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Factors Associated with Empathy Among Adolescents with Attention Deficit Hyperactivity Disorder

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SUMMARY

Objective: The aim of this study is to investigate the effects of psychiatric comorbidities on the level of empathy in adolescents diagnosed with ADHD; to evaluate the relationship between adolescent behavioral problems and empathy; to acquire information on the role of having parents with psychiatric symptoms and the perceptions of the adolescents of parental acceptance and rejection in empathy development.

Method: The study sample consisted of 101 adolescents of 12-16 years of ages diagnosed with ADHD and 50 adolescents as the control group. K-SADS-PL is used for the DSM-IV diagnoses and WISC-R is applied to the participants with ADHD. Both the ADHD and the control groups were evaluated with the Basic Empathy Scale, Parental Acceptance-Rejection/Control Questionnaire and the Young Self Report. The parents completed the Sociodemographic information form, Child Behavior Checklist and the Symptom Checklist-90-Revised; and the teachers completed the Teacher Report Form.

Results: There was no significant difference between ADHD and control group about basic empathy scale scores. The and emotional empathy scores were significantly lower in ADHD group with comorbid Oppositional Defiant Disorder (ODD) than ADHD group with no comorbidity.

Conclusion: In our study having only ADHD had no effect on empathy levels, ODD comorbidity was related to lower basic and emotional empathy levels. In order to determine causal/temporal relations, prospective studies, studies with larger sample sizes and with more homogenous groups are needed.

Keywords: Adolescent, attention deficit hyperactivity disorder, empathy, parental acceptance and rejection, parental psychiatric symptoms

INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder progressing with shortened attention span, chaotic movement and impulsivity with the majority of symptoms continuing throughout life (American Psychiatry Association 2013). ADHD causes incompetence in social, academic and family areas in children and adults, and in work areas in later life (Barkley 2003). Children and adolescents with ADHD are known to have weaker social and communicative skills compared to children and adolescents without ADHD diagnosis (Biederman 2005). When ADHD presents with psychiatric comorbidities such as conduct disorder (CD) and oppositional defiant disorder (ODD), there is a tendency for increased difficulties in social relationships (Rowland et al. 2002, Oktem 1996, Grady and Keightley 2002).

Successful social interaction is linked to social cognitive characteristics. Social cognition is the underlying mechanism of social behavior and involves coding of social cues, representing and interpreting cues, identifying emotion from faces and prosody, and understanding mental concepts, empathy and temperament (Uekermann et al. 2010). Empathy is an important social cognitive ability easing the

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individual's compatibility with social life. Some authors have defined empathy as an affective process, while some have defined it as a cognitive process. The cognitive dimension of empathy indicates understanding of another person's feelings; however, for this dimension it is not necessary to share that one person has understood the other (de Wied et al. 2005, De Kemp et al. 2007). Cognitive empathy means being able to assess events from another's perspective and it is effective on the social functioning of individuals (Smith and Adam 2006). The emotional dimension of empathy means being able to feel the emotions another person experiences and to provide the most appropriate response to another's emotional status (de Wied et al. 2005, De Kemp et al. 2007). Emotional empathy is very important in terms of moral development, motivating individuals to perform altruistic behavior toward their families, friends and strangers. Explanations that emotional empathy may be a key mechanism to suppress violence are included in the literature (Smith and Adam 2006).

Evidence obtained from neuroimaging studies have shown that social cognition is processed by networks in the prefrontal cortex (PFC) (Uekermann et al. 2010). Lesions in the PFC frequently result in disrupted empathy (Stuss et al. 2001, Shamay-Tsoory et al. 2005). Considering that cognitive incompetency and disrupted social cognition observed in ADHD may be assessed within the scope of frontostriatal function disorders, we see in recent years an increasing number of studies focusing on social cognition and empathy in ADHD. Although some studies have reported that in children with ADHD emotional and cognitive empathy skills are reduced and that there is difficulty interpreting social cues due to PFC function disorders (Barkley 1997, Westby and Cutler 1994), some studies have identified inconsistent findings. Marton et al. (2009), using self-report scales, did not find a difference in empathy between the ADHD and control groups, while the families of children with ADHD reported less empathy in their offspring, which, however, could be explained, by comorbidity of ODD and CD. Deschamps et al. (2015) reported that that children with CD and ADHD were assessed by teachers as being less empathic than the control group, while the same conclusion was not made on the reports of their families.

Şan et al. (2018) investigated emotional regulation and empathy skills in adolescents with ADHD diagnosis and identified that feeling identification and regulation skills were lower in the ADHD group compared to the healthy controls. Schwenck et al. (2011) reported that children diagnosed with inattentive type ADHD had higher empathy levels compared to children with the combined type, without there being a difference for feeling recognition. Although ADHD is frequently comorbid with ODD and CD and it is known that aggressive tendencies in children older than 6 years are negatively associated with empathy, available studies have not sufficiently included comorbid diagnoses that may be associated with empathy in ADHD studies. Also, in some studies a strong relationship was revealed between parental child-raising styles and empathy levels in children. It was emphasized that parental warmth, support and general acceptance are important especially for emotional empathy development. Considering the importance of the parent-child interaction in the child's development and the effect of empathy on social and emotional development, it should not be forgotten that there may be correlations between the parental psychological symptom levels, the perception by the adolescents of parental acceptance-rejection levels and the empathy skill levels of adolescents.

Up to now there have been inconsistencies between the few study results in this area. As a result, in our study we planned to research empathy and related factors in adolescents with ADHD and to assess correlations between empathy and the diagnoses of comorbid CD, ODD, anxiety disorder and depression and adolescent behavioral problems. The aim was to acquire information about the role of parental psychological symptom levels and adolescent perceptions of parental acceptance and rejection in the development of empathy.

METHOD

Sample

The study was completed in Ankara University School of Medicine, Department of Child and Adolescent Psychiatry. The study was approved by Ankara University School of Medicine Non-Interventional Research Ethics Committee.

From March 2015 to September 2015, adolescents in the 12-18-year age range monitored by the clinic for Attention Deficit Hyperactivity Disorder diagnosis were invited to join the study. The ADHD group comprised adolescents who accepted participating in the study and met the inclusion criteria. Adolescents with mental retardation, autism spectrum disorders, chronic medical disease and in institutional care were not included in the study.

The control group comprised healthy adolescents from neighboring schools with matched age, gender and sociocultural features, without any psychiatric disorders and clinically considered cognitively competent after interviews with teachers and parents. Adolescents with any psychiatric or medical disorders or considered to be cognitively incompetent clinically were not included in the study.

Instruments for Data Gathering
Sociodemographic Information Form

This form, prepared by the researchers, included questions on sociodemographic information on maternal-paternal age,

educational level and occupation, monthly income, family structure, history of psychiatric and physical disease in the family, number of siblings and order in the family).

The Schedule for Affective Disorders and Schizophrenia for School-Aged Children – Present and Lifetime Version (K-SADS-P)

The K-SADS-P was developed by Kaufman et al. (1997) with the aim to identify psychopathologies in the past and present based on the DSM-III-R (APA 1987) and DSM-IV (APA 1994) diagnostic criteria in children and adolescents. Its adaptation to the Turkish language and its validity and reliability were demonstrated by Gökler et al. (2004). K-SADS-P is a semi-structured interview form comprising three sections. The first section, called the "unstructured initial interview", obtains information about demographics, developmental history, health status, school status and friendships of children. The second section assesses 200 specific symptoms and behaviors. The screening interview questions an additional complementary control list for 5 diagnostic areas with the aim of confirming diagnosis if symptoms are present. The third section is organized to determine the current functioning level of the child and is called the "general assessment scale for children" (Kaufman et al. 1997).

The Wechsler Intelligence Scale for Children-Revised (WISC-R)

This scale was developed with the aim of measuring the intelligence levels of children aged 6 to 16 years (Wechsler 1949). Standardization for use with Turkish children was completed by Savaşır and Şahin (1995). The WISC-R comprises scales for scoring verbal and performance skills which when added up give the total intelligence score (Wechsler 1974).

The Basic Empathy Scale

The Basic Empathy Scale was developed by Jolliffe and Farrington (2006) to measure the empathy levels in the framework of four basic emotions (fear, sadness, anger, happiness). The scale contains 2 items with five-point Likert type scoring with 9 items measuring cognitive empathy and 11 items measuring emotional empathy. The validity and reliability study for our country was completed on adolescents by Topçu et al. (2010). The scale is based on the latest conceptual studies and has the advantages of measuring both emotional and cognitive empathy, differentiating cognitive empathy from the perspective concept and emotional empathy from the sympathy concept (Jolliffe and Farrington 2006) and it is easy to understand and apply.

The Parental Acceptance-Rejection/Control Questionnaire (PARQ/C)

The Parental Acceptance/Rejection Questionnaire (PARQ) was developed by Rohner et al. (1978) with the aim of assessing perceived parental acceptance-rejection. It's a four-point Likert scale with sixty items and a total of 4 subscales of warmth/affection, hostility/aggression, indifference/neglect and undifferentiated rejection. The PARQ total scores obtained by adding the scores for each of the subscales provides a general measurement of the individual's perception of acceptance-rejection in relationships with their mother or father. Rohner added a second dimension of perceived "parental control" in addition to perceived acceptance-rejection to the scale in 1997. The "control" subscale comprised 13 items, and the Parental Acceptance/Rejection Questionnaire (PARQ) was renamed as the Parental Acceptance-Rejection/Control Questionnaire (PARQ/C). The validity and reliability studies for the control subscale were completed by Rohner and Brothers in 1999. The reliability and validity study for the child PARQ/C to be used in Turkey was completed by Varan (2003).

The Child Behavior Checklist for 6-18 Years (CBCL/6-18)

This scale with adaptation, validity and reliability studies completed for use in Turkey (Erol et al. 1995), assesses problematic behavior in children and adolescents aged 6-18 years on information obtained from mothers and fathers (Dümenci et al. 2004, Erol and Şimşek 1998). It comprises 8 competencies and 113 problem behavior items.

The Youth Self-Report for Ages 11-18 Years (YSR/11-18)

This scale assesses problem behaviors of adolescents aged 11-18 years on information provided by themselves. The scale includes competency sections assessing activity, sociality and academic success of the adolescents. The scale is parallel to the CBCL/6-18 in terms of items, subscales and points. The 89 problem items on all three scales are common. The validity and reliability studies for the scale with the Turkish sample were completed by Erol et al. (2010).

The Teacher's Report Form for Children and Youth Aged 6-18 Years (TRF/6-18)

This scale was developed by Achenbach (1991) with the aim of assessing school adaptation and problem behavior in the 6-18year age group based on information obtained from teachers. The validity and reliability studies for the scale were completed by Erol et al. (1998).

The Symptom Checklist-90-Revised (SCL-90-R)

This is a self-assessment psychiatric screening tool developed in its final form by Derogatis in 1977 (Kessler et al. 2005).

The scale includes a total of 90 items and 10 subdimensions headed as somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, anger and hostility, phobic anxiety, paranoia, psychoticism and additional items. The validity and reliability of the scale for use in Turkey was completed by Dağ (1991).

Procedure

After signing informed consent forms the adolescent patients who accepted participation in the study were separately interviewed by the researcher on a sociodemographic data form and the make diagnoses on the Structured Clinical interview scale for DSM-IV of the Schedule for Affective Disorders and Schizophrenia for School-Aged Children – Present and Lifetime Version. All adolescents included in the ADHD case group were also tested on the Wechsler Intelligence Scale for Children-Revised (WISC-R) by expert psychologists to determine their intelligence levels. In the control group, clinical interviews were performed and information was obtained from teachers and parents to assess whether there was any physical and psychiatric diagnosis. All adolescents participating in the study completed t After signing informed consent forms the adolescent patients who accepted participation in the study were separately interviewed by the researcher on a sociodemographic data form he Basic Empathy Scale, the Parental Acceptance-Rejection/Control Scale, and the Youth Self-Report for ages 11-18 years. Parents completed the sociodemographic information form, the Child Behavior Checklist for 6-18 Years (CBCL/6-18) and the Symptom Checklist, while teachers completed the Teacher's Report Form for Children and Youth aged 6-18 Years.

Statistical Analysis

Statistical analyses were made on the IBM SPSS Statistics for Windows 21.0 software. The Pearson chi-square test, or Fisher exact test for small values with expected frequency of less than 5 were used to compare qualitative variables in the groups. The Kolmogorov-Smirnov test was used to investigate whether numerical variables had normal distribution or not. The Mann Whitney U test was used to compare variables without normal distribution in the 2 groups. The Pearson correlation coefficient was used to investigate the correlation between variables with normal distribution, while the Spearman rank correlation coefficient was used to investigate the correlation between variables without normal distribution. To investigate the effect of diagnosed comorbidity on empathy levels in the ADHD group, multiple linear regression analysis was used. Values of $p<0.05$ were accepted as statistically significant.

RESULTS

Our study included 101 ADHD cases consisting of 66 (65.3%) males and 35 (34.7%) females; and 50 control participants consisting of 32 (64%) males and 18 (36%) females (p=0.87, χ^2 =0.03). Mean ages of the ADHD and the control groups were 13.89 (±1.58) and 13.82 (±1.53) years, respectively (p=0.79, t= -0.26). Monthly incomes of the families of the ADHD and the control groups, were, respectively 2771±2376 TL and 2058±1584, and the difference was statistically significant (p=0.01). Numbers of the ADHD patients with divorced parents were significantly higher than those living in the nuclear family structure (p=0.01). In the ADHD group, maternal education duration was longer than that in the control group (p=0.01). The percentage of working mothers in the ADHD group was higher compared to that in the control group (p=0.03). The incidence of psychiatric symptoms among the parents of the ADHD group was higher than that in the control group (p=0.01).

Among the 101 cases included in the study, 64 (63.4%) were of the had inattentive dominant type and 37 (36.6%) were of the combined type. There were not any cases of dominant types of hyperactivity and impulsiveness. While 43 (42.6%) participants of the ADHD group did not have any comorbid psychiatric disorders, 58 (57.4%) cases were diagnosed with psychiatric comorbidities including anxiety disorder in 25 (24.8%), depression in 20 (19.8%), conduct disorder in 17 (16.8%) and ODD in 14 (13.9%). Mean total score of the ADHD group on the WISC-R was 95.2 (±11.3) and the scores on the verbal and performance skills were, respectively, 91.5 (±10.9) and 99.9 (±14.4), Significant

Table 1. Variation of Empathy Levels in the ADHD and Control Groups

	Basic Empathy		Cognitive Empathy		Emotional empathy	
	mean±sd	p	mean±sd	p	mean±sd	p
ADHD	70.14 ±11.29	0.29	33.95±6.51	0.40	36.19±7.31	0.36
Control	72.24±11.83		34.90±6.55		37.34±7.25	
Pure ADHD	70.20 ±10.54	0.96	34.25±5.92	0.69	35.95±6.58	0.77
Comorbid ADHD	70.10±11.91		33.72±6.97		36.37±7.85	
Attention deficit dominant type	70.95 ±10.68	0.35	34.34±6.39	0.43	36.60±6.92	0.46
Combined type	68.75±12.31		33.27±6.76		35.48±7.98	

Table 2. Effects of the Psychiatric Comorbidities Diagnosed in the ADHD Group on Empathy Levels

	Basic Empathy			Cognitive Empathy			Emotional Empathy		
Variables	**b#**	**t**	**p**	**b#**	**t**	**p**	**b#**	**T**	**p**
Fixed	70.9	48.06	0.00	34.8	40.55	0.00	36.1	36.83	0.00
Depression	3.8	1.41	0.16	1.1	0.70	0.49	2.7	1.51	0.13
Anxiety disorder	-0.1	-0.02	0.98	-1.7	-1.16	0.25	1.6	0.98	0.33
Conduct disorder	3.8	1.31	0.19	2.4	1.41	0.16	1.4	0.73	0.47
ODD	-9.6	-3.06	<0.01*	-4.9	-2.70	0.01*	-4.7	-2.25	0.03*
Other (OCD+Tic+ externalized disorders)	-9.6	-2.37	0.02*	-4.7	-1.97	0.05	-5.0	-1.83	0.07

#: Regression coefficients, *: P<0.05

differences were not determined between the WISC-R scores of patients on the bases of the two ADHD types and having or not having comorbid psychiatric disorders.

In the control group, the empathy level of the girls (80.66±10.63) was higher as compared to boys (67.50±9.74). In the ADHD group, girls had higher basic (75.71±10.52, p<0.001) and emotional empathy scores (40.28±6.57, p<0.001) compared to the boys (67.19±10.63 and 34.03±6.77, respectively).

Multiple linear regression analysis was used to investigate the effect of comorbid diagnoses on empathy levels in the ADHD group. When the effect of the other comorbid diagnoses remained fixed, participants with ODD diagnosis were determined to have lower basic empathy by 9.6 points compared to those without ODD (Table 2).

When groups were compared for the parental PARQ/C and subscale scores, adolescents in the ADHD group had lower perception of parental warmth than the control group (p<0.001) while perceiving parental coldness, hostility/aggressiveness, indifference/neglect, undifferentiated rejection and total rejection more than the participants of the control group (p<0.001).

In both groups, the parental SCL-90 general symptom index (GSI), positive symptom index (PSDI) and subtests in any area were not found to be significantly different (p>0.05).

When the correlation between parental SCL-90 scores and adolescent empathy scores was investigated in both groups, the phobic anxiety level of fathers in the control group had a negative weak correlation with the basic (r=-0.34, p=0.02) and the cognitive (r=-0.36, p=0.01) empathy levels of the adolescent offsprings. In the ADHD group, the obsessive-compulsive level of fathers was determined to have a negative weak correlation with the basic (r=-0.21, p=0.04) and the cognitive empathy (r=-0.22, p=0.04) of the adolescents.

In both the ADHD and control groups, there were not statistically significant correlations between maternal PARQ/C scores and empathy levels (p>0.05). In the control group, there was a negative weak correlation between paternal undifferentiated rejection and cognitive empathy (r=-0.30, p=0.03) and negative weak correlations between paternal scores on control and the basic (r=-0.38, p=0.01), cognitive (r=-0.38, p=0.01) and emotional (r=-0.28, p=0.04) empathy scores. In the ADHD group, there was not significant correlation between PARQ/C and empathy scores.

When the correlation between CBCL/6-18 subscale score with empathy was investigated in the control group, there was a positive weak correlation between adolescent school success and cognitive empathy scores (r=0.30, p=0.03) and negative weak correlations between thought problems (r=-0.34, p=0.02) and opposition to rules (r=-0.28, p=0.04) and cognitive empathy. There were negative weak correlations

Table 3. Correlation of the Scores on Behavior Assessment Scales and Empathy in the ADHD Group

	ADHD					
	Basic Empathy		Cognitive Empathy		Emotional Empathy	
	r	**p**	**r**	**P**	**r**	**p**
CBCL/6-18						
Obsessive Compulsive Disorder	-0.12	0.24	-0.20	0.04	0.02	0.88
TRF/6-18						
Aggressive Behavior	-0.16	0.13	0.01	0.96	-0.22	0.04
Oppositional Defiant Disorder	-0.21	0.06	-0.01	0.90	-0.26	0.02
YSR/11-18						
Positive Features	0.28	0.01	0.40	<0.001	0.09	0.38

between TRF/6-18 subscale scores on attention problems, aggressive behavior and external orientation and the basic (r=-0.29, p=0.04; r=-0.29, p=0.04; r=-0.32, p=0.02, respectively) and emotional empathy (r=-0.33, p=0.02; r=-0.37, p=0.01; r=-0.37, p=0.01, respectively). A negative weak correlation was identified between total problems on the TRF/6-18 and emotional empathy (r=-0.36, p=0.01). There were negative weak correlations between attention deficit/hyperactivity disorder, oppositional defiant disorder and conduct disorder scores and the basic (r=-0.30, p=0.04; r=-0.30, p=0.04; r=-0.30, p=0.03, respectively) and the emotional empathy scores (r=-0.31, p=0.03; r=-0.32, p=0.02; r=-0.29, p=0.04, respectively). On the YSR/11-18, there were negative weak correlations between the scores on social problems and attention deficit hyperactivity subscales and the cognitive empathy levels (r=-0.32, p=0.02; r=-0.29, p=0.04, respectively) and, also, between conduct disorder scores and the basic empathy scores (r=-0.32, p=0.02).

DISCUSSION

In recent years the number of studies focusing on social cognition in ADHD have been increasing. In this study, the social cognitive skill of empathy and factors that may be associated with empathy were investigated in adolescents with ADHD diagnosis.

In some studies children with ADHD were reported to have reduced emotional and cognitive empathy skills and difficulty interpreting social cues due to PFC function disorders (Barkley 1997, Westby and Cutler 1994). Studies by Marton et al. (2009) and Deschamps et al. (2015) used self-report scales, parental and teacher empathy scales and the results on each were inconsistent. In our study, the empathy levels in the ADHD and control groups were observed to be similar. In adults with ADHD diagnoses, total empathy and emotional empathy scores were lower in the subclinical ADHD group compared to the control group, while ADHD subtypes and gender factors did not affect the scores. The authors stated the need for studies with neuropsychological tests rather than self-report scales to support their findings (Groen et al. 2018).

Although aggressive tendencies are known to be negatively correlated with empathy, available studies have not sufficiently considered comorbid diagnoses which may be related to empathy in ADHD. A study in recent years found that parents of children with ADHD stated the children were less empathic; however, this situation was explained by comorbid ODD and CD (Marton et al. 2009). However, Schwenck et al. (2011) in a study assessing emotional and cognitive empathy of children with ADHD and CD with self-report scales did not identify a difference between the two groups. In our study, in the ADHD group with ODD, the basic, emotional and cognitive empathy levels were found to be significantly lowered. However, there may be a two-way relationship between ODD comorbidity and low empathy such that the question whether oppositional behavior affects empathy or whether low empathy causes oppositional problems is an element that remains to be answered in future studies. There were not differences with respect to the empathy levels in the groups with comorbid depression, anxiety disorder and conduct disorder. The lack of difference in empathy levels in the conduct disorder group may be due to children having insufficient self-awareness, being unaware of the situation or due to reflecting their desired situation on the scales (positive imaginary bias). Using only a self-report scale in the study as the evaluation tool for empathy in a small patient sample which was monitored may have caused this results.

Studies investigating the correlation between ADHD subtypes and empathy reported that empathy levels in combined type ADHD were lower compared to the inattentive subtype (Schwenck et al. 2011, Strassner 2006). This situation is explained by combined type ADHD being more commonly accompanied by expression problems, CD and ODD. Including patients with comorbid CD and ODD diagnoses n our study may have caused the observed lack of difference in empathy level between ADHD subtypes.

When executive attention was assessed on self-report scales for empathy and sympathy after exposure to 3 film clips involving sadness, poor executive attention skills were found to be associated with low empathy and sympathy scores among boys with anxiety disorder comorbid with ODD and CD. It was emphasized, however, that individual differences may underlie the empathy deficiency in this heterogenous patient group (Pijper et al. 2018). Hence, it should be remembered that development of executive attention skills may be important for development of empathy.

Research has shown correlations between empathic skills and gender, age, education, intelligence, temperament traits, family environment, parental attitude and environmental factors. In investigation of empathy levels on the basis of gender, there appears a consensus in the relevant literature that females have higher empathy levels (Ickes 1997). In our study, as expected, girls were shown to be more empathic than boys.

Du Paul et al. (2001) reported that children with ADHD diagnosis had problems with parent-child relationships, family functioning and exposure to high levels of stress. Also, mothers and fathers with ADHD diagnosis were observed to be easy to anger, commonly displaying provocative behavior and excessively negative reactions when disciplining children with ADHD and were considered to be inappropriate negative examples for children (Turgay 2001). In our study, as expected, adolescents in the ADHD group perceived low warmth levels from parents and high levels of coldness,

hostility/aggression, indifference/neglect, undifferentiated rejection and total rejection. Considering that children with ADHD diagnosis have higher probability of having a parent with ADHD, it is not a surprising to find that these children perceive more negativity in parental attitudes.

In our study, the psychiatric symptom levels and divorce incidences in families of the ADHD group were significantly higher. However, in the ADHD and control groups, there was not a statistically significant to identify between the "general symptom index" and the "positive symptom index" on the SCL-90 scale. One of the limitations of the study is that the SCL-90 only cross-sectionally screens the mental health symptoms of mothers and fathers. In future studies, identification of psychopathology with structured interviews instead of self-report scales for parental psychological symptoms will increase the power of the study results.

Research has proven that children with mothers responding to the child's needs, protective, accepting, not violent, neglectful or rejecting have higher empathic level compared to the children of negligent, disinterested mothers who reject their children. Önder et al. (2017) did not observe a correlation between maternal acceptance-rejection level and children's empathy levels, which was explained by moderate empathy levels in the children and the scoring by the mothers on the acceptance related part of the scale. In our study, a negative correlation was detected between paternal rejection and empathy levels of adolescents in the control group. However, a correlation between empathy and maternal acceptance-rejection levels was not observed.

Inverse correlations observed between empathy and aggressiveness and bullying have suggested that empathy may assist in reducing aggressive and antisocial behavior (Endersen and Olweus 2001, Gini et al. 2007, Miller and Eisenberg 1998). Empathy was argued to be associated more with ODD and CD rather than ADHD (Marton et al. 2009). In our study it is notable that empathy score of the control group was negatively correlated with scores assessing thought problems, attention problems, social problems, opposition to rules, aggressive behavior, externalizing problems, and total problem behavior assessment scales and also the DSM-IV based subscale scores on ADHD, ODD and CD. In the ADHD group aggressive behavior correlated negatively with obsessive-compulsive disorder (OCD) on behavior assessment scales and with ODD on the DSM-IV subscale on empathy. OCD is known to display excessive functioning in the nerve network including the prefrontal cortex, cingulate cortex and the caudate nucleus. In our study, this correlation between OCD and empathy indicates the association of the frontostriatal region function with empathy. There is a need for future studies researching the correlation between OCD and empathy.

Miller and Eisenberg (1988) reported that positive traits including self-disclosure, socialization, social sensitivity, community adaptation and self-esteem correlated with empathy. Our observations of positive correlations between empathy and school success in the control group and with positive traits in the ADHD group agree with the results of Miller and Eisenberg (1988), indicating that it is important to support the strong aspects of children and to increase positive traits for development of empathy.

In the literature there are limited studies related to empathy levels in adolescents with ADHD, but studies on correlation of empathy with comorbid depression, anxiety disorder, ODD and CD were not encountered. In our study, diagnosis of ADHD without comorbid psychiatric disorders was not associated with changed empathy levels, while ODD comorbidity caused a reduction in basic and emotional empathy levels. In the ADHD group it was determined on behavior assessment scales that as aggressive behavior and oppositional behavior increased, emotional empathy was reduced and as positive traits of adolescents increased, the basic and cognitive empathy increased.

Although the groups in our study did not differ in terms of age and gender, there were intergroup differences of socioeconomic status which is a limitation of the study. A study investigating association of empathy levels with income determined that the group with the lowest empathy level perceived their income as low, while the group with highest empathy level, consisting of adolescents, perceived their income as moderate (Çetin 2008). Future studies including larger groups with similar socioeconomic level will titer interpretation not these results.

It is possible that the adolescents tested on the self-report Basic Empathy Scale may have reflected the empathy skills they wish to have rather than the actual. Therefore, future studies using parent and teacher completed scales should be supported by using semi-structured interviews with children and adolescents.

On the bases of the evaluated results of this study, it is emphasized that treatment planned for adolescents diagnosed with ADHD and comorbid oppositional defiance, aggressive behavior or obsessive traits should be structured to encompass all appropriate interventions for these traits aiming to increase and support the awareness of their strong aspects in order to contribute positively to empathy development . Studies with larger patient samples, using clinical interviews and assessment methods with high ecological validity will provide more detailed information. This approach will help increasing empathy skills and interpersonal relationships of adolescents diagnosed with ADHD subtypes without comorbid psychopathology.

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