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Empathy Differences Between and Within Children With Attention Deficit Hyperactivity
Disorder (ADHD) and Typically Developing Children

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Abstract

This study examined differences in cognitive and affective empathy between 6 and 7 year old children with and without attention deficit hyperactivity disorder (ADHD) and the influence of symptoms of inattention and impulsivity/hyperactivity on empathy levels in the ADHD children. ADHD status was assigned based on a parent interview which reflected DSM-IV diagnostic criteria. Parents and teachers reported on both cognitive and affective empathy through questionnaires. A story task measured self-reports of affective empathy by presenting children with an emotional story about a boy or girl of their age and asking them how the story made them feel. Furthermore, a computer ball game task measured the behavioral expression of empathy by simulating a ball game in which the child had to choose between self-gain or empathy and act accordingly. ADHD children received lower empathy ratings from both their parents and their teachers, with the exception of parental affective empathy ratings. Self-reports on the story task did not differ between the two groups. In the ball game task, children with ADHD were equally sensitive to the distress of the child but let him become maximally sad more often than healthy developing children. Finally, the amount of symptoms of inattention and impulsivity/ hyperactivity could not predict empathy levels in children with ADHD in any of the measures. Overall, our results show that cognitive empathy and the behavioural, but not verbal, expression of affective empathy were affected in children with ADHD. Implications are discussed.

Keywords: attention deficit hyperactivity disorder, empathy, inattention, impulsivity, children

Introduction

Attention Deficit Hyperactive Disorder (ADHD) is a developmental disorder, characterized by a persistent pattern of inattention and/or hyperactive and impulsive behavior that is more severe than in children at a comparable level of development (Kaplan & Sadock, 2003).

Previous studies have shown that children with ADHD show more dysfunctional social behavior than typically developing children of the same age (Leipold & Bundy, 2000; Melnick & Hinshaw, 1996). With an ever growing number of children diagnosed and treated with ADHD, it becomes increasingly important to understand the nature of deficits in social and affective information processing and their relationship with core ADHD symptoms.

One of the explanations for deficits in social behavior in ADHD is that they have deficient levels of empathy. Empathy is described as “the ability to identify another person’s emotions and thoughts and to respond to these with an appropriate emotion” (Davis, 1994) and consists of an affective and a cognitive component. Cognitive empathy is comparable to Theory of Mind (ToM) and enables a person to take on the perspective of another person and predict their state of mind or behavior (Baron- Cohen, 2005). Affective empathy can be subdivided into an emotional response to the emotional displays of others (e.g., their facial expression, tone of voice or non-verbal expression) and a response to other emotional events and stimuli (e.g., an emotional response to hearing a sad story) (Blair, 2005).

Previous research in children with ADHD has shown that they find it difficult to identify the emotional states of others and fail to share their affective responses (Braaten & Rosen, 2000; Clark et al., 1999; Cordier et al., 2009; Dyck et al., 2001). Barkley (2006) suggested that children with ADHD show less affective and cognitive empathy because of their impaired prefrontal behavioral inhibition. It has been shown for example that children with ADHD are more often bullies, possibly related to lowered self-control (Unnever & Cornell, 2003). In summary, Barkley suggested that deficits in self-regulation make children

with ADHD unable to inhibit their behavior long enough to realize what another person might be thinking and feeling.

However, not all ADHD subtypes are associated with inhibition deficits. Children with the primarily inattentive subtype (ADHD-I) have difficulty sustaining attention for longer periods of time and are easily distracted, but inhibition deficits are not at the core of their problems (American Psychiatric Association, 1994). Based on Barkley's theory, children with the combined subtype of ADHD (ADHD-C) and the primarily hyperactive impulsive subtype (ADHD-HI) might be expected to show more affective and cognitive empathy deficits compared to children with ADHD-I, who have no symptoms related to impulsivity and hyperactivity.

The assumed link between impulsivity and lower levels of empathy fits the literature on the relation between impulsivity and impaired social behavior in children with ADHD. Several studies have focused on the link between antisocial behavior in children with different subtypes of ADHD (Eiraldi, 1997). Children with the inattentive subtype have typically been found to be less aggressive than those with the hyperactive or combined subtype (Baeyens, Roeyers & Vande Walle, 2006; Carlson, Shin & Booth, 1999). Maedgen and Carlson (2000) showed that parents and teachers rated children with the combined subtype as more aggressive compared to children with either ADHD-I or typically developing children. Although children with the inattentive subtype were rated as more socially passive, they were not reported to have emotional regulation deficits. Colledge and Blair (2001) assessed the relation between ADHD and psychopathy by letting teachers of children with ADHD fill in the Psychopathy Screening Device (PSD, Frick & Hare, 2001). This questionnaire consists of two subscales: Impulsivity/ Conduct Problems (I/CP) and Callous and Unemotional (C/U). They found that the inattention component of ADHD was not related to any of the subscales, whereas the impulsivity component of ADHD was related to the antisocial behavior

component (I/CP) of psychopathy. Interestingly, neither impulsivity nor inattention in ADHD were related to the CU subscale which reflects the emotional-affective deficits component of the psychopathy construct. Furthermore, inhibition deficits and hyperactivity, but not attention deficits in children with ADHD have been associated with criminal involvement later in life (Babinski et al., 1999). These studies indicate that antisocial behavior, which is strongly related to decreased levels of empathy (de Kemp et al., 2007; Jolliff & Farrington, 2007; Lahey & Waldman, 2003), is predominantly influenced by disinhibition rather than inattention in children with ADHD.

Research on the question to what extent inhibition deficits in ADHD are related to empathy deficits is lacking and no study has yet examined empathy in children with different subtypes of ADHD. Studying subtypes allows the search for a link between empathy and two distinct symptom clusters (attention and impulsivity/hyperactivity deficits), rather than between empathy and the more general diagnosis of ADHD. Moreover, a better understanding of the contribution of inattention versus impulsiveness/ hyperactivity to empathy deficits in children with ADHD can eventually aid in focusing social training programs aimed at increasing social skills and preventing long-term disruptive behavior.

The present study explored whether 6 and 7 year old children with different ADHD subtypes (inattentive, hyperactive/impulsive or combined) and controls differ in their levels of cognitive and affective empathy. Parents and teachers reported on both cognitive and affective empathy through questionnaires. Children were presented a story task and a ball game task. The story task measured the verbal expression of affective empathy by presenting children with an emotional story about a boy or girl of their age. They were then asked how the protagonist in the story felt, and how the story made them feel. The ball game task measured the behavioral expression of affective empathy by simulating a ball game in which the child had to choose between self-gain or empathy and act accordingly. The inclusion of two

different affective empathy measures allowed for the examination of the relationship between verbal and behavioral expressions of affective empathy.

We hypothesized, based on findings from previous studies with children with ADHD (Braaten & Rosen, 2000; Clark et al., 1999; Cordier et al., 2009; Dyck et al., 2001), that overall, children with ADHD (all subtypes taken together) would show less empathy than healthy developing children as measured by both the parental and teacher questionnaires and the story and ball game task presented to the children. Based on Barkley's theory (2006), we further hypothesized that within the group of ADHD children, children with higher levels of impulsivity would be rated as less empathic than children with lower levels of impulsivity by both their parents and their teachers and would show lower empathy scores on both the story task and the ball game task. Children with more attention deficits were not expected to have lower empathy levels than children with less attention deficits.

Methods

Ethics

The study's research protocol was approved by the Medical Ethics Committee (METC) of the University Medical Centre Utrecht (UMCU). The children's parents provided their written informed consent before the test procedure and were free to withdraw their participation at any time.

Participants

This study was part of a larger study investigating empathy in 6 and 7 year old children with psychiatric disorders and controls. The clinical group consisted of 75 children who were diagnosed with ADHD-I, ADHD-HI, or ADHD-C. They were recruited at the department of children- and youth psychiatry at the academic hospital in Utrecht and Amsterdam. The 55 children in the control group were recruited from schools in the province of Utrecht. In order to assess intelligence, children performed on two subtests (block design and vocabulary) of

the Wechsler Intelligence Scale for Children (WISC-III-NL) (Kort et al., 2005). Children with an estimated IQ below 70 were excluded from the study.

Procedure

The children's parents received an information letter regarding the study and were subsequently approached by telephone to ask for their participation. When parents agreed to participate in the study, the children's schools were approached by telephone to ask their permission to test the child at school. Also, the children's teachers were asked to fill out a booklet of questionnaires regarding the development of empathy of the child. After parents had given their written consent to participate in the study, they filled in a booklet with questionnaires and were visited at home for a structured interview. The interview consisted of module E of the Diagnostic Interview Schedule for Children (DISC-IV-P), which assesses presence of ADHD and disruptive behavior disorders (ODD). The child was then tested at school. The experimenter picked up the child in class and put it at ease by explaining that they would be playing games together and that the child would receive a sticker after each game and a little present when all games were done. The child then performed the block design and vocabulary subscales of the WISC-III, a computer ball game task and a story task.

Measures

Griffith empathy measure.

The Griffith Empathy Measure (GEM) (Dadds et al., 2008) is a parent and teacher report measure, adapted from Bryant's index of Empathy for Children and Adolescents (Bryant, 1982). It measures affective empathy (e.g., "My child become sad when other children are sad.") and cognitive empathy (e.g., "My child doesn't understand why other people cry out of happiness."). The parental scale consists of 23 items and the teacher scale of 18 items which are measured on a 9-point Likert scale (-4 = strongly disagree; +4 = strongly agree). A higher score on the scales represents a higher level of empathy. All scales had a

high internal consistency: parent cognitive (Cronbach's $\alpha = .70$), parent affective (Cronbach's $\alpha = .78$), parent total (Cronbach's $\alpha = .85$), teacher cognitive (Cronbach's $\alpha = .80$), teacher affective (Cronbach's $\alpha = .84$) and teacher total (Cronbach's $\alpha = .90$).

story task.

The story task, (Feshbach & Roe, 1968) measures affective empathy. For boys, the story involves a boy protagonist; the version for girls involves a girl. The task consists of 8 short stories, in which the protagonist feels angry, happy, sad, or fearful. Each emotion is represented by two stories. The child was first asked how the protagonist felt (angry, happy, fearful, sad or neutral), and to what extent (a little, average, very much). Then, the child was asked how he or she felt after hearing the story. Again, the child could choose between the 5 different emotions and the three intensity levels. Dichotomous affective empathy levels (0 or 1) were computed by adding the scores on the two stories per emotion (angry, happy, fearful or sad). If the child had reported feeling the same emotion as the protagonist on at least one of the two stories, it received a score of one (resemblance in emotion). If the child had not reported feeling similar to the protagonist on at least one occasion, the child received a score of zero (no resemblance in emotion).

computer ball game task.

The computer ball game task, developed by Dadds & Hawes (2004), measures the behavioral expression of empathy. During the task, the child plays a ball game with two fictitious peers, a boy and a girl. When the ball is thrown to one of the children, its facial expression momentarily turns happier and it rewards the playing child by giving him or her money. In the first round, both children keep a happy facial expression, regardless of whether the ball is passed to them or not. In the second round, one of the children runs out of money, and each time the ball is not passed to this child, it displays an increasingly distressed emotion. The task has two outcome measures regarding the sensitivity of the child to the

distress of the child without money and the playing child's behavioral reaction. The first measure (sensitivity to distress) yields a continuous score, based on the child's behavioral response to the emotional expression of the child that runs out of money. It constitutes the number of times the ball is thrown to the child when it runs out of money and shows a sad emotion, as opposed to the number of times the ball is passed to the child when it runs out of money, but keeps a neutral emotional expression. A higher score represents a higher sensitivity to the distress of the child without money and, thereby, indicates a higher level of empathy. The second outcome measure is maximum distress, which measures the extent of distress that the child allows the child without the money to express. This is a dichotomous measure with two possible outcomes (0 and 1), in which the child either does, or does not allow the other child to become maximally distressed. When the child does not throw the ball to the distressed child, it eventually reaches maximum distress. In this case, the child receives a zero score. If the playing child at some point prevents the other child from becoming more distressed, it receives a score of one, because the child has shown an empathic response to the other child's emotion.

Data analysis

IBM SPSS Statistics 19 was used for the statistical evaluation of the data. To test our first hypothesis, we examined whether, at a categorical level, children with ADHD (all subtypes combined) had different empathy levels compared to typically developing children. Univariate AN(C)OVA's were performed for empathy measures with continuous outcome measures (GEM parent and teacher and computer ball game tasks' sensitivity to distress). Sex was included as an independent categorical variable, and age, intelligence and social economic status (SES) were included as covariates. Chi-square tests were used for empathy measures with categorical dependent variables (story task and computer ball game tasks' maximum distress).

To test the second hypothesis, bivariate correlation analyses were performed to check for associations between the number of inattention and impulsivity/ hyperactivity symptoms and scores on the GEM parent and teacher, story task and computer ball game task. Linear regression analysis was used to investigate how much of the variance in empathy levels of children with ADD, AHD and ADHD (pooled) was due to the factor inattention and how much due to the factor disinhibition. Inattention was determined by the number of symptoms on the inattention scale of the DISC-IV, whereas disinhibition was determined by the number of symptoms on the impulsivity/ hyperactivity scale.

Results

Descriptives

Independent samples t-tests were used to test for mean differences in age, IQ and SES between healthy developing children and children with ADHD. Results are presented in table 1. The group of healthy developing children ($M = 7.17$, $SD = 0.55$) were significantly older than those in the ADHD group ($M = 6.91$, $SD = 0.63$), $t(128) = 2.42$, $p = .02$. The IQ of children in the control group ($M = 118.27$, $SD = 25.21$) was also significantly higher than that of children with ADHD ($M = 102.53$, $SD = 20.17$), $t(128) = 3.95$, $p < .01$. Finally, controls ($M = 7.22$, $SD = 1.76$) had significantly higher SES levels than ADHD children ($M = 5.43$, $SD = 1.68$), $t(128) = 5.88$, $p < .01$. To test whether boys and girls were equally distributed among the control group and ADHD group, a chi-square test was performed. The control group consisted of a significantly higher percentage of girls (44%) compared to the ADHD group (13%), $\chi^2(1, N = 130) = 6.46$, $p = .011$. In order to control for the influence of age, IQ, SES and sex, these variables were included as moderators in the ANCOVA's and included in the regression model.

Empathy differences between healthy developing children and ADHD children

Griffith Empathy Measure (GEM)

Univariate ANOVA's showed that both parents and teachers rated healthy developing children as significantly more empathic than ADHD children on all dependent variables ($p < .01$) except for parent affective empathy, (control group: $M = 2.47$, $SD = 7.48$; ADHD group: $M = 0.44$, $SD = 12.16$), $F(1, 128) = 1.20$, $p = .275$. Results are shown in table 2. Because of the significant differences in age, intelligence, SES and sex between the control and the ADHD group (table 1), ANCOVA's were used to test if ratings were confounded by these moderating variables. None of the teacher ratings were influenced by moderator variables (all: $p < .01$). Parental ratings of cognitive empathy were also not influenced by moderator variables, $p < .01$. On the affective empathy scale, scores were moderated by age $F(1,126) = 6.06$, $p < .05$, $\eta^2 = .047$, and SES $F(1,126) = 9.85$, $p < .01$, $\eta^2 = .074$. Total parental empathy ratings no longer revealed a main effect of group (control, ADHD), $F(1,126) = 1.1$, $p = .295$, $\eta^2 = .009$, while SES had a significant moderating influence, $F(1,126) = 4.82$, $p < .05$, $\eta^2 = .038$.

Story task

As shown in table 3, no significant differences in affective empathy were found between the control group and the ADHD group (all: $p > .05$) on the story task.

Computer ball game task

Results on the computer ball game task showed that healthy developing children behaved significantly more empathic than ADHD children. As table 4 shows, children in the control group ($M = -0.67$, $SD = 35.78$) were more sensitive to the distress of the child they were playing with than those in the ADHD group ($M = -16.47$, $SD = 38.55$). They passed the ball more often to the child when it had a sad, rather than a neutral expression than did the children in the ADHD group, $F(1, 128) = 5.66$, $p < .05$. However, when results were moderated for age, IQ, SES and sex, the significant group difference disappeared and only age differences turned out to be significant, $F(1,126) = 4.82$, $p < .05$, $\eta^2 = .038$.

Scores on the second outcome measure, maximum distress (table 3), showed that the majority of children in both the ADHD group (69.3%) and the control group (50.9%) allowed the child to reach maximum distress by not playing the ball to him when it ran out of money, $\chi^2(1, N = 130) = 4.638, p = .031$.

Influence of inattention and disinhibition on empathy in ADHD children

Bivariate correlation analysis (table 5) showed that neither inattention nor disinhibition was significantly related to the outcome measures of the GEM, story task or computer ball game task (all: $p > 0.05$), except for a positive relation between disinhibition and the fearful emotion on the story task, $r = .275, p < .05$. This finding indicated that a higher number of impulsivity and hyperactivity symptoms were linked to a higher level of affective empathy when the protagonist in the story was feeling afraid. However, after post hoc Bonferroni correction, this relation was no longer significant.

Linear regression analyses (table 6) showed that neither inattention nor disinhibition were significant predictors of empathy ratings by parents and teachers or sensitivity to the sadness of the child on the computer ball game task (all $p > .05$). Age, IQ and SES were also no significant predictors of empathy ratings (all: $p > .05$), with the exception of age, $\beta = .27, t(69) = 2.40, p < .05$, and SES, $\beta = .38, t(69) = 3.48, p < .01$, on parental ratings of affective empathy.

Discussion

This study among 6 and 7 year old children explored whether children with ADHD differed from healthy developing children on cognitive and affective empathy measures. Furthermore, it examined how well the symptoms of inattentiveness and impulsivity/hyperactivity of the children with ADHD could predict parental and teacher ratings of empathy and the children's sensitivity to the distress of the child on the computer ball game task.

Based on previous research with children with ADHD (Braaten & Rosen, 2000; Clark et al., 1999; Cordier et al., 2009; Dyck et al., 2001), the first hypothesis proposed that children with ADHD would show less cognitive and affective empathy than healthy developing children. The results partially confirm this assumption. Teachers assigned higher cognitive and affective empathy ratings to healthy developing children compared to ADHD children. Although parents also gave children in the control group higher cognitive empathy ratings, differences in affective empathy ratings between the groups were not significant.

Self-report scores of affective empathy on the story task also showed no significant differences between the groups of children.

The computer ball game task, in which children played a ball game with a fictitious boy and girl, showed that children in the control and in the ADHD group were equally sensitive to the distress of the child that ran out of money. The number of times they passed the ball to the child when it ran out of money and showed a sad emotion, as opposed to the number of times they passed the ball when he ran out of money but kept a neutral emotional expression, did not differ between the groups. Compared to healthy developing children, ADHD children more often let the child become maximally distressed by not passing the ball to it when it ran out of money. This latter finding indicates that a higher percentage of ADHD children was prone to ignore the distressed child in order to earn more money.

The second hypothesis was based on Barkley's (2006) assumption that impaired prefrontal behavioral disinhibition causes children with ADHD to show less affective and cognitive empathy. The hypothesis that children with higher levels of impulsivity would be rated as less empathic than children with lower levels of impulsivity by both their parents and their teachers and would show lower empathy scores on both the story task and the ball game task has been rejected. Neither impulsivity nor inattention was a significant predictor of either parental or teacher ratings or of the child's sensitivity to the distress of the child on the ball

game task. Surprisingly, the only significant relation was found between disinhibition and the fearful emotion on the story task. However, after post hoc Bonferroni correction, this relation was no longer significant.

Previous studies have typically reported lower levels of affective empathy in children with ADHD. Cordier and colleagues (2009), for example, showed that 5 to 11 year old children with ADHD had difficulty identifying and empathizing with the emotional states of other children while engaging in play. Braaten and Rosen (2000) found that although 6 to 13 year old boys with ADHD could identify the emotion of a protagonist on a story task, they were less likely than controls to share its emotion. The current study, however, found no such differences. Eisenberger and Fabes (1990) have argued that children younger than 8 years lack the cognitive and verbal ability to communicate their internal states. However, our findings show that a large part of the 6 and 7 year old children in our sample were already able to report on both their own feelings and those of others.

The present study has offered powerful insight into the different aspects of empathy by combining teacher, parent and self-reports as well as a behavioral task. The results showed that different tasks and different reporters yielded conflicting results, indicating that caution should be taken when interpreting and comparing results across different empathy measures. According to Eisenberg & Lennon (1983), children's self-reports of empathy, such as on the story task, are unrelated to their prosocial behavior and may be affected by factors such as the sex of the experimenter. Yet, although children with ADHD allowed the other child to become maximally sad more often than healthy developing children on the computer ball game task, they did show equal sensitivity to the distress of the other child. Cordier (2009) has argued that children with ADHD may not understand the importance of reciprocity in social play. This could explain why children with ADHD tend to show more negative

behaviors (e.g., violating rules), during play than typically developing children of the same age (Melnick & Hinshaw, 1996).

Limitations

Several limitations of the present study can be mentioned. Firstly, some parents and teachers complained that the booklet of questionnaires, of which the GEM was a part, took a long time to complete and that some questions were difficult to understand and answer. This might have led parents and teachers to answer superficially or incorrectly. Parent SES, based on the combined SES of both parents, confounded the parent, but not the teacher, ratings. We did not examine which parent completed the questionnaire, so it is unknown whether parent SES was a valid indicator of the reporting parent. Still, it should be noted that, if the influence of SES were to be disregarded, empathy differences between control- and ADHD children would become significant on all GEM measures except for the parental affective scale.

Secondly, the story task had its limitations as well. Perspective-taking, which is a requirement of the story task, is an essential component of empathy (Blair, 2005; Davis, 1983). However, as noted before, self-reported empathy tends to be unrelated to actual prosocial behaviour (Eisenberg & Lennon, 1983). Eisenberg and Miller (1987) have shown that stories tend to be too short to evoke empathy, while longer stories typically do not improve validity. Therefore, as is the case in the current study, most studies do not solely rely on self-report measures of empathy, by also incorporating questionnaires and behavioural or physiological measures (Eisenberg & Fabes, 1990; Hubbard et al., 2002; Tamburrino et al., 1993). The question “how do you feel after hearing this story?” might have been too ambiguous for many children. Factors such as social desirability (“I am being tested so I should act happy”), shame (“I will not show weakness by saying I feel scared now”) or feelings unrelated to the task (“In a short time, I will receive a present for my participation”), might have influenced children’s reactions. For instance, several children reported to feel

(very) happy or neutral after hearing a story in which Mario's dog died. However, as the task continued, they mentioned their own experiences with grief, brought on by the loss of a pet. This seems to indicate that while they failed to report the appropriate emotion while being explicitly asked, the story did cause them to be reminded of a personal event and evoked a similar feeling.

Lastly, it is important to note that the validity of the computer ball game task has yet to be determined. The only published article that has reported on the computer ball game task (Dadds et al, 2008) used a sample of a mere 23 children and only examined associations between the GEM and the computer ball game task. Given its experimental nature, the current study's observations are used to highlight some of the shortcomings of the task.

Despite their young age, many children in our sample were familiar with computer games. Most computer games underscore the importance of achievement by requiring the player to reach certain goals in order to proceed in the game. It can be argued that the computer ball game task requires the child to choose between goal-achievement (earning as much money as possible) and empathic behavior (consoling the child that ran out of money while missing out on the chance to make money). At first, many children were puzzled to see that one of the children was no longer able to donate money. After a clear and often verbal hesitation, many then went on to play the ball to the child who still had money left. The underlying reasons of the children's responses might have differed at this point. Possibly, some children might have had a personal goal to earn as much money as possible whereas others might have assumed that the game required them to. This is important, because it might have influenced their reaction to the child's distress that soon followed. Again, many children were puzzled to see the sad face and hesitated before continuing with the game. Most of the children then turned to the experimenter to ask why the child was distressed. The experimenter said she did not know and stressed that the child was free to choose. Some

children then said that they thought the child was distressed because it ran out of money and proceeded by playing the ball to the child with the money. Others concluded that the child was distressed because it was excluded from the ball game and played the ball to the child without the money. Many children then continued to play the ball in turns to the child with and without money. Possibly, younger children may have played the game differently than older children. The results showed that children with ADHD and healthy developing children did no longer differ in their behaviour when age was taken into account. Younger children showed less empathic responses in the ball game task compared to older children. It is possible that younger children were sticking to the goal of earning as much money as they could more closely than the older children. Another possibility is that younger children had more difficulty dividing their attention between their own goals and the emotion of the child they were playing with because of age-dependent differences in attentional functioning (Hanisch et al., 2004). In any case, the age of the children should be taken into account when interpreting the results of the computer ball game task.

In order to get a better understanding of influence of attention deficits and impulsivity on empathy, further research is warranted. Children are typically diagnosed with ADHD-I, ADHD-HI and ADHD-C based on DSM-IV criteria. The DSM-IV uses pre-determined cut-off points to arrive at a diagnosis despite the fact that both attentional deficits and impulsivity occur on a sliding scale. In order to ensure sufficient ecological validity, it might be advisable to use the DISC-IV-P to assess the extent of the children's impulsivity and attention deficits and combine this information with the use of traditional measures of executive function such as the go/no-go task and the stop-task to obtain a clearer measure of impulsivity. Likewise, sustained, selective and divided attention tasks could be performed to measure attentional deficits.

In conclusion, this study has tried to contribute to the existing body of knowledge about empathy differences between typically developing children and children with ADHD, and between the different subtypes of ADHD, by including cognitive, affective and behavioral measures of empathy. It has shown that ADHD sometimes has a negative influence on empathic behavior, but at the same time, it has shown that children with ADHD are capable of feeling the emotions of another child and often respond to these emotions in an empathic manner. The results emphasize the importance of regarding empathy as a construct that can be measured on multiple levels and may indicate that ADHD influences empathic behavior rather than empathic feelings.

References

- American Psychiatric Association. (1994). *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition. Washington, DC: American Psychiatric Association.
- Babinski, L. M., Hartsough, C. S., Lambert, N. M. (1999). Childhood Conduct Problems, Hyperactivity-impulsivity, and Inattention as Predictors of Adult Criminal Activity. *Journal of Child Psychology and Psychiatry*, 40, 347- 355. doi: 10.1111/1469-7610.00452.
- Baeyens, D., Roeyers, H. & Vande Walle, J. (2006). Subtypes of attention-deficit/hyperactivity disorder (ADHD): Distinct or related disorders across measurement levels? *Child Psychiatry and Human Development*, 36, 403–417. doi: 10.1007/s10578-006-0011-z.
- Barkley, R. A. (2006). A Theory of ADHD. In: R. A. Barkley (Ed.), *Attention Deficit Hyperactivity Disorder: a Handbook for Diagnosis and Treatment*, (3rd edition, pp. 297-336). New York: Guilford Press.
- Baron-Cohen S. (2005). The empathizing system: a revision of the 1994 model of the mindreading system. In: Ellis B, Bjorklund D (Eds.), *Origins of the social mind* (pp. 468- 492). New York: Guilford Press.
- Blair, R. J. R. (2005). Responding to the emotions of others: Dissociating forms of empathy through the study of typical and psychiatric populations. *Consciousness and Cognition*, 14, 698- 718. doi:10.1016/j.concog.2005.06.004.
- Braaten, E. B., & Rosen, L. A. (2000). Self-regulation of affect in attention deficit-hyperactivity disorder (ADHD) and non- ADHD boys: Differences in empathic responding. *Journal of Consulting and Clinical Psychology*, 68, 313- 321. doi: 10.1037/0022-006X.68.2.313.

- Bryant, B. K. (1982). An index of empathy for children and adolescents. *Child Development*, 53, 413- 425. doi: 10.2307/1128984.
- Carlson, C. L., Shin, M. & Booth, J. (1999). The case for DSM-IV subtypes in ADHD. *Mental Retardation and Developmental Disabilities Research Reviews*, 5, 199–206. doi: 10.1002/(SICI)1098-2779.
- Clark, T., Feehan, C., Tinline, C., & Vostanis, P. (1999). Autistic symptoms in children with attention deficit- hyperactivity disorder. *European Child and Adolescent Psychiatry*, 8, 50- 55. doi: 10.1007/s007870050083.
- Colledge, E., & Blair, R. J. R. (2001). The relationship in children between the inattention and impulsivity components of attention deficit and hyperactivity disorder and psychopathic tendencies. *Personality and Individual Differences*, 30, 1175- 1187. doi:10.1016/S0191-8869(00)00101-X.
- Cordier, R., Bundy, A., Hocking, C., & Einfeld, S. (2009). A model for play-based intervention for children with ADHD. *Australian Occupational Therapy Journal*, 56, 332- 340. doi: 10.1111/j.1440-1630.2011.00928.x.
- Dadds, M. R., & Hawes, D. J. (2004). The interpersonal response test. *Author: The University of New South Wales, Sydney, Australia.*
- Dadds, M. R., Hunter, K., Hawes, D. J., Frost, A. D. J., Vassallo, S., Bunn, P., Merz, S., & El Masry, Y. (2008). A Measure of Cognitive and Affective Empathy in Children Using Parent Ratings. *Child Psychiatry & Human Development*, 39, 111- 122. doi: 10.1007/s10578-007-0075-4.
- Davis, M.H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, 44, 113–126. doi: 10.1037/0022-3514.44.1.113.
- Davis, M. H. (1994). *Empathy: A social psychological approach*. Boulder, Co: Westview

Press.

- de Kemp, R., Overbeek, G., de Wied, M., Engels, R., & Scholte, R. (2007). Early adolescent empathy, parental support, and antisocial behavior. *Journal of Genetic Psychology, 168*, 5-18. doi: 10.3200/GNTP.168.1.5-18.
- Dyck, M. J., Ferguson, K., & Shochet, I. M. (2001). Do autism spectrum disorders differ from each other and from non-spectrum disorders on emotion recognition tests? *European Child and Adolescent Psychiatry, 10*, 105- 116. doi: 10.1007/s007870170033.
- Eiraldi, R. B., Power, T. J., Nezu, C. M. (1997). Patterns of comorbidity associated with subtypes of attention-deficit/hyperactivity disorder among 6- to 12-year old children. *Journal of the American Academy of Child and Adolescence Psychiatry, 36*, 503- 514. doi:10.1097/00004583-199704000-00013.
- Eisenberg, N. & Fabes, R. A. (1990). Empathy: Conceptualization, measurement, and relation to prosocial behavior. *Motivation and Emotion, 14*, 131- 149. doi: 10.1007/BF00991640.
- Eisenberg, N., & Lennon, R. (1983). Gender differences in empathy and related capacities. *Psychological Bulletin, 94*, 100-131. doi: 10.1037/0033-2909.94.1.100.
- Eisenberg, N., & Miller, P. A. (1987). The relation of empathy to prosocial and related behaviors. *Psychological Bulletin, 101*, 91- 119. doi: 10.1037/0033-2909.101.1.91.
- Eisenberg-Berg, N., & Lennon, R. (1980). *Child Development, 51*, 552-557. doi: 10.2307/1129290.
- Feshbach, N.D., & Roe, K. (1968). Empathy in six and seven year olds. *Child Development, 39*, 133- 145.
- Frick, P. J., & Hare, R. D. (2001). *The antisocial process screening device*. Toronto: Multi-Health Systems.

- Hanisch, C., Konrad, K., Günther, T., & Herpertz-Dahlmann, B. (2004). Age-dependent neuropsychological deficits and effects of methylphenidate in children with attention-deficit/hyperactivity disorder: a comparison of pre- and grade-school children. *Journal of Neural Transmission*, *111*, 865- 881. doi: 10.1007/s00702-003-0056-0.
- Hubbard, J.A., Smithmyer, C.M., Ramsden, S.R., Parker, E.H., Flanagan, K.D., Dearing, K.F., Relyea, N., Simons, R.F. (2002). Observational, Physiological, and Self-Report Measures of Children's Anger: Relations to Reactive versus Proactive Aggression. *Child Development*, *73*, 1101- 1118. doi: 10.1111/1467-8624.00460.
- Jolliffe, D., & Farrington, D. P. (2007). Examining the relationship between low empathy and self-reported offending. *Legal and Criminological Psychology*, *12*, 265-28. doi: 10.1348/135532506X147413.
- Kaplan, B. J., & Sadock, V. A. (2007). *Concise Textbook of Clinical Psychiatry, 9th Revised Edition*. Philadelphia: Lippincott Williams & Wilkins.
- Kort, W., Schittekatte, M., Dekker, P. H., Verhaeghe, P., Compaan, E. L., Bosmans, M., & Vermeir, G. (2005). WISC-III^{NL}. *Handleiding en verantwoording met aanvullende technische achtergrondinformatie*. London: Hartcourt Test Publishers.
- Lahey, B. B., & Waldman, I. D. (2003). A developmental propensity model of the origins of conduct problems during childhood and adolescence. In B. B. Lahey, T. E. Moffitt, & A. Caspi (Eds.), *Causes of conduct disorder and juvenile delinquency* (pp. 76–117). New York: Guilford Press.
- Leipold, E. E., & Bundy, A. (2000). Playfulness in children with attention deficit hyperactivity disorder. *Occupational Therapy Journal of Research*, *20*(1), 61- 82.
- Maedgen, J. W., & Carlson, C. L. (2000). Social functioning and emotional regulation in the attention deficit hyperactivity disorder subtypes. *Journal of Clinical Child Psychology*, *29*, 30- 42. doi:10.1207/S15374424jccp2901_4.

Melnick, S., & Hinshaw, S. (1996). What they want and what they get: The social goals of boys with ADHD and comparison boys. *Journal of Abnormal Child Psychology*, 24, 169-185. doi: 10.1007/BF01441483.

Tamburrino, M. B., Lynch, D. J., Nagel, R., & Mangen, M. (1993). Evaluating empathy in interviewing: Comparing self-report with actual behavior. *Teaching and Learning in Medicine: An International Journal*, 5, 217- 220. doi: 10.1080/10401339309539626.

Unnever, J., & Cornell, D. G. (2003). Bullying, self control, and ADHD. *Journal of Interpersonal Violence*, 18, 129-147. doi: 10.1177/0886260502238731.

Table 1

Mean Differences in Age, IQ, Social Economic Status (SES) and Sex Between Control Children and ADHD Children.

	Control children			ADHD children			<i>p</i>
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	
Age	55	7.17	0.55	75	6.91	0.63	.017
IQ	55	118.27	25.21	75	102.53	20.17	.000
SES	55	7.22	1.76	75	5.43	1.68	.000
Boys/ girls	31/ 24			58/17			.011 ^a

^a Chi square test was used for the difference between boys and girls

Table 2

Empathy Scores on the Cognitive, Affective and Total Scale of the Griffith Empathy Measure (GEM) Parent and Teacher.

	Control Children			ADHD Children			<i>F</i>	η	<i>p</i>
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>			
Parent cognitive	55	9.05	6.67	75	3.57	8.26	16.38	0.11	.000
Parent affective	55	2.47	7.48	75	0.44	12.16	1.20	9.31	.275
Parent total	55	18.56	16.31	75	7.04	25.48	8.64	0.06	.004
Teacher cognitive	55	5.85	5.66	75	0.51	6.38	24.26	0.16	.000
Teacher affective	55	0.31	8.73	75	-7.00	10.43	17.67	0.14	.000
Teacher total	55	9.02	17.07	75	-8.73	19.79	28.33	0.18	.000

Table 3

Cross Tabulation of Group (Control, ADHD) and Resemblance in Emotion (Yes or No) on the Story Task and Group and Maximum Distress (Yes or No) on the Computer Ball Game Task.

	No resemblance in emotion		Resemblance in emotion		χ^2	<i>p</i>
	Controls	ADHD	Controls	ADHD		
Story task						
Angry	26 (47.3%)	28 (37.3%)	29 (52.7%)	47 (62.7%)	0.914	.339
Happy	11 (20%)	11 (14.7%)	44 (80%)	64 (85.3%)	0.319	.572
Fearful	30 (54.5%)	40 (53.3%)	25 (45.5%)	35 (46.7%)	0.000	1.000
Sad	21 (38.2%)	11 (38.7%)	34 (61.8%)	64 (61.3%)	0.000	1.000
All emotions	11 (20%)	6 (8%)	44 (80%)	69 (92%)	3.033	.082
Computer ball game task						
	Maximum distress		No maximum distress		<i>Chi2</i>	<i>p</i>
	Controls	ADHD	Controls	ADHD		
Maximum sadness	27 (49.1%)	52 (69.3%)	28 (50.9%)	23 (30.7%)	4.638	0.031*

**p* < .05.

Table 4

Sensitivity to Distress Scores on the Computer Ball Game Task

	Control Children			ADHD Children			<i>F</i>	η	<i>p</i>
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>			
Sensitivity to distress	55	-0.67	35.78	75	-16.47	38.55	5.66	0.04	.019*

* $p < .05$.

Table 5

Correlations Between Inattention, Impulsivity/Hyperactivity and GEM Parent and Teacher, Story Task and Computer Ball Game Task.

	<i>Inattention</i>	<i>Impulsivity/ Hyperactivity</i>
GEM		
Parent cognitive	-.166	-.054
Parent affective	-.076	-.028
Parent total	-.104	-.044
Teacher cognitive	.137	-.136
Teacher affective	.034	-.126
Teacher total	.093	-.107
Story task		
Angry	-.180	.119
Happy	-.007	-.070
Fearful	.010	.275*
Sad	.101	-.077
All emotions	-.021	.014
Computer ball game task		
Sensitivity to distress	-.181	-.003
Maximum distress	-.044	-.032

* $p < .05$.

Table 6

Summary of Simple Regression Analysis for Inattention and Impulsivity/Hyperactivity Predicting Parent and Teacher Ratings of Cognitive, Affective and Total Empathy and the Computer Ball Game Tasks' Sensitivity to Distress (N = 75)

Variable	<i>B</i>	<i>SE B</i>	β
Parent and Teacher Cognitive			
Inattention	-.699 / .473	.495 / .386	-.164 / .144
Hyperactivity/ Impulsivity	-.228 / -.541	.571 / .445	-.047 / -.143
Parent and Teacher Affective			
Inattention	-.467 / .214	.738 / .638	-.075 / .040
Hyperactivity/ Impulsivity	-.179 / -.790	.849 / .735	-.025 / .127
Parent and Teacher Total			
Inattention	-1.341 / .996	1.514 / 1.209	-.102 / .098
Hyperactivity/ Impulsivity	-.590 / -1.313	1.775 / 1.392	-.039 / -.112
Sensitivity to distress			
Inattention	-2.160	1.533	-.177
Hyperactivity/ Impulsivity	-1.131	1.490	-.095