evaluation is based on feedback from educators regarding children with autism. The findings indicate that autistic children facing significant challenges in these areas tend to struggle with narrating events in a story, identifying key parts of the narrative, mastering the anaphoric use of articles, and using a variety of words in storytelling. Repetitive and restricted behaviors are central features of autism spectrum disorders. These behaviors include repetitive motor movements, intense focus on specific objects, sensory sensitivities, and a strong preference for sameness and routine (American Psychiatric Association, 2013). The link between pragmatic language difficulties and repetitive behaviors (RRBs) in individuals with autism is well-documented (Keating et al., 2024). Previous research shows that the prevalence of RRBs in children with autism significantly hinders learning and social adaptation (Leekam et al., 2011). Children exhibiting higher levels of RRBs are likely to have underdeveloped receptive and expressive language skills and lower levels of adaptive communication and socialization (Troyb et al., 2016; Lampi et al., 2020). These studies highlight the necessity for a longitudinal examination of the long-term effects of RRBs on future outcomes (Troyb et al., 2016). The results of our study confirm that RRBs adversely affect the organization and coherent sequencing of story grammar components, as well as the range of vocabulary used by autistic children and adolescents. This evidence enhances our understanding of the therapeutic needs of autistic individuals and informs us about the development of appropriate intervention programs. There is a growing recognition that more tailored approaches to treatment, which modify the environmental factors that provoke or sustain issues of repetitiveness, ritualistic behaviors, and pragmatics, may be more effective in reducing RRBs (Lampi et al., 2020). In effect, Latrèche (2024) research demonstrates that improvements in receptive and expressive language skills are associated with reduced RRBs. Therefore, the clinical recommendation is to prioritize intervention for the repetitive behaviors and pragmatic challenges of autistic children, rather than focusing solely on developing their narrative skills.

Social communication skills refer to a child's ability to connect with others through appropriate verbal and non-verbal communication. These skills, as evaluated by the educators, have found to be predictive of how well autistic children recognize and label the main characters in a story. The results show that when a child can engage in spontaneous interactions and respond appropriately to others, he can identify the story characters as active agents. Additionally, social communication skills

correlate with how many words children use during storytelling tasks. This suggests that a child's ability to establish both verbal and non-verbal contact with others is essential for their engagement in narrative tasks, leading to longer storytelling.

Since storytelling is a way to create shared experiences within a social group, these findings highlight the importance of having emerging social communication skills for effective storytelling (Goldingay et al., 2020). The implications of this research, along with the suggestion reported in the Adams Research Report (2012), are that intensive social communication interventions can improve the overall quality of conversations among autistic children and adolescents. By emphasizing the social dimensions that influence narrative performance, this longitudinal study recommends focusing early intervention efforts on strengthening social communication skills.

In the subscale of Unusual Approach, which measures unusual social approach behaviors related to impairments in self-regulation and externalizing behaviors, lower scores indicate a higher severity level. As assessed by parents, this measure predicts that autistic children with a more severe Unusual Approach develop less mastery of the Anaphoric use of the article. As reported in the *second chapter*, the items of this dimension of social skills evaluated with the SSDS questionnaire overlap and correlate to the Problems of repetitiveness, ritualistic and pragmatic of the ASDBI: both refer to the identification of unusual behavior, which, as previously reported, effectively seems to impact the level of cohesion in telling a story. This is the only predictive measure considering the evaluation made by parents, which differs from educators' results. Previous studies highlighted that the low levels of agreement between informants could be explained, at least in part, by the different perceptions among informants and the different contexts of observation (Martel et al., 2017). In addition, specific manifestations of either conduct, attention/hyperactivity, or oppositional problems might be expected to occur more frequently in one context over another (such as the clinical center or at home) in some children (Lapalme et al., 2020). The lack of alignment across informants in the perception of social skills highlights the critical need to include multiple perspectives when planning interventions for autistic children and adolescents (Hume, et al., 2018). Therefore, this study confirms the need to engage more than one informant who can report on children's behavioral problems in different contexts to gain a completer and more representative picture of their functioning (Barry et al., 2013).

Age is a relevant predictor of the types/tokens ratio (TTR) and the mean length of utterances (MLU). Therefore, as age increases, the narratives of autistic children become more morphosyntactically complex. Previous literature found age significantly related to the measures of narrative ability, such that older children used more propositions and evaluative devices than younger children within the

ASD group. These findings are not particularly surprising given the developmental trajectories of storytelling skills across childhood (Rathmann et al., 2007). The growth observed in this sample could reflect the response of autistic children to exposure to oral and written narratives in school, at home and in the clinical center (McIntyre et al., 2020).

Typically developing girls and boys have different narrative experiences from an early age, leading to distinct storytelling styles. Studies indicate that girls tend to tell longer, more emotionally expressive narratives and are more likely to reference others' internal states (Bohanek & Fivush, 2010; Schulkind et al., 2012). Additionally, research by Boorse (2019) found that autistic girls exhibited a unique mixed narrative style, resembling autistic boys in their use of nouns and showing similarities with typical girls and boys in the cognitive process words domain. Unlike this emerging evidence, our study did not identify any gender-based influences on the Psychological Lexicon, a measure of the ability to describe internal states. These contrasting results could be ascribed to the gender imbalance among the autistic children and adolescents involved in the studies. Although the proportion of boys to girls aligns with the higher prevalence of ASD diagnoses in boys, the number of girls in the study may have been too small to reveal significant trends regarding their proficiency in using psychological language in narratives. Furthermore, participants in Boorse's study had full-scale, verbal, and nonverbal IQ estimates greater than 79 on a standardized intelligence test, whereas the current study includes both high- and low-functioning children.

The results did not indicate any significant predictive relationship between non-verbal IQ and narrative performance. These findings align with the hypothesis of the literature, which suggests that the acquisition of narrative competence depends on factors external to general cognition (Tuller et al., 2017; Wittke et al., 2017).

Identifying the predictive variables that function as barriers or facilitators to develop narrative performance in autistic children and adolescents is crucial for designing effective interventions that aim to support individuals in achieving storytelling competence. Considering the impact of narrative skills on establishing and maintaining everyday interactions with conversation partners, it is essential to address this developmental area in treatments for this neurodiverse population.

The results of this longitudinal study indicate that clinicians must acknowledge the negative effects of repetitive, ritualistic behaviors, and pragmatic challenges, as these factors hinder the development of narrative skills. Therefore, proposed treatment interventions should initially adopt rehabilitation strategies to manage such behaviors. This can include environmental modifications that promote the well-being of autistic individuals. Moreover, psychoeducational interventions should focus on enhancing the ability of autistic children to utilize both verbal and non-verbal communication in

active interactions with their communicative partners. In fact, strengthening this aspect of development, known as social communication, can effectively foster children's narrative skills.

The results should also be interpreted in the light of some limitations.

First, the participants are all children treated at the same rehabilitation center, so the skills analyzed are undoubtedly affected by the methodology and the therapeutic approach adopted. There was no control group which did not receive any kind of intervention. Therefore, it is impossible to say how narrative ability naturally develops in 19 months without any kind of intervention.

A further limitation is the fact that the narrative skills of the participants were evaluated only through a storytelling task with images. It will be important to compare children's narrative abilities across different discourse contexts, including conversation and narratives elicited using different types of stimuli (Peristeri et al., 2017). Particular patterns of strengths and weaknesses have been documented across contexts in prior studies of autism (Losh & Capps, 2003).

Additionally, considering the multi-informant approach, a limitation of this study is that most of the parents are not native Italian speakers, which may have led to interpretative difficulties in filling out the questionnaires. Furthermore, future studies should involve teachers as informants; given how much time children and adolescents spend at school, that is the main context in which they can exercise their social skills with neurotypical peers.

Finally, it should be noted that the sample size could have impacted the results. However, the difficulty in recruiting participants with the required demographic and clinical characteristics is a known limitation in the field, often resulting in reduced sample sizes that do not ensure sufficient statistical power (Tager-Flusberg, 2004). This limitation is integral to research embedded within the clinical practice (Janssen, et al., 2020).

5. Conclusion

This study provides insights into the developmental trajectories of narrative abilities in autistic children and adolescents. The longitudinal results allow for a better understanding of how social skills, age, nonverbal IQ, and gender contribute to shaping narrative competencies in this population. The findings show that children facing more challenges with pragmatic skills, exhibiting numerous repetitive or ritualistic behaviors, and adopting more unusual approaches tend to create fewer complex stories, struggling to produce well-structured, coherent, and cohesive narratives. Meanwhile, better social communication skills predict an enhanced ability to recognize a character's role in a story and engage more effectively in storytelling, leading to longer narratives.

In Autism Spectrum Disorder, socio-communicative impairments significantly affect children's social interactions. Narrative storytelling plays a crucial role in these interactions by helping children

understand their world and share their experiences with others. Therefore, clinicians and educators should recognize the predictors of narrative and pragmatic language impairments to develop effective treatment plans for autistic children and adolescents. Early detection and intervention regarding storytelling difficulties can be particularly important, especially considering that these challenges may persist in adolescence.

FIFTH CHAPTER

1. Bridging the Gap Between Research and Clinical Practice

The design of this PhD Executive project began with the results that emerged from the debate highlighting the difficulty of recognizing the evidence base in the autism intervention field (Vivanti G., 2022). The scope of the evidence base for autism intervention is limited, mainly reflecting short-term, proximal, and context-bound results (Sandbank et al., 2021). Additional research on outcomes reflecting more distal, generalized, and long-term intervention effects is needed, a priority that extends to psychosocial interventions in the broader effort to characterize the behaviour of children with autism in multiple environments (Kasari, 2015).

This longitudinal descriptive study aims to contribute to a better understanding of the autistic phenotype, broader and more representative than that garnered by relatively brief diagnostic encounters (Vivanti & Messinger, 2021). This explorative research project followed for two years the development of social and narrative skills of a group of autistic children involved in small psycho-educational groups to enhance their social skills. It is based on the needs of clinical practice to ensure that the results can be effectively spent at an operational level and guarantee the enrichment of the intervention model.

2. Clinical Implication of Research project design

2.1 Individualized Rehabilitation Projects

Beginning with a review of the scientific literature, a comprehensive multi-informant assessment battery was developed to monitor the social skills of autistic children participating in small-group therapy. To enhance the impact of this research on clinical practice and improve the quality of services provided to users, the findings on the development of the child's skills across various life contexts were considered to evaluate the variability in the child's behaviour. In fact, the study was designed to capture aspects of the social functioning of autistic individuals, not only in clinical practice settings, but also in their daily environment.

The project involved healthcare professionals to share objectives, methods, and findings at various stages throughout the research process. Therefore, the results from the data collection were communicated to the multidisciplinary team involved in the care of autistic children and adolescents through the organization of meetings.

The multi-informant approach employed provided clinicians with valuable insights into educators' and parents' perspectives on the child's functioning. To simplify and make available these results, a comparison of scores was presented through graphs created for each child, as reported in the examples

shown in *Figure 1* and *Figure* 2. In line with the findings of the first study, the Stanford Social Dimensions Scale allowed professionals to analyze the different components of the social functioning of an autistic child.

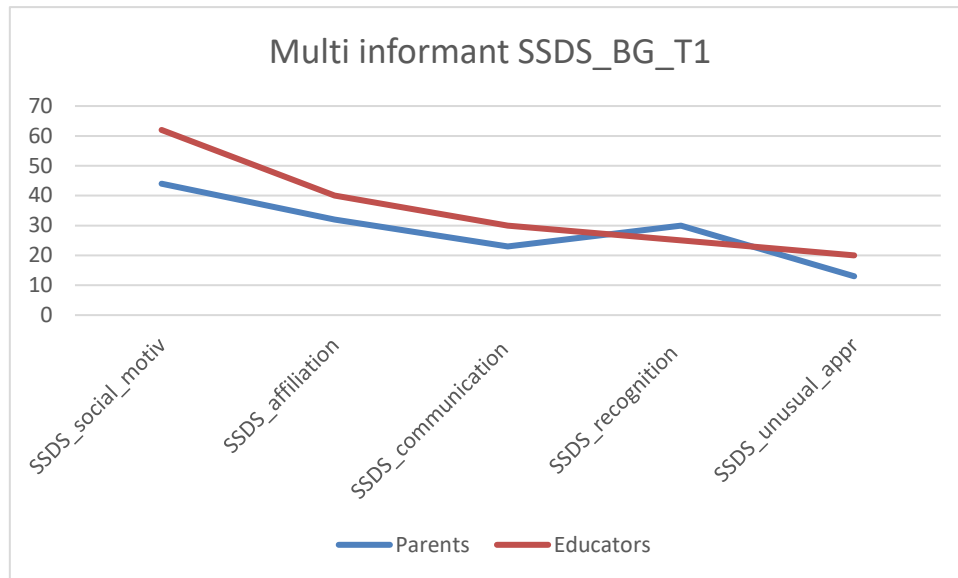*Figure 1: Comparison of Parents' and Educators' SSDS scores in the evaluation of BG at T1*
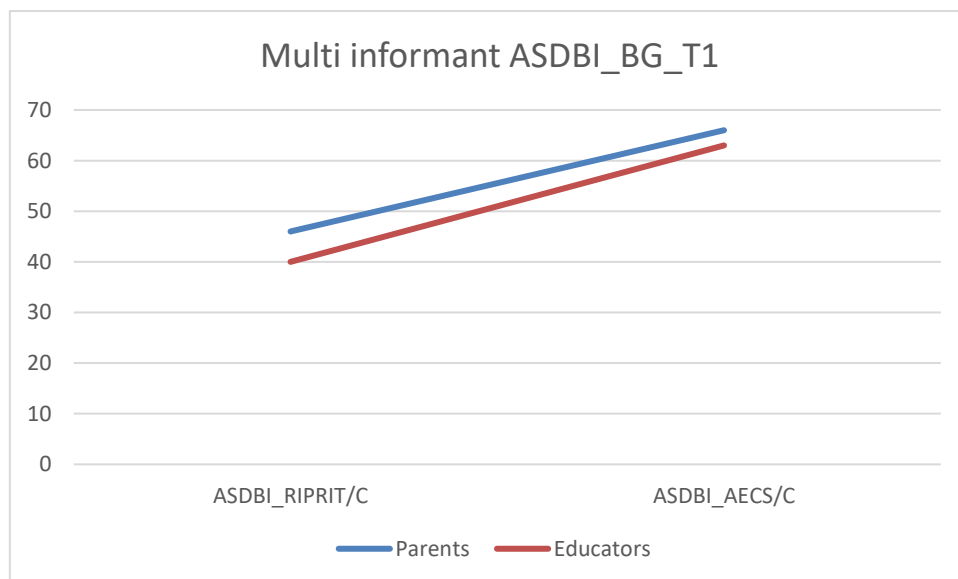

Figure 2: Comparison of Parents' and Educators' ASDBI composite scores in the evaluation of BG at T1

At the clinical level, an expected outcome of the research project was the introduction of a battery of evaluations into rehabilitation practice. This assessment was needed as a reference for monitoring the rehabilitation progress of each child based on his individualized goals. The assessment battery proposed by this research project addressed this clinical need over two years of rehabilitation, ensuring that each child's achievements were consistently monitored. The results from direct and indirect evaluations at each time point were documented in the personal medical records of each child.

With the approval of clinical leaders, the assessment battery developed through this research has been adopted as a tool to assist professionals in identifying personalized rehabilitation objectives for autistic children and in monitoring their development.

2.2 Small group therapy

This exploratory research aimed to identify innovative evaluation tools to systematize the selection criteria for autistic children and adolescents to access small treatment groups, which were previously based solely on age, IQ, and clinical observations. The primary objective of these therapy groups is to enhance socio-communicative skills in autistic children. Therefore, identifying groups of children with similar levels of social skills, as manifested in the clinical center, would facilitate the establishment of common intervention goals and maximize the effectiveness of the rehabilitation project.

Starting from the first data collection point, the scores derived from the educators' evaluations of social skills demonstrated by each child in the clinical center were shared with the multidisciplinary healthcare team. This information was represented in a comprehensive overview of the social competencies assessed for the autistic children and adolescents involved in the 11 different therapy groups, an example of which is reported in *Figure 3* and *Figure 4*. The presentation of the data collection results to the healthcare multidisciplinary team encouraged open discussions about potential adjustments to the group compositions for the upcoming rehabilitative year.

Figure 3: Group 1 social skills assessed by educators' SSDS
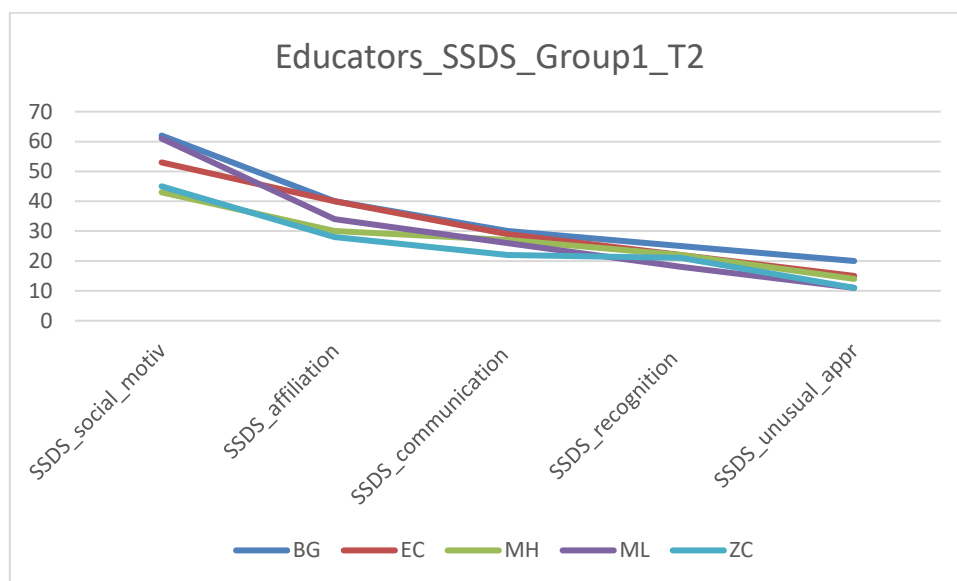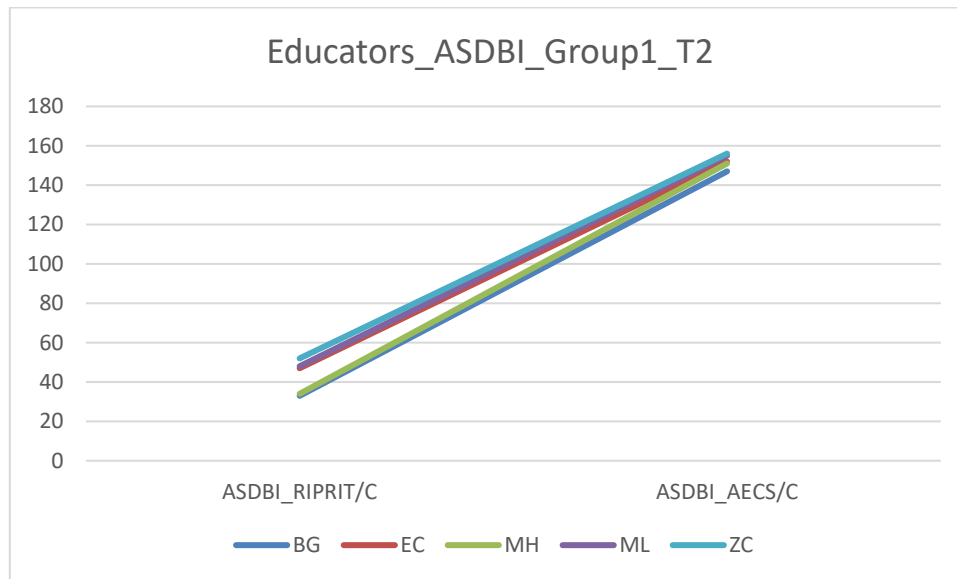
Figure 4: Group 1 social skills assessed by educators' ASDBI

The social skills assessment battery was adopted to select participants for small therapy groups for neuroatypical children. The SSDS and ASDBI questionnaires were used to assess participants' social skills levels, thereby helping to structure interventions around common rehabilitation objectives. Consequently, the research project's data collection made it possible to propose changes to systematize the intervention model following the guidelines for the treatment of Autism Spectrum Disorder (Istituto Superiore di Sanità, 2015). Finally, the explorative study made through the Executive PhD project allowed the multidisciplinary team to rediscuss the model of psycho-educational treatment adopted in clinical practice, impacting the everyday rehabilitation work conducted at the rehabilitation center.

3. Clinical implication of Research Project results

This research project explores the relationship between social skills and narrative abilities in children and adolescents with autism. By investigating the socio-communicative deficits reported as diagnostic criteria within the Autism Spectrum Disorder continuum, the studies aimed to enhance our understanding of the autistic phenotype and to identify potential avenues for rehabilitation. In fact, previous studies highlighted the urgent need to support autistic children and adolescents in strengthening social skills to help form friendships in everyday social contexts.

The first cross-sectional study showed a significant correlation between social skills and narrative competence in autistic children with different functioning profiles: children with more developed social skills can produce more complex and elaborate narratives than children with lower social skills. The longitudinal study confirmed this evidence, recognizing social communication as a significant predictor of the enhanced ability to recognize a character's role in a story and engage more effectively

in storytelling, leading to longer narratives. The clinical side of this finding is the suggestion for early intervention to focus on reinforcing the autistic child's ability to recognize and appropriately use verbal and non-verbal communication during the interaction.

Additionally, the findings showed that children who exhibit numerous repetitive or ritualistic behaviors and adopt more unusual approaches tend to create fewer complex stories, struggling to produce well-structured, coherent, and cohesive narratives. This predictive report highlighted the need to investigate the origin of such behavioral manifestations further so that effective environmental and psycho-educational interventions can be structured to contain them.

The significant results observed in developing narrative competencies, analyzed from macrostructure and microstructure perspectives after one year of small-group therapy, are encouraging. They showed the potential for structuring targeted rehabilitation interventions. These findings suggest to focus on reinforcing storytelling within rehabilitation projects for neuroatypical peer groups. Notably, the evidence reported similar positive outcomes in the development of narrative skills for both high- and low-functioning individuals. This supports the clinical decision to implement rehabilitation interventions in small groups for autistic children across various levels of functioning to enhance their socio-communicative skills.

4. Conclusion and future directions

Individuals on the spectrum face personal difficulties related to their experience as being autistic, with many reporting challenges in areas such as social inclusion and interpersonal relationships (Milton, 2012). The socio-communication impairment, which is a criterion for autism diagnosis, dramatically hinders their ability to form friendships. For verbal autistic individuals, a key element of successful communication is developing narrative skills. Effective storytelling is crucial in initiating and maintaining social relationships among peers during school age. Given the close relationship between social and narrative skills, this research analyzed their correlation and evolution over time to contribute to a better understanding of the autistic phenotype, which is representative of different levels of functioning.

The results confirmed a significant correlation between various dimensions of socio-communicative skills and the narrative performance of autistic children and adolescents. The findings provided insights into the predictive relationship between both the dimensional aspects of social skills and the typical behavioral problems associated with autism on the development of narrative competencies. Additionally, the longitudinal study focused on the evolution of storytelling ability and demonstrated the potential for positive growth in mastering narrative skills achieved by autistic school-age children at different functioning levels.

The design of the longitudinal study, developed in collaboration with clinicians from the therapeutic center, influenced the systematic approach to the proposed small-group rehabilitation treatment. The introduction of a multi-informant assessment battery has facilitated continuous monitoring of the progress of the children involved in the intervention. This tool has proven valuable for tracking the development of each child and offered essential contextual insights to help identify individualized rehabilitation goals. Additionally, it enabled the introduction of the evaluation of social skills as a criterion for composing small-intervention groups with more uniform competencies. Since the primary focus of small therapy groups for autistic children is to improve and enhance their social skills, identifying groups of children with similar competencies would help establish common goals for intervention.

The small group treatment for autistic children and adolescents creates a safe space where they can exercise the social skills needed for interacting with one another. This approach answers the need for interventions to be provided respectfully and focuses on teaching useful skills. However, to effectively improve the quality of relationships among autistic children and adolescents, it is essential that the rehabilitative intervention focuses on enhancing skills that are predictive of advancements in their socio-communicative competencies. Based on the findings of this research, psychoeducational interventions in small groups should primarily focus on enhancing specific aspects of social skills at the clinical level. It is important to renew these interventions by providing targeted training for educators responsible for rehabilitation projects.

Future studies could aim to investigate the long-term development of socio-communicative competencies with a clearer definition of objectives and intervention approaches. By establishing a control group, the outcome of the intervention could be assessed through a longitudinal study.

Finally, future studies should include teachers in multi-informant evaluations to provide a more comprehensive understanding of generalization in the learning process. This will help to understand if improvements in socio-communicative competencies translate to developing enriched relationships with neurotypical peers in everyday contexts.

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Acknowledgment

This doctoral thesis is the result of enriching collaborations among people, ideas, experiences, and perspectives that have shaped these three years of intense work.

First, I would like to thank my tutor, Professor Laura Zampini, for her unwavering passion and professionalism. Her support has been invaluable in helping me complete this doctorate. I also thank my business tutor, Paolo Meucci, for encouraging me to embrace this challenge. Additionally, I wish to express my gratitude to Professor Alessandro Crippa and Professor Victoria Sánchez-Gómez for their generous contributions of expertise to this project.

I would also like to recognize my fellow doctoral students, Giulio and Margherita, who provided me with an insight into the world of academia. I thank my colleagues for sharing the efforts and joys of our daily moments, which have fostered deep friendships.

I deeply appreciate my large family, both by blood and by choice, whose presence has been a vital resource for me. I am thankful to my parents and siblings: a family I can always count on. I am also grateful to Nonna Franca, my safe space.

I am deeply grateful to Gionata for supporting me with sincere love. I thank Silvia for being my life companion, Erica for always standing by my side, and Fede for being back in my life.

I am grateful to the world of athletics, a passion that has allowed me to make my friends for life.

I want to express my gratitude to Fondazione Piatti Onlus for their trust in me and for providing funding for this PhD Executive project to advance the understanding and support of autistic children and their families.

I am thankful to all the children, families, and educators who participated in this study. Finally, a special thanks goes to the daily work of the rehabilitation team of Mafalda Luce Center for Autism and Developmental Age.