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Local Coherence, Emotional Empathy and Cognitive Empathy of Children with High Functioning Autism

Tammy Groman

*Talpiot College, Ono Academic College, Israel

*Corresponding author:

Tammy Groman, E-Mail: Tammy.groman@talpiot.ac.il

Abstract.

The current study investigates the impact of meditation to local coherence on emotional and cognitive empathy in children with High-Functioning Autism (HFA), aged five to seven, attending special education programs in Israel. Based on the Weak Central Coherence Theory (Happé & Frith, 2006), Theory of Mind (Osterhaus & Koerber, 2021), Mediated Learning Experience (MLE) and Structural Cognitive Modifiability (SCM) theories (Feuerstein et al., 1981), the research aimed to explore how children with HFA process information and express empathy while reading stories in which different social situations are described. Twenty-six children (18 boys, 8 girls) participated diagnosed with HFA, aged five to seven, divided into intervention and control groups. The intervention group received mediation during completing a local coherence inference test, while the control group completed the test independently. Two main tools were used: the Children Local Coherence Perception Questionnaire and the RAMA Empathy Questionnaire, both administered pre- and post-intervention. Results demonstrated a significant positive correlation between cognitive empathy and local coherence perception, as well as between responses to social situations and local coherence perception. While emotional empathy showed significant improvement in the intervention group post-mediation, no significant differences were found between groups in other measures. The findings highlight the potential of mediation in enhancing emotional empathy in children with HFA, though broader improvements may require more intensive interventions.

Keywords: High-Functioning Autism (HFA); Mediated Learning Experience (MLE); Local Coherence; Empathy ; Social Understanding.

1. Introduction

Autism is a neurodevelopmental disorder characterised by impairments in communication and social interaction, repetitive behavior patterns, and unique areas of interest. In early childhood, social communication deficits manifested as difficulties in making eye contact, understanding facial expressions, and developing peer relationships (APA, 2013). Children with autism exhibit a range of strengths and challenges, particularly in emotional expression and cognitive empathy. Cognitive empathy, as a fundamental element of social cognition, refers to the ability to interpret social situations and respond appropriately (Nuske & Bavin, 2015).

A more nuanced understanding of autism suggests a complex view. The double empathy theory posits that social communication difficulties in autism arise not from a lack of emotional resonance but from a gap in mutual understanding between individuals on the spectrum and those who are not. Individuals with autism can form social connections and demonstrate empathy, particularly in interactions with others on the spectrum (Mitchell et al., 2021).

Local coherence is defined in professional literature as the ability to link different pieces of information to form a meaningful and complete picture. This skill is essential for understanding social situations, which require linking verbal and non-verbal cues. Some children with autism tend to focus on individual details and struggle to see the overall picture, which can affect their understanding of social situations (Nuske & Bavin, 2015; Tzuriel & Groman, 2017).

The aim of this study is to examine the impact of meditation to local coherence on expressions of empathy and understanding social situations in children with autism. The quantitative study was conducted in an educational setting and assessed the impact of implementing mediation strategies aimed at promoting coherent understanding of social situations in children with autism. The significance of the study lies in expanding theoretical knowledge about the relationship between local coherence ability and empathy in young children with autism, an area which has not been widely explored. Insights from the study may provide tools for educators and therapists working with children with autism, thereby contributing to improving their quality of life and social integration. The current study might contribute to the discourse on the social and emotional abilities of children with autism from a strengths-based perspective, rather than focusing solely on difficulties. In doing so, the research supports a more respectful approach to working with children with autism.

2. Body of paper

Literature Review

Autism

Autism Spectrum Disorder (ASD) encompasses a broad range of neurological disorders characterised by difficulties in communication and interpersonal relationships. According to the DSM-5 (2013) ASD involves significant and persistent impairments in communication and social interaction, alongside restricted and repetitive patterns of behavior, activities, or interests. The definition highlights deficits in three main areas: social-emotional reciprocity, nonverbal communicative behaviors, and the ability to develop and maintain relationships. Functional difficulties span various fundamental psychological domains, including communication, language, perception, sensory-motor regulation, and cognitive functions (APA, 2013).

Central Theories of Autism

Several theories explain the difficulties associated with autism. The Theory of Mind (ToM) refers to the cognitive ability to understand and attribute mental states to oneself and others. This ability is crucial for making inferences about others and is essential for normal social development (Bamicha & Drigas, 2022). The development of ToM is gradual, beginning with a basic understanding of emotions, perceptions, and desires at age two years, and evolving to the understanding of false beliefs between ages three and five years (Rosello et al., 2020). Baron-Cohen (1995) first identified the link between autism and ToM deficits in 1995, describing it as mindblindness. This theory suggests that communication and social interaction difficulties are related to impairments in the neuro-cognitive mechanism supporting ToM development (Bamicha & Drigas, 2022).

The Weak Central Coherence Theory, developed by Uta Frith in 1985, posits that individuals with autism process information differently from neurotypical individuals. While neurotypical individuals process information holistically, those with autism focus on details and struggle to create a comprehensive picture (Nuske & Bavin, 2015). This weakness in central coherence can explain attention to minor details, special abilities in certain areas (such as memory for details), and difficulty understanding broader contexts and complex social meanings.

Social Cognition in Autism

In the realm of social ability, some children with autism may not initiate contact and prefer to engage in personal interests. They may lack eye contact, gestures, or vocalisations to draw others' attention. By age three, they may struggle to share reciprocal play. Other children may desire social interaction but exhibit stereotyped ways of forming connections, characterised by difficulty understanding social codes. There are noticeable difficulties in nonverbal communication used for social interaction and in developing and understanding social

relationships. These challenges affect the ability to understand social situations and acquire language intuitively and quickly. Deficits are evident in vocabulary, morphology, phonology, semantics, and pragmatics of language (Bamicha & Drigas, 2022; Bauminger, 2013). Regarding intelligence, there is a wide range of IQ levels, from intellectual disability to above average. Some children exhibit exceptional abilities beyond their age in certain areas, such as exceptional memory, sequential knowledge, high mathematical abilities, or musical talents. However, these abilities do not necessarily aid in daily functioning (Bauminger, 2013).

Empathy

Empathy is the ability to understand the emotions and experiences of others, essential for communication and the development of appropriate social relationships. Empathy provides a basis for understanding others and responding sensitively and appropriately to their emotional state. Despite the variety of definitions in professional literature, the commonality is the response to another's situation and the ability to connect to their inner world (Russo-Zimet & Dev, 2018).

Emotional empathy refers to the ability to feel the emotions of another and experience similar or corresponding emotions (Russo-Zimet & Sagie, 2017). Cognitive empathy, or "perspective-taking," involves understanding the mental world of another; thoughts, beliefs, and intentions, without necessarily experiencing the same emotions. This ability allows one to step into 'another's shoes' and understand their perspective, even if it differs from those of its own (Shapira & Aram, 2016). The distinction between the two types of empathy reflects differences in the processes involved in each. While emotional empathy involves an automatic and often unconscious emotional response, cognitive empathy requires conscious and deliberate intellectual effort (Kaufman Talmi & Mashal, 2023).

Despite their differences, the two types of empathy complement each other and work in coordination. Emotional empathy provides the immediate basis for caring responses, while cognitive empathy offers the depth needed for a more complex understanding of social situations and the formation of planned and sensitive responses (Shapira & Aram, 2016). Educational intervention programs indicate the possibility of nurturing both types of empathy, with different programs focusing on strengthening either emotional or cognitive empathy according to specific goals (Russo-Zimet & Sagie, 2017; Kaufman Talmi & Mashal, 2023).

Emotional Empathy

Emotional empathy allows an individual to experience and feel the emotional world of another as if it were his own. This process manifests in a shared or parallel emotional experience, laying the foundation for meaningful interpersonal communication. This ability enables individuals to respond appropriately and sensitively to the emotional states of those around them and to maintain social relationships (Kaufman Talmi & Mashal, 2023). The importance of emotional empathy is particularly evident in understanding complex social situations. It allows individuals to function socially more intuitively, understand subtle

emotional cues, and grasp the emotional significance behind others' behaviors and expressions (Shapira & Aram, 2016).

In recent years, with the growing recognition of the importance of emotional empathy for pro-social behavior, there has been an increase in the development of intervention programs to cultivate this ability. There is a growing understanding that emotional empathy can be developed and refined over time. Emotional empathy is not only expressed through verbal communication. Studies on adolescents have shown that non-verbal expression, such as body and facial language or artistic expressions, can also reflect an empathetic emotional experience. These findings expand the understanding of emotional empathy and emphasise that it is a process that occurs through multiple channels and modes of expression, including those not dependent on language or advanced verbal abilities (Russo-Zimet & Sagie, 2017).

The development of emotional empathy begins in the early stages of life and is a gradual and ongoing process. The seeds of emotional empathy are evident in early childhood when young children show sensitivity to others' emotional states and respond to them intuitively. During the preschool years, this ability develops, especially when children are exposed to stories and social situations that evoke various emotions. Such exposure serves as a form of training for empathy, allowing children to indirectly experience diverse emotional experiences and expand their range of emotional responses (Russo-Zimet & Sagie, 2017).

As children transition to elementary school, their empathetic ability continues to develop and become more sophisticated. During this period, children become more aware of their emotional world and the emotions of others, and they can discern more subtle emotional nuances. Studies with eleven- and twelve-year-old students have demonstrated how focused intervention programs, based on considerate dialogue and additional educational tools, can significantly promote children's emotional empathy (Kaufman Talmi & Mashal, 2023). The accelerated emotional development characteristic of elementary school age allows children to better understand the inner emotional world while simultaneously developing greater sensitivity to others' emotions. It strengthens pro-social behaviors such as the willingness to help and support others. Deep emotional experiences, such as those related to emotions like sadness or concern, play a central role in fostering empathy (Russo-Zimet & Sagie, 2017).

Cognitive Empathy

Cognitive empathy is also part of the ability to understand another's inner world by understanding their thoughts and intentions, as well as their emotions (Kaufman Talmi & Mashal, 2023). Unlike emotional empathy, which focuses on emotional resonance and shared experience, cognitive empathy involves the intellectual aspect of understanding another's situation (Russo-Zimet & Sagie, 2017). There is a positive correlation between the development of ToM and the improvement of cognitive empathy. Correlations have been found between performance on ToM tasks and the ability to respond appropriately in conversation, which requires considering the listener's perspective (Khanjani et al., 2015). As children develop a better understanding of others' mental states, as measured by 'false belief' tests, they show an improved ability to understand others' perspectives in various social situations (Russo-Zimet & Sagie, 2017). Thus, interventions aimed at promoting ToM skills, such as encouraging perspective-taking in storytelling and role-playing, improve not only the

understanding of mental states but also the ability to understand others (Rosello et al., 2020). Brain imaging studies (fMRI) have found that cognitive empathy tasks involving the perception of movement, facial expressions, body gestures, and understanding intentions activate common brain areas (Oliver et al., 2018).

The development of cognitive empathy in typically developing children is also a gradual process. During preschool and elementary school years, children gradually develop the ability to understand that others may think, feel, and know things differently from themselves (Osterhaus & Koerber, 2021; Shapira & Aram, 2016). They begin to understand complex concepts like 'I know you don't know,' laying the foundation for understanding different and diverse perspectives (Bamicha & Drigas, 2022). Many factors influence this development, including social interactions, language, and shared experiences. Activities such as reading stories with a significant adult mediator, discussing the emotions and thoughts of characters in stories, and role-playing contribute to the development of cognitive empathy (Alwaely et al., 2021; Osterhaus & Koerber, 2021).

Reading stories has been found to contribute not only to language development and early literacy but also to fostering empathetic abilities (Groman, 2022; Osterhaus & Koerber, 2021). As a child gains more experience dealing with diverse perspectives, their ability to understand others becomes more refined. Rich social experiences allow children to be exposed to different situations where people experience and respond differently to the same situations, thus expanding their ability to understand the complexity of the human condition (Russo-Zimet & Sagie, 2017). Various interventions aimed at improving social and cognitive skills have been proven effective in enhancing cognitive empathy. For example, using digital social stories has been found to help develop social skills directly related to understanding others' perspectives (Crank et al., 2021).

Empathy in Children with Autism

Children with autism face challenges in empathy, both cognitively and emotionally. They may have difficulty understanding others' mental states, including thoughts, emotions, beliefs, and intentions (Tzuriel & Groman, 2017). These difficulties manifest in a limited ability to understand others' perspectives and interpret complex social situations that require understanding hidden intentions (Barak-Levy & Flavian, 2022). Tzuriel & Groman (2017) examined the difference in figurative understanding between high-functioning children with autism and typically developing children. They found that high-functioning children with autism showed more variability in performance compared to the relative stability of typically developing children. Through dynamic assessment, children with autism showed improvement in figurative understanding. For children with autism, verbal ability and local coherence ability were significant predictors of figurative understanding, while for typically developing children, the ability for metaphorical thinking and working memory predicted figurative understanding (Tzuriel & Groman, 2017).

In terms of emotional empathy, children with autism may struggle to recognise others' emotions, understand the social contexts of these emotions, and produce appropriate emotional responses (Barak-Levy & Flavian, 2022). Difficulties were noted in recognising emotions and understanding others' intentions compared to typically developing children

(Rosello et al., 2020). A deep understanding of how children with autism perceive and respond to emotions can help find a balance between support and challenge. Approaches based on understanding each child's strengths and challenges promote empathetic abilities and the quality of social interactions. The key is understanding that empathy difficulties do not indicate a lack of ability or desire to connect with others but rather different processing patterns that require tailored educational and therapeutic approaches (Mitchell et al., 2021).

Double Empathy Theory

The Double Empathy Theory offers a new perspective on understanding these challenges. This theory suggests that social and communication difficulties attributed to autism are a mutual phenomenon occurring in the interaction between people from different neurological groups (Mitchell et al., 2021). Neurotypical individuals show a bias towards certain prominent social characteristics, while individuals with autism exhibit different social scanning patterns. These differences in how social information is received, processed, and interpreted make it difficult to create a sense of mutual empathy and deepen the gaps in interpersonal communication (Bottema-Beutel et al., 2019). The double empathy theory emphasises that just as individuals with autism struggle to understand the thoughts and intentions of neurotypical individuals, neurotypical individuals equally struggle to understand those of individuals with autism. The difficulties do not reflect a lack of social ability on one side but represent a communication gap arising from fundamental differences in how different groups experience and interpret the social world (Bamicha & Drigas, 2022).

Another aspect of the double empathy problem relates to cognitive-social processes between the groups. Studies on emotion recognition and understanding intentions have found differences between children with autism and typically developing children. These differences do not necessarily reflect a deficit in individuals with autism but rather a different way of processing and understanding social and emotional information. When people from two different groups process and understand social information differently, the result is mutual misunderstanding and a sense of lack of empathy from both sides (Rosello et al., 2020). The impact of such a mutual gap can lead to poor communication and feelings of alienation and social isolation (Mitchell et al., 2021).

Support for this comes from research distinguishing between cognitive abilities that allow inference about motives and beliefs and emotional abilities that require empathetic cooperation to understand emotional situations. In the context of double empathy, differences in thinking and communication styles between individuals with autism and neurotypical individuals make it difficult to understand mental states, regardless of each side's level of empathy (Bottema-Beutel et al., 2019). Understanding empathy difficulties may stem from different social information processing patterns leads to examining the cognitive processes through which humans organise, link, and interpret complex information to create an organised picture of the social and emotional world around them (Rosello et al., 2020).

Local Coherence

Local coherence is defined as the cognitive ability to link different pieces of information, whether close or distant, to create a meaningful mental representation of a situation, text, or event (Nuske & Bavin, 2015; Tzuriel & Groman, 2017; Van der Hallen, et al., 2018). This process is essential for understanding the world, as it allows one to recognise patterns, and build a comprehensive picture from separate pieces of information. The ability goes beyond understanding individual details and involves organising them logically to create coherence, a sense of alignment and mutual connection between the information components. Thus, Local coherence refers to the cognitive ability to integrate different pieces of information from a text, situation, or prior knowledge to create an overall understanding. The process includes integrating different meanings to achieve a global processing of information (Nuske & Bavin, 2015). For example, during narrative comprehension, the reader or listener must draw conclusions and connect different events and facts to understand the plot, the characters' motives, and the overall message (Ferretti et al., 2018).

Weak Central Coherence Theory

The Weak Central Coherence Theory (WCC) provides a conceptual framework for understanding one of the central cognitive characteristics of autism. According to this theory, individuals with autism tend to process information in a local, detailed, and fragmented manner, in contrast to most neurotypical individuals who process information globally (Happé, F & Frith, 2006). This local processing tendency impairs the ability of individuals with autism to use broader context to derive overall meaning and understand figurative language. Children with autism struggle with the efficient integration of two sentences and their understanding in a prior context. Additionally, there is a deficient ability to achieve local linguistic coherence and to interpret words and understand their meaning in the context of the sentence (Tzuriel & Groman, 2017).

Findings in a study using an adapted local coherence inference test for children aged 5-11 showed that typically developing children performed significantly higher ability compared to children diagnosed with autism. Skorich et al. (2016) found that a higher Autism Quotient (AQ) was associated with more local and less global organisation of social information. This finding supports the idea of a preferred information processing style in autism and emphasises the connection between traits on the autism spectrum and a preference for local over global information processing.

Despite relatively intact structural language development in high-functioning autism, communication comprehension difficulties persist. Individuals with high-functioning autism struggle to understand others' speech and have significant difficulty using contextual cues to understand the meaning of interactions. For example, there is a tendency for overly literal interpretation of messages without awareness of the speaker's intent. Another difficulty is poor understanding of idiomatic expressions, despite intact understanding of the individual words comprising the expression. Preliminary evidence also suggests that specifically, inference skills, the ability to fill in unseen information in a message, are impaired in high-functioning autism. A study examining the understanding of the main idea from short verbal narratives (Nuske & Bavin, 2015) further supports the connection between information

processing difficulties and communication and social understanding problems. Individuals with autism struggle to use context-derived information and the event environment to understand others' mental states, explaining their difficulty in predicting how people will behave in different situations. This difficulty is likely related to their ability to integrate information from the broader context of social interaction (Ramachandran et al., 2009).

Mediated Learning

Mediated learning describes the role of the adult who helps the learner understand information and experiences from the environment. People can also learn from direct experience, but with good mediation, learning becomes meaningful and goal directed. In the educational context, mediation is a central tool in the educator's work and helps develop the learners' cognitive, emotional, and social abilities (Tzuriel & Groman, 2017; Tzuriel, 2013).

This approach recognises individual differences and places the learner at the center of the learning process. Each learner should be allowed a learning and development pace tailored to them, setting educational, social, and personal goals that match their abilities and needs. Educators' role is to adapt the learning environment to the diverse needs of the learners. Through mediation, the individual learns not only new information but also how to learn independently and how to cope with challenges (Tzuriel & Groman, 2017; Tzuriel, 2013).

Feuerstein identified several important principles for quality mediation, including the principle of intentionality and reciprocity, which refers to the mediator's intention to help the learner and the learner's openness to receive mediation. Another principle is the provision of meaning, where the mediator conveys the importance or value of what is being learned. Another principle is transcendence, meaning that mediation goes beyond the immediate situation and connects learning to other life situations. Another important principle is the sense of competence, where the mediator encourages the learner to believe in their ability to succeed. There are also principles of regulation and control, shared behavior, and individuation (Feuerstein et al., 1981).

Feuerstein's approach was based on pedagogical optimism and the belief that anyone could change and develop at any age and in any situation, provided they receive appropriate mediation. He developed a special method called Instrumental Enrichment, designed to improve learning through focused mediation. His approach is particularly relevant in education because it emphasises the ability of anyone to change and develop in response to proper mediation (Tzuriel, 2013).

Mediation for Children with Autism

Children with autism need intensive and tailored mediation to bridge gaps in understanding social communication (Tzuriel & Groman, 2017). The dynamic assessment approach to figurative language, based on the principles of mediated learning, allows identifying the learning potential of children beyond what is seen in standard tests. It enables educators and parents to understand the children's potential for improvement, not just their abilities at the initial assessment. With appropriate mediation, children with autism can significantly improve their understanding and expression in the figurative domain (Tzuriel & Groman, 2017).

The current study aimed to examine whether mediation for local coherence, which refers to the ability to link different pieces of information and create a meaningful and complete picture, improves emotional and cognitive empathy abilities in children with autism.

Methodology

The current study is based on the quantitative paradigm, examining the impact of mediated local coherence inference on emotional and cognitive empathy abilities in children with autism. This methodological framework allows for the examination of causal relationships between variables and provides an empirical basis for testing the research hypotheses.

Participants

The study involved 26 children, 18 boys and 8 girls, aged 5-7, formally diagnosed with autism. All participants were enrolled in special education settings in Israel (inclusive school and communication kindergarten). Inclusion criteria were a formal diagnosis of autism according to DSM-5, age 5-7 years, and parental consent for participation. Exclusion criteria included additional neurological disorders besides autism and language difficulties that prevent basic understanding of instructions. The average age of the participants was 92.30 months with a standard deviation of 33.01. The sample was randomly divided into two groups: an intervention group that received mediation during the local coherence inference test and a control group that performed the test independently.

The study was conducted after obtaining approval from the Chief Scientist and written consent from the participants' parents, adhering to all ethical research guidelines and ensuring complete confidentiality of background data.

Research Instruments

The current study utilised two existing and validated questionnaires. Background data of the participating children were also collected.

Children Local Coherence Test (Tzuriel & Groman, 2013). This test assesses a child's ability to draw conclusions from given information and connect different pieces of information to create a comprehensive understanding of situations. The test consists of a reading comprehension section and ten graded items, each containing two short sentences describing a situation or sequence of events, followed by three additional sentences. The task is to choose the sentence that bridges the first two sentences in the most coherent and logical manner. The test score ranges from 0 to 10 points, with graded scores for correct answers. The original study by Tzuriel & Groman (2017) found a high Cronbach's alpha reliability (α=0.84), and the current study found a reliability of α=0.71, indicating sufficient internal consistency of the questionnaire.

Empathy Level Questionnaire for Children Aged 4-8 (Russo-Zimet & Sagie, 2017). This questionnaire measures various components of empathy in young children through their responses to short stories depicting diverse social and emotional situations. The questionnaire includes five stories in separate versions for boys and girls, describing different emotional states such as sadness, anger, fear, jealousy, and joy. Each story is accompanied by pictures

showing different facial expressions of the characters. The internal reliability of the questionnaire was found to be sufficient for all its dimensions: self-emotion intensity (α=0.71), other-emotion intensity (α=0.70), pro-social behavior level (α=0.69), and cognitive level of behavior explanation (α=0.77). The current study found similar reliability values: cognitive empathy (α=0.72), emotional empathy (α=0.68), and response to social situations (α=0.79).

Background Data Questionnaire. This questionnaire was designed to collect essential demographic and background information to understand the characteristics of the sample and examine possible effects of background variables on the findings. The questionnaire included information on the child's age and gender, an assessment of the child's functioning level on the autism spectrum as evaluated by the educational team, a description of the educational setting in which the child is enrolled (such as inclusive communication class), the number of siblings in the family, and additional relevant developmental history information.

Procedure

The study was implemented according to ethical research guidelines, ensuring complete confidentiality of the children's background data. The tests were administered individually by the research team, with each researcher working with one participant at a time in a separate, quiet, and isolated room. The tests were conducted in the early morning hours after breakfast. The test administration order was as follows: first the Empathy Level Questionnaire, followed by the Local Coherence Inferences Test, and finally the repeated Empathy Level Questionnaire. The intervention group received mediation during the Local Coherence Inferences Test, while the control group performed the test independently. The mediation involved the researchers reading the first two sentences to the child and asking them to imagine the situation described. They explained that three additional sentences would be read, from which the child must choose the one that connects the first two sentences. It was emphasised that the chosen sentence must be related to the first two sentences. The mediation continued with detailed explanations on how to link different pieces of information and demonstrations of strategies for identifying the correct bridging sentence. The researchers documented the children's responses during the test and later scored the results for analysis. However, if the researchers felt that the child did not understand the situation but should have succeeded in the question, they re-explained the situation in a different way. The mediation was based on Feuerstein's mediated learning principles, emphasising giving meaning to the activity and fostering a sense of competence among the children.

The researchers ensured consistent and structured mediation for all children in the intervention group. The tests were administered at an adapted pace of up to three participants per day, with each participant completing only one test per given day, according to the available time frame. Before each test, a preliminary explanation was provided, emphasising the non-evaluative nature of the test and the fact that it was not a graded exam. In cases of difficulty in completing the test in one go, the test could be divided into sections or breaks could be given, according to the participant's needs.

Findings

The study involved 26 children diagnosed with High-functioning autism (HFA) including 18 boys and 8 girls, aged five to seven, with an average age of 72.50 months (SD=33.04). The research aimed to examine the participants' performance in understanding social situations and expressions of empathy, before and after an intervention in local coherence.

Internal Reliability

To assess the internal reliability of the research questionnaires, which examine understanding of social situations, expressions of empathy, and local coherence, Cronbach's alpha coefficients were calculated for each category, as presented in table 1.The internal reliability of the research questionnaires was found with Cronbach's alpha values ranging from 0.72 to 0.79.

Table 1. Cronbach's alpha coefficients

Variable	α	N
Emotional Empathy	0.78	**5**
Cognitive Empathy	0.75	**5**
Response to Social Situations	0.79	**5**
Local Coherence	0.72	**10**

Averages and standard deviations of research variables

The averages and standard deviations of all research variables are presented in Table 2. The data was collected before and after the intervention for four key measures: cognitive empathy, emotional empathy, response to social situations, and local coherence.

Table 2. Averages and standard deviations of variables

Variable	Time of Measurement Before Intervention	M	SD
Emotional Empathy		0.60	0.27
Cognitive Empathy		0.84	0.18

Response to Social Situations	0.70	0.25
Intervention		
Local Coherence	0.82	0.11
After Intervention		
Emotional Empathy	0.79	0.20
Cognitive Empathy	0.85	0.17
Response to Social Situations	0.82	0.21

Results

- **Emotional Empathy.** The average before the intervention was 0.60 (SD=0.27), suggesting a lower level of emotional identification with others .After the intervention, the average increased significantly to 0.79 (SD=0.20).
- **Cognitive Empathy.** Before the intervention, the average was 0.84 (SD=0.18), indicating a relatively high level of ability to understand others' feelings and thoughts. After the intervention, there was a slight increase in the average to 0.85 (SD=0.17).
- **Response to Social Situations**. The average before the intervention was 0.70 (SD=0.25), representing a moderate-high level of responsiveness. After the intervention, the average increased to 0.82 (SD=0.21).
- **Local Coherence.** The average was 0.82 (SD=0.11), indicating a relatively uniform level of functioning in this area.

Correlations between Variables

The study hypothesised positive correlations between expressions of empathy (both cognitive and emotional) and local coherence. Pearson correlation matrices were used to examine these relationships as presented in table 3. The findings indicated a moderate positive correlation between cognitive empathy and local coherence (r=0.46, p=.028) and a moderate positive correlation between response to social situations and local coherence (r=0.37, p=.042). However, no significant correlation was found between emotional empathy and local coherence.

Table 3. Pearson correlation matrices

	Local Coherence
Emotional Empathy	r=0.05, p=.836
Cognitive Empathy	r=0.46*, p=.028
Response to Social Situations	r=0.37*, p=.042

T-tests were conducted to examine differences in local coherence and empathy improvement between experimental and control groups.The results showed a significant improvement in emotional empathy in the experimental group compared to the control group as presented in table 4.

Table 4. T-tests in local coherence and empathy improvement

Variable's Level of Improvement	Experimental Group		Control Group		t	Sig.
	M	SD	M	SD		
Emotional Empathy	0.28	0.27	0.17	0.26	1.90*	0.04
Cognitive Empathy	0.05	0.15	0.03	0.23	0.30	0.38
Response to Social Situations	0.12	0.31	0.10	0.21	0.13	0.45

3 Conclusion (TNR 14pt., bold)

This study examined the impact of mediation for local coherence on emotional and cognitive empathy abilities in children with autism aged 5-7 years. Based on the Weak Central Coherence Theory (Happé & Frith, 2006), the study explored the relationships between local coherence ability and various components of empathy.

The findings indicate that the intervention had a significant impact on emotional empathy only. The intervention group showed a more significant improvement in emotional empathy compared to the control group, highlighting the positive potential of the mediation approach. However, the lack of significant differences in cognitive empathy and response to social situations raises questions about the fundamental mechanisms of empathy in autism and the need for additional and prolonged intervention approaches.

Research hypothesis and Findings

1. **Emotional Empathy and Coherent Inference**. The hypothesis that there would be a positive correlation between emotional empathy and coherent inference ability was not supported. This finding suggests that coherent inference ability does not directly

translate to improved emotional empathy, possibly due to the presence of alexithymia in individuals with autism (Kinnaird et al., 2019).

2. **Cognitive Empathy and Coherent Inference**. The hypothesis that there would be a positive correlation between cognitive empathy and coherent inference ability was supported. This finding aligns with the theoretical basis of the study, indicating that coherent inference ability is crucial for understanding others' mental perspectives (Ramachandran et al., 2009).
3. **Response to Social Situations and Coherent Inference**. The hypothesis that there would be a positive correlation between understanding social situations and coherent inference ability was supported. This finding suggests that children who can make coherent inferences from social situations are better able to respond appropriately (Nuske & Bavin, 2015).
4. **Differences in Coherent Inference Ability Between Groups**. The hypothesis that the intervention group would show higher local coherence ability than the control group was not supported. This raises questions about the immediate effectiveness of the intervention and the time required for changes in such basic cognitive skills (Nuske & Bavin, 2015).
5. **Improvement in Emotional Empathy in the Intervention Group**. The hypothesis that the intervention group would show greater improvement in emotional empathy was supported. This finding highlights the potential of mediation for coherent inference in enhancing children's ability to empathise emotionally with others (Feuerstein et al., 1981).
6. **Improvement in Cognitive Empathy in the Intervention Group**. The hypothesis that the intervention group would show greater improvement in cognitive empathy was not supported. This suggests that improving cognitive empathy may require more complex and prolonged interventions (Bamicha & Drigas, 2022).
7. **Improvement in Response to Social Situations in the Intervention Group**. The hypothesis that the intervention group would show greater improvement in understanding and responding to social situations was not supported. This indicates that translating improved coherent inference ability into practical social responses may require more time and tailored interventions (Rosen et al., 2021).

Theoretical and Practical Contributions

The study contributes to the theoretical understanding of the relationships between cognitive abilities and empathy in autism. The significant correlation between cognitive empathy and coherent inference supports the theoretical link between Weak Central Coherence Theory and Theory of Mind. The study also emphasises the complexity of empathy processes and the need for differentiated interventions for various empathy components. Practically, the findings provide educators and therapists with insights into the potential of mediation for coherent inference to improve emotional empathy and highlight the need for personalised intervention approaches.

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