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Empathy ability in children with motor coordination disorders

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Abstract

Aim: Children with motor coordination problems are known to have emotional difficulties and poor social skills. The current study investigated whether children with poor motor abilities have poor emotion recognition skills when they are compared with typically developing children without movement difficulties. **Method:** For the examination of empathy ability the Greek version of the self-completed questionnaire Empathy for children and adolescents was used (Empathy Index for children and Adolescents; Bryant, 1982). Participants were divided into two groups of 30 school-age children each with chronological age ranged from 7-15 years. All participants from the Group A were diagnosed with motor difficulties as well as developmental coordination problems. Comparison group was consisted of 30 school-age children without motor coordination disorders or any other developmental disorder. **Results:** Findings indicated that performance of the children with coordination disorders were characterized by relatively poor scores in comparison with the typically developing children without movement difficulties. Practical implications and recommendation for further research on empathy ability in children with motor difficulties are discussed.

Keywords: Motor coordination disorder; empathy ability; social interaction; children.

1. Introduction

Empathy is the capacity to recognize, understand and share the emotional states of others (Decety & Moriguchi 2007) and is considered to be the cornerstone of genuine and reciprocal human relationships. Empathy is the basis of social interaction and plays an important role in the development of moral judgment, social competence and adaptation in childhood (Cummins, Piek, & Dyec, 2005).

Empathy is defined as an affective response that stems from the apprehension or comprehension of another's emotional state or condition and is similar to what the other person is feeling or would be expected to feel in the given situation (Eisenberg, Fabes, & Spinrad, 2006). Sometimes empathy is the outcome of direct exposure to another's emotion and other times, an observer may make assumptions about another's emotional state base on environmental cues or other information. Children with high empathy reveal greater sensitivity to the feelings of others, as the hire and understand them in a more sophisticated

way, exhibit less aggressive and developed moral judgment compared to children who exhibit low empathy (Krebs, Biswas, Pascalis, Kamp-Becker, Remschmidt, & Schwarzer, 2011).

Empathy is assumed to consist of three components: a) motor, b) cognitive, and c) empathy (Blair 2005). Motor empathy refers to automatically and unconsciously mirroring the facial expressions of another person, known as facial mimicry. The cognitive dimension of empathy refers to the cognitive understanding of the experience of the other. That is, the person sees and feels from the perspective of the other. In other words, cognitive empathy is the ability to rationally understand and recognize the emotional state, and to take the perspective of other persons. So, emotion recognition is an important component of cognitive empathy. The emotional dimension of empathy refers to the direct experience of the feelings of the other (Lynch, Rosenthal, Kosson, Cheavens, Lejuez, & Blair, 2006). In this sense, a person shares the emotional state or experience of another person. Emotional empathy refers to the experience of emotions consistent with and in response to those of others. Emotional empathy can be distinguished in, a) Empathic concern, which is empathy and compassion for others, and b) personal anguish, referring to egocentric feelings of distress and anxiety in response to someone suffering (Snyder & Lopez, 2009).

Lack of empathy has been invoked as an explanatory mechanism in some psychiatric disorders, but foremost in autism spectrum disorders (ASD), conduct disorder (CD) and developmental coordination disorder (DCD) (Blair 2005). Individuals with autism exhibit less attention to negative emotional displays of others (Bacon, Fein, Morris, Waterhouse, & Allen, 1998; Corona, Dissanayake, Arbelle, Wellington, & Sigman, 1998; Sigman, Kasari, Kwon, & Yirmiya, 1992), demonstrate less positive affect in combination with attention to social partner (Dawson, Hill, Spencer, Galpert, & Watson, 1990; Snow, Hertzog, & Shapiro, 1987), more negative affect in social interactions (Yirmiya, Kasari, Sigman, & Mundy, 1989), and exhibit limited affect expression in social interactions (Joseph, & Tager-Flusberg, 1997) when compared with matched controls. Children with DCD and other disorders of attention, motor control, and perception commonly have empathic ability deficits which may account for impaired social functioning.

Motor skills play a crucial role in a child's functioning in social and emotional domains. Studies have shown that poor motor coordination can affect children's sense of competence, their success within their peer groups, academic achievement, and even their selection of recreational activities (Bons van den Broek, Scheepers, Herpers, Rommelse, & Buitelaar, 2013).

Developmental coordination disorder (DCD) is a disorder characterized by movement problems severe enough to interfere with children's daily living as it is identified by the American Psychiatric Association (1994). According to Fliers and colleagues, (2007) children with moving difficulties and other severe problems in attention, motor control, and perception often exhibit empathic ability deficits which may account for impaired social functioning. Children with DCD have a broad range of perceptual problems, including visuo-spatial processing (Coleman, Piek, & Livesey, 2001) kinesthetic processing (Piek & Coleman, 1995) and cross-modal integration (Wilson & McKenzie, 1998). Motor coordination has been positively related to empathic ability measures in typically developing children (Coleman et al., 2001). Studies have shown that emotion recognition tasks in particular, but also emotion understanding are related to measures of fine and gross motor coordination among children with and without motor coordination problems (Livesey & Parkes, 1995). Children with low

motor coordination scores (normal verbal IQ) have significantly lower scores than comparison group on their ability to recognize emotional facial expressions. In just over a quarter of cases (12 of 45), scores on the 14 emotion recognition measures and other empathic ability measures were under 85 (IQ-equivalent score). This low value has been associated with significant elevations on parent-rated behavioral problems (Dyck et al., 2004a). This kind of association between motor coordination and empathic abilities may account for Gillberg's (1992) beliefs that include disorders of attention, motor control, and perception among the empathy disorders. The relationship between motor skills and social or emotional functioning is usually thought to be indirect. Poor motor skills may result in poor performance in individual and team games/sports, which may reduce a child's sense of competence which in turn reduces success within peer groups, lower academic achievement (Cantell, Smyth, & Ahonen, 1994), and may increase the child's experience of anxiety and depression (Skinner & Piek 2001; Fairchild, Stobbe, van Goozen, Calder, & Goodyer, 2010). Alternatively, it is possible that the processes responsible for poor motor skills might affect social performance by reducing the child's ability to perceive socially relevant cues.

On the basis of these theoretical considerations, we hypothesized that children with coordination disorder and poor motor skills will also experience problems across a range of empathic abilities compared with typically developed school-aged children at the same chronological age. The study was designed to provide more detail about the deficit in emotional responsivity in children with motor coordination problems and to examine the ability of children with movement problems to understand, become aware and share the feelings of others.

2. Methodology

2.1 Participants

Group A consisted of 30 school-age children (N=17 boys and N=13 girls) with chronological age ranged from 7-15 years (M = 11.73, SD = 2.79). All participants from Group A were diagnosed with motor difficulties as well as developmental coordination problems. They scored at or below 80 on the McCarron Assessment of Neuromuscular Development (MAND, McCarron 1997). Comparison group was consisted of 30 school- age children (N=15 boys and N=15 girls) (MO = 10.7 years, TA = 1.2). All participants from both groups came from different public schools from the region of Thessaloniki, the second larger city in Greece. The present study was approved by the Greek Ministry of Education and Lifelong Learning and all parents signed informed consent, while children provided verbal assent. All participants came from different socioeconomic levels based on educational level and professional status of their parents. The participants were individually tested and the total duration was about 20 minutes.

2.2 Measuring Instruments and assessment procedures

The Greek version of the self-completed questionnaire Empathy for children and adolescents (Empathy index for children and Adolescents; Bryant, 1982) was used. The Empathy Index for Children and Adolescents (IECA) is a 22-item self-report questionnaire developed and validated by Bryant (1982) to assess dispositional affective empathy in children 6 years and

older. The questionnaire includes a total of 22 closed questions in which children were asked to respond with "Yes" or "No". The Bryant (1982), created for each question one dichotomous variable, which takes the value 1 for "Yes" and 0 for "No". The IECA, derived from Mehrabian and Epsteins's (1972) adult measure of emotional empathy, has been designed to assess emotional responsiveness, rather than accuracy of cognitive insight. The alfa reliability coefficients (a) of Cronbach ranging from .54 for children of childhood, to .68 for children of prepubertal and .79 for adolescents. The respective retest reliability coefficients (testretest reliability coefficient) is quite high ($r_{53} = .74$, $r_{108} = .81$ and $r_{80} = .83$) and confirm the reliability of this questionnaire.

3.Results

Univariate analysis of variance was used to compare IECA's scores between the two groups. The results revealed significant statistical differences regarding empathic ability. More specifically, children with motor coordination disorders exhibited lower scores in comparison with control group. The mean scores and standard deviations for the two groups were $M = 13.50$, $SD = 2.93$ and $M = 17.43$, $SD = 2.09$ respectively. Table 1 contains differences on empathy abilities from the total sum of participant's responses.

Table 1. Differences on empathy abilities for the two groups

		Group A	Group B	df	f	p value
		Mean (SD)	Mean (SD)			
Empathy abilities		13.50 (2.93)	17.43 (2.09)	27	3.38	.04*
Gender	Boys	17	15			
	Girls	13	15			
Age in years		11.73 (2.79)	10.7 (1.2)			

*p <0.05

4.Discussion

In an attempt to clarify the results of previous investigations about empathy in schoolage children, we examined a sample of elementary school children and adolescents with moving difficulties and compared them with a group of typical children. Empathy was measured with the self-completed questionnaire Empathy for children and adolescents (Bryant, 1982). The current findings demonstrated that children with motor problems exhibited lower empathy ability compared to the children of the comparison group.

Results of the present study confirm the findings of Cummins and colleagues (2005) who studied empathy in a sample of 234 children (6-12 years) with or without motor difficulties, and concluded that children with motor problems show a delay in their empathic ability. Moreover, results of research conducted by Soulis and Christodoulou (2011) who investigated the empathy in a sample of 46 children and adolescents with visual impairment and 46 children without visual impairment, concluded that children and adolescents with visual impairment showed less empathy than children and adolescents who had no vision

problems. One possible explanation is that vision is among the most important senses and loss or decrease is associated with severe consequences in people's life and development (Angelopoulou-Sakantami, 2002). Children with visual impairment face several difficulties in their everyday life in the cognitive, social and motor domains of their development (Kalloniatis & Johnston, 1994). In addition, the consequences of poor physical conditioning and motor abilities observed in children with visual impairment include exclusion and marginalization from peers (Kalloniatis et al., 1994; Lieberman & McHugh, 2001). This results in feelings of insecurity, loneliness, and disappointment (Lieberman & McHugh, 2001).

An alternative explanation is that the processes responsible for poor motor skills might affect social performance by reducing the child's ability to perceive socially relevant cues. In addition to that, the poor performance of experimental group appeared to result from impairment in recognizing emotions in different situations. However, Cutting and Dunn's (1999) argue that emotion recognition and understanding tasks reflect different aspects of social cognition. The findings related to deficits in recognition of emotions support the notion that children with motor problems may be disadvantaged in the social domain, which in part might account for their established social and academic problems in childhood.

Empathic capacity or its expression may be associated with delays or other dysfunctions of socio-moral development. These may include greater incidence of antisocial behaviors and other forms of externalizing psychopathology. Thus, one might expect that a deficiency in the capacity to respond to others empathically may be a contributing factor to dysfunctions in social interaction that attain clinical levels (Gibbs, 1987).

Although the present study has yet to explain the exact nature of the relationship between empathic abilities and motor coordination, it has shown that children with motor coordination problems do have specific deficits in empathy. The findings of this study must be into consideration when designing educational intervention programs for children with developmental delays and movement difficulties.

5. Limitations and recommendations for future research

The small size of the sample participated in this study is one of the limitations when trying to generalize the findings for children with coordination disorders. Future studies must focus on the investigation of empathy in children with other developmental delays and assess comorbidity in symptoms between disorders. Since participants with motor difficulties shows lower performance on the self-completed questionnaire Empathy for children and adolescents (Bryant, 1982) further studies should be considered. We therefore recommend that dynamic facial expressions of experienced emotions are recommended as stimuli to elicit an empathic response. Empathy can be measured in response to facial expressions, one of the most powerful ways to communicate emotions (Frith 2009). Since eye contact is considered necessary for the recognition of facially expressed emotions (Batty, Meaux, Wittemeyer, Rogé, & Taylor, 2011), future studies should focus on eye contact and visual impairment as a possible explanation for empathic deficits.

References

- American Psychiatric Association, (1994). *Diagnostic and Statistical Manual of Mental Disorders: DSM-IV*. 4th Ed. Washington, DC: American Psychiatric Association.
- Batty, M., Meaux, E., Wittemeyer, K., Rogé, B., & Taylor, M. J. (2011). Early processing of emotional faces in children with autism: an event-related potential study. *Journal of Experimental Child Psychology*, *109*, 430–444.
- 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.
- Bons, D., van den Broek, E., Scheepers, F., Herpers, P., Rommelse, N., Buitelaar, J. K., Decety, J., & Moriguchi, Y. (2013). Motor, Emotional, and Cognitive Empathy in Children and Adolescents with Autism Spectrum Disorder and Conduct Disorder. *Journal of Abnormal Child Psychology*, *41*, 425–433.
- Bryant, B. K. (1982). An index of empathy for children and adolescents. *Child Development*, *53*, 413–425.
- Cantell, M., Smyth, M., & Ahonen, T. (1994). Clumsiness in adolescence: educational, motor and social outcomes of motor delay detected at 5 years. *Adapted Physical Activity Quarterly*, *11*, 115–129.
- Coleman, R., Piek, J. P., & Livesey, D. J. (2001). A longitudinal study of motor ability and kinaesthetic acuity in young children at risk of developmental coordination disorder. *Human Movement Science*, *20*, 95–110.
- Cummins, A., Piek, J., & Dyck, J. (2005). Motor coordination, empathy and social behavior in school-aged children. *Developmental Medicine and Child Neurology*, *47*, 437–442.
- Cutting, A., & Dunn, J. (1999). Theory of mind, emotion understanding, language, and family background: individual differences and interrelations. *Child Development*, *70*, 853–865.
- Decety, J., & Moriguchi, Y. (2007). The empathic brain and its dysfunction in psychiatric populations: implications for intervention across different clinical conditions. *Biopsychosocial Medicine*, *1*, 22–31.
- Dyck, M., Farrugia, C., Shochet, I., & Holmes-Brown, M. (2004). Emotion recognition/understanding ability in hearing or vision-impaired children: do sounds, sights, or words make the difference. *Journal of Child Psychology and Psychiatry*, *45*, 789–800.
- Dyck, M., Hay, D., Anderson, M., Smith, L., Piek, J., & Hallmayer, J. (2004a). Is the discrepancy criterion for defining developmental disorders valid? *Journal of Child Psychology & Psychiatry*, *45*, 979–995.
- Eisenberg, N., Fabes, R. A., & Spinrad, T. (2006). *Prosocial development*. In N. Eisenberg (Ed.), *Handbook of child psychology: Social emotional, and personality development* (pp. 646–718). Hoboken, NJ: John Wiley & Sons.
- Fairchild, G., Stobbe, Y., van Goozen, S. H. M., Calder, A. J., & Goodyer, I. M. (2010). Facial expression recognition, fear conditioning, and startle modulation in female subjects with conduct disorder. *Biological Psychiatry*, *68*, 272–279.
- Fliers, E., Rommelse, N., Vermeulen, S. H. H. M., Altink, M., Buschgens, C. J. M., Faraone, S. V., Sergeant, J. A., Franke, B., & Buitelaar, J. K. (2008). Motor coordination problems in children and adolescents with ADHD rated by parents and teachers: effects of age and gender. *Journal of Neural Transmission*, *115*, 2011–2020.
- Frith, C. (2009). Role of facial expressions in social interactions. *Philosophical Transactions of the Royal Society. Biological Sciences*, *364*, 3453–3458.

- Gillberg, C. (1992). Deficits in attention, motor control and perception, and other syndromes attributed to minimal brain dysfunction. In J. Aicardi (Ed.), *Diseases of the nervous system in childhood. Clinics in developmental medicine*: No. 115- 118. (pp. 1321-1337). London: Mac Keith Press.
- Krebs, J. F., Biswas, A., Pascalis, O., Kamp-Becker, I., Remschmidt, H., & Lynch, T. R., Rosenthal, M. Z., Kosson, D. S., Cheavens, J. S., Lejuez, C. W., & Blair, R. J. (2006). Heightened sensitivity to facial expressions of emotion in borderline personality disorder. *Emotion, 6*, 647–655.
- Pick, J. P., & Coleman, R. (1995). Kinaesthetic sensitivity and motor performance of children with developmental co-ordination disorder. *Developmental Medicine & Child Neurology, 37*, 976-984.
- Schwarzer, G. (2011). Face processing in children with autism spectrum disorder: independent or interactive processing of facial identity and facial expression? *Journal of Autism and Developmental Disorders, 41*, 796– 804.
- Singer, T. (2006). The neuronal basis and ontogeny of empathy and mind reading: review of literature and implications for future research. *Neuroscience and Bio behavioral Reviews, 30*, 855–863.
- Skinner, R., & Piek, J. (2001) Psychosocial implications of poor motor control coordination in children and adolescents. *Human Movement Science, 20*, 73–94.
- Snyder, C. R., & Lopez, S. J. (2009). *Handbook of Positive Psychology*. Oxford: Oxford University Press.
- Williams, J. H. G., Whiten, A., & Singh, T. (2004). A systematic review of action imitation in autistic spectrum disorder. *Journal of Autism and Developmental Disorders, 34*, 285–299.
- Wilson, P., & McKenzie, B. (1998). Information processing deficits associated with developmental co-ordination disorder: a meta-analysis of research findings. *Journal of Child Psychology and Psychiatry, 39*, 829–840.