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EFFECTIVENESS OF THEORY OF MIND THERAPY CARRIED OUT BY PARENTS OF CHILDREN WITH AUTISM – A PRELIMINARY STUDY

Abstract

The subject of the paper is therapy program for children with autism which is applicable for parents who can use it in everyday situations. Therapy is focused on the Theory of Mind Mechanism (ToMM), mainly recognizing others' mental states, emotions and true or false beliefs.
12 children (8–12 yr olds) with autism was divided into 2 groups: 6 participated in individual sessions (parents repeated sessions activities at home) by 6 months, the next 6 made the control group without treatment. Session plan is described.
There is a large effect size in treatment group. The most increased skills were: distinguishing previous from present opinions, taking others' perspective and emotion recognizing. Statistical analysis and qualitative interpretation confirm therapy effectiveness.

Keywords: autism, theory of mind therapy, false beliefs, emotion recognizing, parental care

FORMY TERAPII AUTYZMU W ZAKRESIE TEORII UMYSŁU DO STOSOWANIA SAMODZIELNIE PRZEZ RODZICÓW – BADANIA WSTĘPNE

Streszczenie

Tematem artykułu jest program terapii dzieci z autyzmem, ze szczególnym uwzględnieniem dziecięcej teorii umysłu. Terapia koncentruje się na mechanizmach teorii

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umysłu (The Theory of Mind Mechanism; ToMM), która uczy rozpoznawania głównie stanów mentalnych innych osób, emocji oraz odróżniania prawdziwych lub fałszywych przekonań.
W badaniu wzięło udział 12 dzieci (w wieku 8–12 lat) z autyzmem. Podzielono je na 2 grupy 6-osobowe: „grupa leczona" uczestniczyła przez 6 miesięcy w sesjach indywidualnych (rodzice powtarzali sesje zajęć w domu), pozostałych 6 dzieci z „grupy kontrolnej" nie było poddawanych leczeniu.
W grupie leczonej zaobserwowano wzrost następujących umiejętności: odróżniania opinii, przyjmowania perspektywy i rozpoznawania emocji. Analiza statystyczna i interpretacja jakościowa potwierdzają skuteczność terapii.

Słowa kluczowe: autyzm, terapia teorii umysłu, fałszywe przekonania, rozpoznawanie emocji, opieka rodzicielska

This article presents a preliminary study that could be considered a starting point for creating individual forms of therapy. To date, at least in some countries, therapists have no standard tests to determine the level of development of the Theory of Mind (ToM). There is also a lack of rehabilitation programs in this area, both for specialized treatment centers and for individual work with children (e.g., Sanchez, 2006; Shattuck & Grosse, 2007; Birkin, Anderson, Seymour, & Moore, 2008; Winczura, 2006). In many cases, professional care and support for individuals with various mental disabilities, including autism, is insufficient. The access to institutional support, funded by the government, is very difficult due to the limited funds spent on this specialized care. The lack of money is also a reason for the long wait for receiving specialized consultative diagnosis, care and therapy. Despite some difficulties, the access to a specialized diagnostic consultation is possible in a reasonable period of time. The problems increase after the diagnosis, with the start of regular treatment. The described situation can be less problematic in two cases – for families living in large cities with easy access to a wide range of therapeutic centers and for individuals who are wealthy and can afford private medical care. The remaining patients encounter significant problems in obtaining proper care. These are the reasons for creating a therapeutic program that could be used at home by the parents or the relatives of children with autism.

The main aim of this preliminary study was to examine whether it is possible to achieve growth in the ToM skills by parental home training. If the results indicate growth, the next aim will be to create a handbook for parents to show them how they can develop ToM skills in everyday situations. The aim of this program is not to replace therapists by the parents, but to help the child in its natural developmental abilities.

The mental development of a child with a complete developmental disorder is possible and occurs independently of the therapy (as indicated by cases of

children diagnosed relatively late). It means that persons, who take care of child, influence on the development of their abilities (the influence is major when the global intellectual functioning is better): The better effects of interactions could be observed when parents will not be guided by intuition but follow the rules.

This study shows that if we take the objectives of the ToM and use the language according to the psycholinguistic theory of autism (e.g., Młynarska, 2008) and studies discussed by Tager-Flusberg and Joseph (2005), it is possible to create a range of tasks and activities that are ready to perform at home by the parents of children with autism without the necessary presence of a qualified therapist. Used in daily situations, this will lead to great improvements in the ToM functioning.

The study was based on Premack and Woodruff's (1978), and Baron-Cohen's (1995) ToM, which was mainly developed at the end of the last century, and it remains one of the most important theories of autistic mind functioning. This theory refers to social interactions due to the understanding of emotions and beliefs of other individuals. The well-developed ToM enables an individual to recognize and distinguish his or her own mental states and deduce the analogical mental states of other individuals (Premack & Woodruff, 1978; Wimmer & Perner, 1983; Baron-Cohen, Leslie & Frith, 1985; Baron-Cohen, 1995, 2003; Saxe & Baron-Cohen, 2006).

Baron-Cohen (1995) described the four brain mechanisms responsible for the development of the ToM:

1. The Intentionality Detector (ID) is a cognitive mechanism that allows for a quick identification of the subject's movement and the association of the movement with the most likely intention.
2. The Eye-Direction Detector (EDD) detects where the eyes of another individual are directed and what object the individual sees.
3. The Shared-Attention Mechanism (SAM) creates the triple representation, which states whether the observing therapist is paying attention to the same object as the child.
4. The Theory-of-Mind Mechanism (ToMM) is a system of deducing all mental states of individuals based on their behavior.

The children with autism spectrum disorder (ASD) have a damaged ToMM; thus, they do not understand other people's beliefs. They are not able to tell the difference between their previous thoughts and their current knowledge, and they do not retain their previous opinions as a separate category of knowledge in their memory (e.g., Muris, Steerneman, & Merckelbach, 1999; Williams & Happé, 2009). A child suffering from autism disorder experiences difficulties with the integration of different information, such as 'I know, but I'm not sure, I could be wrong' and 'I knew it before, but later it turned out that I knew something else than I previously had thought' (Baron-Cohen, 1991; Gopnik & Wellman, 1994; Baron-Cohen, 1995). Two types of beliefs have been distinguished by

Wimmer and Perner (1983): the first-order beliefs include recognizing others' thoughts and emotions, and the secondary-order beliefs describe the ability to think about thinking.

The lack of a properly functioning ToMM in the development of the 'mind reading' process significantly limits the formation of the ability to pretend, which is used by children in a "make-believe" game. As a further consequence, children have problems distinguishing between true and false beliefs. It is difficult for them to understand that sometimes individuals think about things that are true and that sometimes individuals think about things that are untrue (Baron-Cohen, 1991, 1992, 1995; Frith, 1993). Thus, it leads to problems with understanding behaviors, such as deception, lying and cheating.

An underdeveloped ToMM induces a mind blindness in autistic children, which results in troubles with recognizing the emotional states of other individuals and decreases the ability to show empathy, deceive others or determine the difference between a joke and a real threat. Human interpersonal communication is mainly based on non-verbal signals, which are unclear for autistic children. Therefore, their social integration is greatly reduced and impaired. Even well-functioning autistic children feel lonelier and value the quality of their friendships less (Baron-Cohen, 1991, 1992, 1995; Frith, 1993).

The ToMM Therapy

There are many methods worldwide that have been created for working with children to improve the functioning of the ToMM. Some methods are described in the professional literature, and some methods have a more practical aspect. One method was Steerneman's 'Learning to think of thinking and understanding emotions' program (Steerneman & Huskens, 1996; Steerneman, Jackson, Pelzer, & Muris, 1996). The purpose of this exercise was to obtain greater perceptual, cognitive and emotional abilities, as well as cognitive development in autistic children. In this study, Steerneman and his team obtained evidence of significant progress in this area. Autistic children were able to read simple emotions correctly, and they improved their understanding of other people's beliefs. They also developed the ability to pretend. However, these studies show that despite the training, children with autism still have difficulties with recognizing cognitive emotions and with the ability to think about thinking of another individual's thinking, i.e., with using the theory of mind at the second-order level. There are also many other programs, both short and long term, that have proven the existence of improvements in the theory of mind (e.g., Fisher & Happé, 2005; Hutchins & Prelock, 2008; Cusimano, Fama, & Miano, 2011; Thomeer et al., 2011). Computer programs have also been used (e.g.: Silver & Oakes, 2001; Myszak, 2011), as well as drama classes (Corbett et al., 2011). The aim of the present study was to check if the work with the child at home by using: everyday situations, games, fairy tales, is able to increase the level of development of ToM, and in which areas.

If the therapy, carried out by the parents, would prove successful, the work will be conducted over the manual of therapy. The manual could be used by parents at home, so they do not lose time in the rehabilitation of the child, waiting for the possibility of institutional care.

Method

Studies took place before the PTP published methods for autism.

Participants

Twelve children diagnosed with autism spectrum disorder were selected for this research in children's outpatient clinics. None of the children has participated in or in the past in therapy for autistic children. The selected children were 8–13 yr old, they came from complete families and had healthy siblings. All children were diagnosed with autism at the age of 3–4, with the diagnosis of childhood autism, and had a similar degree of the disorder (data from individual medical history), but they differed in special difficulties. To unify the group, the independent side variables were controlled, such as the child's age, the level of intelligence (IQ > 55), the autism level, and the level of linguistic competence (also data from medical history of each child; see Table 1). The confounding variables were observed, such as diseases – longer serious illness of a child or parent was considered as a reason to exclude a child from the group; not observed the none), and the level of parental involvement measured by time spent with the child; children of parents working professionals outside the home was not included in the group. The level of ToMM development of each child was measured by the ToM Scale (described below) and was considered the dependent variable. On the basis of the clearly defined criteria listed above, 12 children qualified for the research: six girls and six boys. The characteristics of the children, their actual age, the age of diagnosis, and the features of functioning are presented in Table 1.

Children were randomly assigned to two groups: the experimental group received the therapy, and the control group was not subjected to any therapeutic interactions at the time of the research. To avoid the unequal treatment of children, a similar therapeutic treatment with children from the control group was carried out after the end of the study.

Table 1
Characteristics of children selected for the research

The treatment group		The control group	
Gender and age, diagnosis age (age in brackets)	Characteristic functioning features	Gender and age, diagnosis age (age in brackets)	Characteristic functioning features
A Girl (8), diagnosis (4)	Verbal and non-verbal communication disorders, uses simple sentences or single words, noun based signalization of needs. Speaking to herself, echolalia, rather sufficient passive vocabulary, adequate answers to questions, understanding orders and ability to use gestures, mimics.	G Boy (8), diagnosis (4,5)	Problems with communicating, simple sentences, he uses well-known texts schematically. Presence of thinking aloud. Lack of eye-to-eye contact. He uses the carer's arm to signal his own needs.
B Boy (11) diagnosis (3,5)	Verbal and non-verbal communication deficit, using writing, writing words on paper, signaling needs by means of single words (verbs), sufficient development of passive vocabulary, lack of non-verbal communication.	H Girl (10) diagnosis (3,5)	She uses simple sentences. In utterances, she makes mistakes with tense and inflection forms and inverts pronouns. Weak eye-to-eye contact, she does not use gestures. She avoids physical contact.
C Boy (8) diagnosis (4,5)	Psychomotor retardation, considerable problems with communication, lack of answers to questions asked, single words, sometimes in the form of echolalia. Only non-verbal signaling of needs. He rarely starts eye-to eye contact.	I Boy (12) diagnosis (5)	He understands orders well. Adequate responses to simple orders. He has a tendency to invert pronouns. Lack of spontaneous responses. Few gestures, however, he correctly tells simple picture stories. With carer's help, he is able to give correct answers to simple questions.
D Girl (9) diagnosis (3)	Developed speech, sentences in the form of a question, fixation about cats, echolalia, she adequately uses words: yes, no, repeats long sentences from hearing, slow reading ability, language semantic sphere disorders. She does not use 'I' pronoun. She uses gesture.	J Boy (10) diagnosis (4)	Difficulties in communication, speech retarded, lack of pronouns, presence of echolalia. Responds in single words. He does not build sentences, does not ask spontaneous questions. Difficult eye-to-eye contact. He uses gesture when he needs something.
E Girl (11) diagnosis (3)	Speech fully developed. She uses correct grammar forms. She speaks rather monotonously and quietly. She understands simple texts. She sets picture stories correctly. She generates simple stories. Ability to write from hearing and reading. She reads simple emotions from a face. She keeps eye-to eye contact in situations which are dangerous for her.	K Girl (8) diagnosis (3)	She forms simple sentences. Sometimes she uses neologisms when she speaks. She mistakes grammar forms. She predominately answers adequately to the questions asked. Minimal eye-to-eye contact. She does not use gestures. Lack of spontaneous speech. Ability of global reading.

The treatment group		The control group	
Gender and age, diagnosis age (age in brackets)	Characteristic functioning features	Gender and age, diagnosis age (age in brackets)	Characteristic functioning features
F Boy (8) diagnosis (5)	Problems in communicating. Speech not distinct, poor vocabulary, sometimes echolalia from TV commercials. He does not use pronouns correctly. Passive speech sufficiently developed. He understands simple texts, replies logically, most often using a single word. Most time he does not keep eye-to-eye contact.	L Girl (11) diagnosis (5)	She uses single sentences. Thinking aloud. Sometimes she does not answer adequately to the questions asked or she does not answer the questions at all. Distinctly retarded development of gross and fine motor coordination. The girl is fixated on playing with a string. She does not use gestures, the face mimics appears dead.

Materials

Due to the lack of the possibility of a professional ToM diagnosis, which could be easily used by parents, a new research tool was created. It is based on the work of researchers, such as Steerneman or Muris (Steerneman et al., 1996; Muris et al., 1999), and on the investigations made by Winczura (2006) and Młynarska (2008) in Poland. The main aim for the development of this scale was the absence of a ToM Scale in Poland, which is only available in the diagnostic centers. Furthermore, creating a tool that is possible to use at home by parents to assess their child's problems in the ToM was important due to the main aim of the study. The ToM Scale is a simple scale which allows to assess the degree of the theory of mind development in general and in its components. The designed scale was divided into seven areas of the child's theory of mind according to the psycholinguistic approach proposed by Młynarska (2008). For each of the tested areas, picture stories, cartoons, plays, scenes, fairy tales, and stage props were proposed. The child received several commands to the prepared stories. The level of performance was evaluated. The commands and the way of evaluating were taken from ToM scale described by Winczura (2006) for other similar study in Poland; however, this scale is not available. Since the research conducted with its use indicated good quality of the tool, they were modeled on trying to construct an evaluation scale for the presented program. The scale areas and example tasks were:

1. Distinguishing fantasy from reality – the degree of controlling the ability of distinguishing the reality from the illusion, dividing between the physical and mental states, displaying the ability to distinguish its initial beliefs from the current knowledge about the object (7 commands, 1 point for each correct execution; sample: an artificial egg is shown to child. After

it, we asked: what is it? Than the egg is given to child's hand and there are other questions: Is this a real egg? Can you eat the egg? Can you break it?).

2. Pretending and cheating – the ability to pretend and to not pretend, the ability to connect information about the real and the notional events (4 commands, max. 7 points; sample tasks: We asked child to pretend to be a seller in the shop. Please note if your child is able to take the role of the seller. Pretend that you are an elephant. Pretend that you are drinking the juice).
3. Distinguishing straight line emotions / simple emotions – the ability to read and to understand non-verbal language, reading straight line emotions (6 commands, max. 8 points; sample: child was shown pictures of people representing various emotions, the child was asked what kind the emotions were).
4. Deducing the false beliefs of others – having a theory of mind on the first-order level beliefs, distinguishing what is real from other people's beliefs and from one's own beliefs about the given subject (example of the task: *The Unexpected Transfer Test*, max. 6 points).
5. Remembering former and current opinions and ideas – the level of second-order beliefs, the ability to think about other people's thinking, the ability to remember previous opinions or decoding the beliefs of two separate individuals about one event ("he thinks that she thinks"; the task: *Deceptive Box Test*, max. 8 points).
6. Taking the perspective of another partner – building a 'naive' theory of the mind about the knowledge, abilities, emotional states and experiences of another partner (4 tasks, 8 points; tasks: cartoons for the inference of emotions and skills presented by drawn children: for example, who / which child is afraid of the dog?).
7. Distinguishing cognitive emotions – the child's knowledge about complex emotions, such as amazement, surprise, disappointment, identification skills, naming and linking emotional states to the events (10 questions, max. 30 points; photo stories of people in unexpected situations; questions to the child what they thought about the person in the pictures, how they were felt).

This scale was used to assess the level of development of the mental states of children at the beginning and end of the treatment. The scores were calculated by grading the level of accomplishment of each task according to the scale and summing all grades. Every child was assessed twice at the same time: once by the examiner (the person who exclusively examined, not participated in the therapy), and the second time – by the parent. The double-assessment procedure has been used for two purposes – to later assess the reliability of the measurement and to assess the applicability of the scale by parents. The scale contained detailed instructions for asking questions and assessing the

level of implementation of the principles. Parents were instructed before the assessment by the examiner. For the purposes of this study parents only assessed the children, tasks and questions asked the examiner. For this publication the examiner's assessments were taken. It is worth noting that the examiner's assessment of the child's skills and changes was consistent with the parent's assessment. Due to the fact the current study was preliminary and was conducted on a very small participant group, other statistical estimations of the reliability and the accuracy were inappropriate. But, the observed data suggested the tool is stabile (see: test–retest for control group, Table 3, Table 6) and accurate. However, the main usage of this scale is the assessment of a child's skills and changes during therapy by non-professionals (e.g. parents, teachers); thus, its usability is mainly practical, a psychometric scale development is necessary. The final evaluation of the accuracy and reliability of the presented tool is currently subject to further research.

Procedure

The training based on the concept of the ToM and on the experimental study conducted by Winczura (2006) was made in such way that allowed the parents to be their child's therapist and train the child in the TOM skills on their own. Session aims and the example tasks are described below. Each session was planned carefully by the therapist and contained a few thematically selected tasks. The therapist used picture stories / story based picture material, individually prepared pictures, everyday items (e.g.: plastic toys, caps, nuts, and balls) and thematic games. The supporting tools were prepared earlier by the therapist or their elements were generally available, so they could be used spontaneously whenever needed. Ready-made picture stories available in bookshops were also used in the training. In the six-month period of time, every child had an individual session one time per week which lasted for approximately 120 minutes with a 15-minute break. The children's parents were present at all sessions and for the first three sessions they only observed the work of the therapist. Before every session the parents received materials (e.g.: a little "handbook" with stories, pictures, stage props and instructions with explanations on how to train skills) and the therapist explained the goals of the session and the participation of the parents. Starting from the fourth session the parents carried out the sessions with their child themselves, under the supervision of the therapist. After the session, the parents worked at home to consolidate the abilities gained during therapy sessions. Due to the wide range of materials used in this research, it is impossible to present all of them here. The examples presented below are representative of the session's objectives, and they can be easily recreated into similar stories or games. Described method was approved by the Institutional Review Board.

Structure of Sessions and Main Goals

Sessions 1–3. *The aim*: *getting acquainted, building a basic relation between the child and the psychotherapist* – introducing the child, telling about the child's self and his or her family, painting the family.

Sessions 4–6. *Distinguishing fantasy from reality*: the main objectives were to distinguish the reality from the mental representation, creating the ability to distinguish the perception of an individual's beliefs concerning the same subject. Exemplary tasks for children:

- It is a sponge that looks like a stone. *What is it really? Can you wash yourself with it?*
- An artificial tomato was shown from a distance. *What is it? What is it used for?*
- An artificial tomato was given to the child's hand. *Is this a real tomato? Can you eat it?*

Sessions 7–10. *Pretending and cheating.* Imagination is the most important component of the ability to pretend. A child pretending to be someone or something gets involved in the imagined situation. "Make-believe" play stimulates the imagination, develops an understanding of the non-verbal speech, and enriches the ability of meta-representation. Various games were used, including role playing, acting, performing, copying animals, and pretending unreal situations. Each game was followed by questions which helped the children realize what was real and what was unreal in the conducted tasks.

Sessions 11–12. *Distinction between simple emotions*. Children learned to name and recognize emotions and relate them to different situations. First, the emphasis was on teaching the children to recognize their own emotions, and later the emotions of other individuals. In these sessions, games with mirrors were used ('*Look at yourself in the mirror and show how you look like when you are sad*'), pictures of simple emotions were shown, and then the photos of loved ones and strangers were presented. Training based on the meaning of emotions in certain situations was also included. The rest of the work was based on commonly known fairy tales. Stories, used for the exercise, were well known and loved by children. They were a great source of simple and cognitive emotions. They talked about the beliefs of the first and second order, pretending, deception, and what is real and fictional.

Sessions 13–16. *Deducing the false beliefs of others.* This part of the exercise was based on the first level reception of other individuals' points of view – the first-order beliefs. Learning to distinguish false beliefs was based on the *Unexpected Change Test*, which, for the purposes of the training, has been significantly modified. The actors were introduced, and the child actively participated in the cognitive process. Because children with autism are characterized with varying degrees of impaired language competence, the subtitles were added. Below, there is an example of the work on first-order beliefs. The training

took place in similar situations, each time using other objects or individuals. One of the tasks was the *Unexpected Change Test* (with a teddy bear or other toy hiding); fairy tales were also used (such as "Little Red Riding Hood" with sample questions such as: *Did Little Red Riding Hood know that the wolf dressed as her grandmother? What was the grandmother convinced about when she opened the door?*).

Sessions 17–19. *The ability to remember and distinguish between their past ideas from the present ones. Thinking about thinking of other individuals.* The work in this area was focused on boosting the skills of thinking about thinking of other people, i.e., understanding and using first-order beliefs. To shape the simplest meta-representation, the *Deceptive Box Test* was used. It was modified and simplified for the training purposes. During the therapy, multiple repetitions of the exercise were used for different subjects. As in the previous sessions, there was also a reference to fairy tales, such as Cinderella, and a set of questions regarding the tale was created: *Do you think that the sisters knew that this beautiful girl at the ball was Cinderella? How do you think, did the prince know when he came to try the shoe, that this dirty and poor girl was Cinderella?*

Sessions 20–24. *The ability to adopt the perspective of another partner, or building the naive Theory of Mind about their knowledge.* Młynarska (2008) developed her own techniques for developing the ToM. Children working on the basis of stories can observe mental changes that occur during the analysis of the sequence of events (Młynarska, 2008). By watching picture stories, children deduced the knowledge, skills, experiences and emotional states of the individuals who were the main characters in the stories.

Sessions 25–27. *Distinguishing cognitive emotions.* The purpose of the exercise was to develop the cognitive ability to recognize emotions, such as surprise, embarrassment, amusement, and fascination. Complex emotions are very complicated because their foundations are formed by one's beliefs. The exercises used in the training are designed to teach a child to recognize emotions that come from beliefs. The tasks not only require the use of the ToM but also a high concentration and understanding of speech. Sample tasks included:

- Pictures of the cognitive emotions were shown to a child, whose task was to name the emotions. *Look at the picture. What do you think: How does the man on the picture feel?*
- Using various types of cartoons, the children were asked to name the beliefs and emotions experienced by other individuals.
- Using a fairy tale, such as Snow White, the children were asked to answer a set of questions about them, such as: *What was the stepmother convinced about when the lumberjack returned from the forest? What did stepmother feel, when the mirror told her that Snow White was living with the dwarfs? Did the Snow White know that the stepmother gave her a poisoned apple?*

Results

The Results are divided into two parts: the first part shows the quantitative analysis based on statistical methods. The results were based on a very small number of study participants and should be treated carefully, however, according to the Winter's (2013) conclusions about the extremely small groups, it was decided to use the *t*-test. As the second method the effect size of Cohen's *d* was used. The second part of the Results presents a more descriptive approach, which analyzed the results obtained by each child individually.

Quantitative Analysis

The results of the initial measurement determining the development level of the ToM by means of the ToM Scale are presented in the following tables. The ToM Scale was filled in individually for each child on the same day. The first measurement was taken before the support processes and the second measurement was assessed after treatment (after 27 sessions for the experimental group or after six months for the control group).

Table 2
Comparison of the treatment and the control groups on the general ToM Scale

Measurement time	Treatment group (*N* = 6)		Control group (*N* = 6)		*t*(*df* = 10)	*p*	Cohen's *d*	95% Confidence interval	Effect size
	M	*SD*	*M*	*SD*					
Before therapy	27.00	5.02	27.33	6.02	−0.104	0.919	0.059	(−1.92; 1.80)	0.002
After therapy	46.16	13.12	31.16	8.84	2.322	0.043	1.340	(−0.33; 3.40)	0.556

As shown in Table 2, the two groups of children did not differ before therapy. All statistics, including *t* tests, Cohen's *d* and the effect sizes clearly indicate the similarities in the ToM skills between groups. However, at the second measurement, we observed higher scores in both groups, and children who participated in the therapy scored higher. The difference between groups was statistically significant (*t*-test), and because the Cohen's *d* was large, according to Cohen (see: Hedges & Olkin, 1985), the effect size was also large. These findings suggest the therapy program significantly increased the ToM skills compared with the natural development process. The next table shows the differences in each group between the first and the second measurements.

Table 3
Comparison of the changes on the ToM Scale across time for the treatment and control groups

Groups	Before therapy		After therapy		$t(df = 5)$	p	Cohen's d	95% Confidence interval	Effect size r
	M	*SD*	*M*	*SD*					
Treatment group ($N = 6$)	27.00	5.02	46.16	13.12	–5.069	0.004	5.40	(–5.26; 6.63)	0.938
Control group ($N = 6$)	27.33	6.02	31.16	8.84	–2.307	0.069	1.81	(–5.09; 9.41)	0.671

As shown in Table 3, the improvement in the ToM skills in the treatment group was highly significant. The Cohen's *d* indicator was very large, which suggests that the difference between the measurements made before treatment and after the completion of therapy is very substantial.

The control group also improved. There was a statistical tendency for *t*, and Cohen's *d* was also large. This result suggests that other factors then therapy treatment (such as natural developing processes or interactions with other individuals and natural feedback of behavior) can bring similar effects, but it is not as large as using special forms of developmental support. The difference between the two groups in the second measurement (Table 2) confirms this state. The detailed results are shown for each of the ToM Scale's subscales. Table 4 shows the differences between the groups on the second measurement.

Table 4
Differences between the groups in the mean ToM subscale scores at the second measurement

ToM subscales	Treatment group		Control group		$t(df = 10)$	p	Cohen's d	95% Confidence interval	Effect size r
	M	*SD*	*M*	*SD*					
Ability to distinguish fantasy from reality	4.50	1.04	3.66	0.81	1.536	0.156	0.90	(–0.98; 2.95)	0.41
Ability to pretend and cheat	4.66	0.51	3.66	0.81	2.535	0.030	1.48	(–0.40; 3.33)	0.59
Ability to distinguish simple emotions	4.66	0.81	3.66	1.21	1.677	0.124	0.97	(–0.90; 2.83)	0.44
Ability to deduce false beliefs of other people	3.50	2.25	2.50	1.22	0.953	0.369	0.55	(–1.31; 2.41)	0.27

ToM subscales	Treatment group		Control group		$t(df = 10)$	p	Cohen's d	95% Confidence interval	Effect size r
	M	*SD*	*M*	*SD*					
Ability to remember own former opinions	2.33	0.81	0.83	1.32	2.355	0.040	1.37	(–0.50; 3.22)	0.56
Ability to take the other partner's perspective	2.50	0.54	1.33	1.36	1.941	0.081	1.13	(–0.74; 2.98)	0.49
Ability to distinguish cognitive emotions	10.00	2.60	8.66	1.21	1.136	0.282	0.66	(–1.21; 2.52)	0.31

The statistical analysis of the differences between the means in the ToM subscales after completing therapy (or after six months for the control group) indicated a significant development only in the ability to pretend and cheat and in remembering one's own former opinions. There was also a statistical tendency for improvements in taking another individual's perspective. However, the Cohen's *d* was large in five of the seven subscales (*d* is more than 0.80), but medium in two scales (*d* is more than 0.50). It indicates that therapy brought expected improvements in some ToM skills, but in the case of the control group, natural developmental processes also provided observable growth.

To explain how the skills changed in the groups in a longitudinal assessment, the next tables show the differences in each subscale between the first and second testing for the treatment (Table 5) and non-treatment groups (Table 6).

Table 5
Differences between the first and the second measurements for the treatment group

	Treatment group				$t(df = 5)$	p	Cohen's d	95% Confidence interval	Effect size r
	Before therapy		After therapy						
	M	*SD*	*M*	*SD*					
Ability to distinguish fantasy from reality	3.00	1.26	4.50	1.04	4.39	0.007	3.33	(2.50; 4.34)	0.86
Ability to pretend and cheat	3.16	1.16	4.66	0.51	3.50	0.017	4.59	(4.18; 5.22)	0.92

Ability to distinguish simple emotions	2.83	1.16	4.66	0.81	11.00	0.000	4.75	(4.10; 5.68)	0.92
Ability to deduce false beliefs of other people	1.00	1.54	3.50	2.25	5.00	0.004	3.37	(1.57; 4.60)	0.86
Ability to remember own former opinions	0.66	1.03	2.33	0.81	5.00	0.004	4.64	(3.99; 5.46)	0.92
Ability to take the other partner's perspective	1.33	0.81	2.50	0.54	3.79	0.013	4.43	(4.00; 5.08)	0.91
Ability to distinguish cognitive emotions	7.00	1.41	10.00	2.60	4.74	0.005	3.83	(1.74; 4.95)	0.89

The statistical analysis for the treatment group across time (before therapy and after the completion of therapy) clearly indicates a significant improvement for each skill assessed in the ToM Scale. The *t* values are significant (*p* less than 0.02 for all subscales). The Cohen's *d* and the effect size *r* indicators were all also large.

The most improved skill was the ability to distinguish simple emotions ($t = 11.00$; $p = 0.000$), i.e., the children were better able to recognize emotional states by understanding a non-verbal language. The *SD* indicator for the second test decreased; thus, the children were more similar in their possibilities after therapy than they were at the beginning. The ability to deduce the false beliefs of other individuals was also improved, but in this case, the diversity among the children was bigger in the second test than at baseline. It suggests the first-order level beliefs are quite difficult to achieve (the *SD* is the highest for this scale). In the case of remembering former opinions, taking another individual's perspective and recognizing cognitive emotions, we can observe significant improvements, but the achieved level of these skills on the second measurement remains weak. However, as shown in Table 6, in non-treatment group, there was no increase at all, which indicates that only intentional work with children can produce the expected effects. In the ability to distinguish cognitive emotion skills, the children learned to link the emotional states to the events and named the event. In achieving these skills, the abilities to pretend and to distinguish reality from fantasy were helpful and a good level in these skills can make it possible to learn more difficult abilities. Table 6 presents the differences in the control group between the beginning of the program and after six months without any treatment.

Table 6
Differences between the first and the second measurements for the control group

	Control group				$t(df = 5)$	p	Cohen's d	95% Confidence interval	Effect size r
	Before program		After 6 months						
	M	*SD*	*M*	*SD*					
Ability to distinguish fantasy from reality	3.50	0.83	3.66	0.81	1.00	0.363	0.50	(–0.15; 1.16)	0.24
Ability to pretend and cheat	3.33	0.81	3.66	0.81	1.58	0.175	1.03	(0.38; 1.69)	0.46
Ability to distinguish simple emotions	3.33	1.36	3.66	1.21	1.58	0.175	0.66	(–0.31; 1.74)	0.31
Ability to deduce false beliefs of other people	2.50	1.22	2.50	1.22	0.00	1.000	0.00	(–0.98; 0.98)	0.00
Ability to remember own former opinions	0.83	1.32	0.83	1.32	0.00	1.000	0.00	(–1.06; 1.06)	0.00
Ability to take the other partner's perspective	1.16	1.16	1.33	1.36	1.00	0.363	0.34	(–0.74; 1.27)	0.17
Ability to distinguish cognitive emotions	7.33	1.86	8.66	1.21	4.00	0.010	2.22	(1.25; 3.70)	0.74

The means obtained from the control group at the first and the second measurements are very similar. Nearly all *t* values (excluding the ability to recognize cognitive emotions) were not significant; there were no differences in the two scales (deducing false beliefs and remembering previous opinions, $t = 0.000$, Cohen's *d* and effect size are both 0.00). However, the *d* for the ability to pretend was large; for the ability to distinguish fantasy from reality and recognizing simple emotions, the *d* was moderate. Thus, it is possible to state there are some factors, such as natural developmental processes or the parents' attention to the child, that may be the reason for improvements in these skills.

The ability to take another individual's perspective had only a small *d* value; thus, it remained difficult for the children as it was at the beginning. There was only one subscale, distinguishing cognitive emotions, where the *t* value was significant ($t = 4.00$; $p = 0.010$) and the Cohen's *d* was also large ($d = 2.22$).

We observed natural growth in this area, however, the difference is meaningful; skills were weak, and the growth was smaller compared with the treatment group.

In conclusion, Tables 5 and 6 clearly show the *advantages of the therapeutic approach* in improving the ToMM skills compared with the natural development process. These findings also suggest its usefulness for parents for home therapy due to the simple tasks that both parents and child can perform.

Descriptive Analysis

Because of the small numbers of participants in both groups, only performing a statistical analysis of the given results could lead to conclusions which are not fully true. Thus, due to the rather qualitative nature of the presented research, the results of every child are shown and analyzed. The next two tables show the results obtained by each child. In Table 7, the measurement was taken before starting therapy (1st test) and approximately six months later without any treatment in the control group.

Table 7
Comparison of the results obtained from each child on the total ToM

	Number of points obtained by the children											
	Treatment Group						Control Group					
	A Girl 8	B Boy 11	C Boy 8	D Girl 9	E Girl 11	F Boy 8	G Boy 8	H Girl 10	I Boy 12	J Boy 10	K Girl 8	L Girl 11
	The first measurement (*before*)											
Points in total	16	18	13	26	30	15	15	28	32	20	17	20
Points in total for the group			118						132			
	The second measurement (*after*)											
Points in total	33	28	25	37	44	26	20	29	33	22	21	21
Points in total for the group			193						146			

The detailed results in the range of the specific ToM mental states development, which were measured using the ToM Scale for the treatment group children during the therapy, are shown in Table 8. The next table shows the results obtained by the children who did not participate in the therapy or any other type of support. The observed changes in the mental states are not the effects of any support (see Table 9).

Table 8
Development of specific mental states in children who received the therapy (treatment group)

		Mental states included in the Theory of Mind Scale						
		Ability to distinguish fantasy from reality	Ability to pretend and cheat	Ability to distinguish simple emotions	Ability to deduce false beliefs of other people	Ability to remember own former opinions	Ability to take the other partner's perspective	Ability to distinguish cognitive emotions
Scores range		0–7	0–7	0–8	0–6	0–8	0–8	0–30
A (Girl, 8)	I test	2/weak	3/weak	3/moderate	0/weak	0/weak	1/weak	7/weak
	II test	5/moderate	5/moderate	5/moderate	3/moderate	2/weak	3/weak	10/weak
B (Boy, 11)	I test	3/weak	3/weak	2/weak	0/weak	0/weak	3/weak	7/weak
	II test	4/moderate	4/moderate	4/moderate	3/moderate	2/weak	3/weak	9/weak
C (Boy, 8)	I test	2/weak	2/weak	2/weak	0/weak	0/weak	1/weak	6/weak
	II test	4/moderate	5/moderate	4/moderate	0/weak	2/weak	2/weak	8/weak
D (Girl, 9)	I test	4/moderate	4/moderate	3/moderate	3/moderate	2/weak	1/weak	8/weak
	II test	5/moderate	5/moderate	5/moderate	6/correct	2/weak	3/weak	10/weak
E (Girl, 11)	I test	5/moderate	5/moderate	5/moderate	3/moderate	2/weak	1/weak	9/weak
	II test	6/correct	5/moderate	6/correct	6/correct	4/moderate	2/weak	15/moderate
F (Boy, 8)	I test	2/weak	2/weak	2/weak	0/weak	0/weak	1/weak	5/weak
	II test	3/weak	4/moderate	4/moderate	3/moderate	2/weak	2/weak	8/weak
Average results for the group	I test	3/weak	3.16/weak	2.83/weak	1/weak	0.66/weak	1.33/weak	7/weak
	II test	4.5/ moderate	4.66/ moderate	4.66/ moderate	35/moderate	2.33/weak	2.5/weak	10/weak
Mental states development		1.5	1.5	1.83	2.5	1.67	1.17	3

Note: I test – measurement before therapy; II test – measurement after completion of therapy.

Table 9
Development of specific mental states in children who were not subjected to the therapy (control group)

		Mental states included in the Theory of Mind Scale						
		Ability to distinguish fantasy from reality	Ability to pretend and cheat	Ability to distinguish simple emotions	Ability to deduce false beliefs of other people	Ability to remember own former opinions	Ability to take the other partner's perspective	Ability to distinguish cognitive emotions
Scores range		0–7	0–7	0–8	0–6	0–8	0–8	0–30
G (Boy, 8)	I test	3/weak	3/weak	2/weak	0/weak	0/weak	1/weak	6/weak
	II test	4/moderate	4/moderate	3/moderate	0/weak	0/weak	1/weak	8/weak
H (Girl, 10)	I test	4/moderate	4/moderate	5/moderate	3/moderate	2/weak	1/weak	9/weak
	II test	4/moderate	4/moderate	5/moderate	3/moderate	2/weak	1/weak	10/weak
I (Boy, 12)	I test	5/moderate	4/moderate	5/moderate	3/moderate	3/weak	2/weak	10/weak
	II test	5/moderate	4/moderate	5/moderate	3/moderate	3/weak	3/weak	10/weak
J (Boy, 10)	I test	3/weak	4/moderate	3/moderate	3/moderate	0/weak	0/weak	7/weak
	II test	3/weak	4/moderate	3/moderate	3/moderate	0/weak	0/weak	9/weak
K (Girl, 8)	I test	3/weak	3/weak	3/moderate	3/moderate	0/weak	0/weak	5/weak
	II test	3/weak	4/moderate	4/moderate	3/moderate	0/weak	0/weak	7/weak
L (Girl, 11)	I test	3/weak	2/weak	2/weak	3/moderate	0/weak	3/weak	7/weak
	II test	3/weak	2/weak	2/weak	3/moderate	0/weak	3/weak	8/weak
Average results for the group	I test	3.5/below moderate	3.33/weak	3.33/weak	2.5/weak	0.83/weak	1.16/weak	7.33/weak
	II test	3.66/below moderate	3.66/below moderate	3.66/below moderate	2.5/weak	0.83/weak	1.33/weak	8.66/weak
Mental states development		0.16	0.33	0.33	0	0	0.17	1.33

Note: I test – measurement at the program beginning; II test – after six months.

Discussion

This study showed that all of the children who received the treatment still experienced significant delays in the theory of mind on *the first-order beliefs*. They had difficulty with realizing that individuals can have true or false beliefs, and these opinions may vary depending on the individual's full knowledge. The children's

thinking processes clearly indicated the problems with their understanding that what they see can only be a representation of things in their minds. Based on Corbett's et al.'s (2011) study, which aimed to increase therapeutic efficacy, it was decided to introduce actors in different role plays. Corbett et al. claimed that modeling behavior by watching actors, even on a video, has quite good effects in teaching skills (Corbett, 2003; Corbett et al., 2011). The actor's introduction and the modifications of the *Unexpected Change Test*, the various questions and the subtitles supporting the understanding of the situations shown in the pictures *made it possible for some children to learn the proper recognition of the knowledge state* of the other individual. The repetitive exercises in this area have enabled the acquisition of these recognizing skills at the level of the first-order beliefs.

It was confirmed that the children with autism disorder have deficits at the level of *first-order beliefs* (Wimmer & Perner, 1983). Although the results obtained using this scale had improved by only 2.5 points, at least these children who mastered the ability to read the first-order beliefs can continue to learn how to think about thinking. However, at this level of difficulty, the children suffer from a lack of language skills, such as semantics, which is typical for most autistic children. It is worth noting that according to Gillott, Furniss, and Walter's (2004) study results, the language difficulties differ in the mental states of children with autism and typically developing children, but do not differ between typically developing and language disorder children. This finding suggests language problems are not the main reason for ToM disabilities (Gillott et al., 2004). Chin and Bernard-Opitz's (2000) study on the efficacy of language teaching clearly indicates that although such treatment increases an interest in conversation and also the number of responses which are appropriate to the context, the ToM (especially in false beliefs tasks) is constant (Chin & Bernard-Opitz, 2000). On the other hand, language problems could be one of the reasons for stress and anxiety. It seems that although for some children with autism, it could be problem, there is no significant relation with anxiety and social stress (Lanni, Schupp, Simon, & Corbett, 2012). Nevertheless, clinicians agree that treatment to improve language could be helpful (Corbett & Prelock, 2005). According to Młynarska (2008), language is the mind's most complicated function; thus, it can be used as a tool for compensation in the ToM. In the presented study, children with lower language difficulties scored higher on the false beliefs scale, which is consistent with published studies.

The applied training *did not produce the expected results in terms of improving the second-order beliefs* in this area. The children were not able to demonstrate an understanding of the image of the other individual's point of view at the level of second-order beliefs. Only good mastering of the ToM at the first order level can be a starting point to work on the ToM on a higher level.

After completing the therapy, the children *still had great difficulty remembering the first judgments about things* and using them for thinking about other people's

thinking. They deduced information on the basis of their last opinion. However, at least in one girl's case (11 yr old), it seems that substantial progress was achieved in this area. By using auxiliary questions, the girl discovered the changes in her own opinions and was able to apply the thinking of others in a correct manner. Crooke, Hendrix, and Rachman (2008) confirmed the effectiveness of social thinking during treatment, but it depends on more simple skills mastering.

On the basis of the gathered information presented in the tables, it can be concluded that by using the recovery program, it is possible for children with autism to develop competence in reading another individual's mental states. All children from the research group have the potential to distinguish fantasy from reality. They correctly concluded that the perception of physical appearance is only a representation in the mind and may vary according to the acquired knowledge.

Corbett (2003) indicates the role of different types of modeling, such as video or role playing in developing social competences. The important role of playing was also suggested by Baron-Cohen (1987). Recently, Mastrangelo (2009) confirmed playing efficacy based on the possibility for children to learn about the world around them and to test their different ideas. The children from the experimental group *showed the ability to play and pretend*. To date, they have used this skill as their reply to modeling, but they *still used their imagination only minimally*. The observation of their work can, however, lead to a conclusion that the continuation of training in this area will contribute to the acquisition of competence. According to Mastrangelo, playing is useful not only for improving the ability to pretend but also for distinguishing reality from fantasy and for considering another individual's perspective. Thus, it increases social competences. Considering the therapy plan was prepared mainly as different forms of play, the obtained results are consistent with the suggested importance for a role of playing.

The program also *improved the ability of understanding non-verbal language* (e.g., gestures, posture, facial expressions) in the examined children, which is consistent with Crooke et al.'s study (2008), and indicates it is possible to learn and develop the ToMM. The recovery program used in the research also brought an improvement in the *recognition of other people's thoughts*. The elements of the recovery program, such as role-playing and the staging of fairy tales, was a good start to improve the skills of taking another individual's perspective and recognizing their thoughts. The children demonstrated the ability to perceive differences in thinking on one subject for two different individuals. They also showed skills for recognizing the thoughts of others based on specific behaviors. According to Crooke et al.'s, understanding and using non-verbal language based on observing an individual's behavior in the correct way is a good starting point for thinking about thinking (secondary order beliefs). The observed

improvement in non-verbal skills is (due to Crooke et al., 2008) connected with increasing improvements on other scales (Crooke et al., 2008). Trainings, such social skills, are effective even in preschool and elementary ages, as Stichter et al. (2012) pointed in their study. Thus, parental treatment for children with autism even at older ages can be useful, due to the possibility of using the techniques in everyday situations.

The current study leads to the conclusion that the proposed therapy provides a possibility for teaching the ability to recognize *simple emotions*, such as anger, happiness, sadness, and fear. The differentiation of simple emotions is an essential component of learning how to read cognitive emotions. Training emotion recognition skills, especially simple skills, is possible in early childhood, for example, by watching tales (Williams, Gray, & Tonge, 2012); for teens and adults, using a virtual platform or virtual reality can be a good tool to increase these skills (Parsons, Mitchell, 2002; Kandalaft, Didehbani, Krawczyk, Allen, & Chapman, 2013). According to studies with similar activities and tasks that were included in the treatment program, the achieved increase in emotion recognition is consistent with the studies previously discussed. Furthermore, such activities can be utilized by parents in the home treatment program and can serve as a foundation to discuss one's emotions with the child. Mastering the reading of simple emotion skills can greatly improve social functioning and is a foundation for complex emotion recognition.

There was also *no change in the causes of complex emotions* as the trained children still deduced them incorrectly. This lack of change may be caused by not achieving a good level of simple emotion recognition. Another reason for this situation could be the fact that the session plan was the same for all six children due to the methodological requirements. However, according to Hoddenbach et al.'s study (2012), the therapy's efficacy (especially short-terms interventions) is determined by many different factors, such as autistic symptoms and their severity or intensity, intelligence quality, and age – as well as parental engagement, attention quality, environment, and health. Structuring personalized sessions could be more effective (Hoddenbach et al., 2012). For this reason, parental cooperation with the child can be a good alternative in ToMM treatment due to their excellent knowledge of the child's possibilities, which is also important according to Mastrangelo (2009). The possibilities for providing attention to the child by others, especially by the parents, are also important, which was indicated in Martins & Harris' study (2006). In the session planning, different forms of playing, such as computer technologies (Silver & Oakes, 2001; Myszak, 2011; Ploog, Scharf, Nelson, & Brooks, 2013), art training (Taghva, Bagherian, Khosroshahi, & Pouretemad, 2011) or even playing with virtual pets (Altschuler, 2008), could be provided for a child based on his own interests.

In current study, the visible differences between the experimental and control groups in the second test indicate that *better results were obtained by the*

experimental group in all mental states. The largest increase in points occurred in the following areas of the ToMM: the ability to remember their previous opinions and distinguish them from the present ones, taking the perspective of another partner, and cognitive emotion recognition (however, in this case, the children's skills remained weak). The increase in the results in the control group was associated with the natural process of development and indicates that better results can be achieved by working on supporting and developing skills, but not only by waiting for naturally occurring skills to develop. Similar effects were reported by Ozonoff and Miller (1995), in which there were no improvements in observed skills in the non-treatment group.

Conclusions

The developed therapeutic program, which was implemented for approximately half a year, provided specific results. Taking into account the fact that working with autistic children is always a long-term process, the achieved results should be considered a success of the program. The developed skills must be revised and internalized such that they can become the basis for more complex skill development, which, in turn, requires a much longer time than adopted in the current study.

Another advantage is the simplicity of the program, which can be used by the parents without special training. The development of a manual, which contains the exercises in a precise order for the specific skills and provides examples of games and exercises (which are based on fairy tales, picture stories and games), will provide the opportunity to construct similar tasks while working with the child, even ad hoc. Thus, the therapy will be more accessible even for those patients who, due to various factors, are not able to participate in the permanent care programs offered by professional centers.

Limitations

The presented research is characterized by a significant limitation, which is a small number of respondents. The conclusions were based on the results of six people's therapy, which does not allow for broad generalization of applications. Therefore, in the case of the presented group, dependencies appeared which are similar to the results obtained in other studies.

An unambiguous assessment of the interactions presented in the text requires further research, which will include not only a much broader group of respondents, but also more closely control such variables as, above all, parents' education, time of impact, child's IQ and level of its functioning, to assess which variables have the greatest impact for the effects.

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