The Impact of Depressive Symptoms in Adults with ADHD Symptoms on Family Function and ADHD Symptoms of Their Children

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Objective   People with attention-deficit/hyperactivity disorder (ADHD) exhibit considerable impairment in social, academic, or occupational functioning. The present study aimed to examine the patterns of associations between ADHD symptoms, depression, and family functioning.

Methods   The sample consisted of 1,022 adults randomly selected from a district in Seoul, South Korea. Several self-assessment scales were utilized to rate ADHD symptoms (both past and current), current symptoms of depression, and level of family functioning. ADHD symptoms in the children of these participants were also assessed. Pearson's correlation and multiple linear regression analyses were performed; structural equation modeling (SEM) was conducted to determine the best fitting model.

Results   Adult ADHD symptoms were positively associated with depressive symptoms. Depressive symptoms, in turn, mediated the relationship between adult ADHD symptoms and cohesion among family members. In addition, depressive symptoms mediated the relationship between adult ADHD symptoms and their children's ADHD symptoms.

Conclusion   The relationship between adult ADHD symptoms and family dysfunction may be influenced by depressive symptoms. When treating ADHD in adults, clinicians should pay attention to the presence or absence of depression.

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Key Words   Attention-deficit/hyperactivity disorder, Depression, Adult, Family, Structural equation modeling.

INTRODUCTION

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder with a symptom complex of inattention, hyperactivity, and impulsivity, affecting about 3−7% of school-aged children, according to the criteria of the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV).[1] ADHD was once believed to be a childhood psychiatric disorder, but its persistence into adulthood has been recognized,[2-6] and an approximately 1−4% prevalence of adult ADHD has been reported.

Childhood ADHD has been reported to show significant correlation with other psychiatric disorders later in adulthood, including mood and anxiety disorders, antisocial personality disorders, substance use disorders, eating disorders, and sleep disorders.[7] By definition ADHD subjects endure significant impairment in social, academic, or occupational functioning regardless of their age, and more specifically, adults with ADHD tend to be at a higher risk of experiencing multiple marriages with repeated episodes of spousal separation and divorce, more frequent changes as well as poorer performance in employment, and increased driving risks including more speeding violations or automobile collisions.[8,9] In terms of parenting, associations between adult ADHD and maladaptive parenting behaviors have been reported, with fathers using nega-

tive, critical, over-reactive, authoritarian, and therefore less effective disciplines when they had symptoms of ADHD, and mothers with ADHD being less consistent toward their children and less effective at solving childrearing problems.[10-12] It is not difficult to assume that the impairments detailed above might compromise the parent-child and husband-wife cohesions, which is supported by the reportedly higher levels of conflict and lower levels of cohesion in families with an ADHD parent.[13] These reports raise questions on the relationship among adults diagnosed with ADHD, other psychiatric disorders, and signs of functional maladaptation noted in various environmental settings.

We evaluated both the current and past severity of ADHD symptoms in a general population of adults. For a comorbid psychiatric disorder, we chose to evaluate the degree of depression, and as an indicator reflecting environmental consequences of the person's functional maladaptation, we chose to evaluate the level of family functioning. The objective of this study was to identify the patterns of interplay among ADHD symptoms, depression, and family functioning in adults. Possible hypothetical models would include, depressive symptoms mediating the relationship between ADHD symptoms and family functioning, or family functioning mediating the other two, or all three directly influencing one another. We also included in our survey the severity of ADHD symptoms found in children of our adult participants, considering the fact that biological offspring of ADHD parents are at higher risk of developing ADHD themselves,[13,14] and ADHD symptoms of children in turn contribute to increased parental distress,[15] which might be associated with more inappropriate and less compliant behaviors reported in those children.[16]

METHODS

Subjects

Participants were 1,022 adults living in the Jung-gu district, one of the 25 districts in Seoul, Korea, with a population of over 130,000. They were randomly selected from the general population of the district in collaboration with the Korea Data Network, a professional survey research company, under the administrative support of the local government office, which provided the addresses of its residents. The investigators visited their homes, provided a detailed explanation of the purpose of the study, obtained informed consent from eligible participants, distributed the questionnaires, and collected them on the same day. The questionnaire covered the following assessments, and those participants who had one or more children attending elementary school were also asked to complete an additional questionnaire inquiring about ADHD symptoms in their children. The institutional review board approval was obtained.

Assessments

The Wender Utah Rating Scale (WURS)[17] is a 61-item self-reporting scale that retrospectively assesses childhood ADHD symptomatology of adult respondents, and the Brown Attention-Deficit Disorder Scale (BADDS) for Adolescents and Adults[18] is a 40-item self-reporting scale that assesses impairments in 5 different clusters of daily executive functioning. Lee had extracted 34 from the 101 items which compose these 2 scales, and reorganized them into a new questionnaire, measuring the degree of ADHD symptoms experienced by the adult within the past month.[19,20] This newly organized adult ADHD questionnaire rates each item on a 5-point Likert scale of 1 (never) to 5 (almost every day), thus the total score of all 34 items ranges from 34 to 170. Cronbach's alpha in the original study was 0.92. We used this questionnaire to evaluate the current severity of ADHD symptoms in our adult participants, and we have abbreviated this Korean questionnaire as K-ADHD-Current throughout this paper.

Lee had also introduced a new questionnaire assessing childhood symptoms of ADHD.[19,20] By translating into Korean the list of 14 symptoms included in the DSM-III-R diagnostic criteria for ADHD, Lee had organized a 14-item self-reporting questionnaire asking the adult respondents to retrospectively rate their childhood ADHD symptoms on a 5-point Likert scale of 1 (never) to 5 (almost every day). The total score ranges from 14 to 70, and Cronbach's alpha for this questionnaire in the original study was 0.88. We used this questionnaire to evaluate the past severity of childhood ADHD symptoms in our adult participants, and we have abbreviated this Korean questionnaire throughout this paper as K-ADHD-Past.

The Center for Epidemiologic Studies Depression Scale (CES-D) is an adult self-reporting instrument containing 20 items designed to measure the degree of depressive symptoms experienced within the past week.[21] A 4-point Likert scale is used, ranging from 0 (rarely or never) to 3 (most or all of the time), thus the total score ranges from 0 to 60. CES-D has been widely used as a screening tool for depression in epidemiologic surveys, and scores on the instrument have shown good correlation with clinical assessments of major depression.[22] Reliability and validity of the Korean version of the CES-D (CES-D-K) have been confirmed.[23,24]

The Family Adaptability and Cohesion Evaluation Scale (FACES III),[25,26] a 20-item self-reporting questionnaire, measures the degree of family functioning in terms of two separate dimensions, which are cohesion and adaptability. Here cohesion reflects the emotional connectedness among members of the family, and adaptability reflects the flexibility to change the rules of the family, as well as the roles of its members. Ten

items are allotted to each dimension, and the items are rated on a 5-point Likert scale of 1 (almost never) to 5 (almost always). Accordingly, the total score of the FACES III questionnaire ranges from 20 to 100, and the score of each dimension from 10 to 50.

The Korean ADHD Rating Scale (K-ARS) is a translated version of the ADHD Rating Scale (ARS),[27,28] which consists of 18 items derived from the 18 symptoms list of the DSM-IV criteria for ADHD. Each item is rated on a 4-point Likert scale of 0 (never or rarely) to 3 (very often), thus the total score ranges from 0 to 54. Reliability and validity of the K-ARS among Korean children have been established.[29]

Statistical analysis

Pearson's correlation tests were performed between each pair of the above-mentioned scale scores using SPSS 19.0 software (SPSS Inc., Chicago, IL, USA). Structural equation modeling (SEM) was conducted with AMOS 5.0 (SmallWaters, Chicago, IL, USA) to determine the best fitting model. The model fit was based on generally accepted thresholds for the root mean square error of approximation (RMSEA), normed fit index (NFI), incremental fit index (IFI), comparative fit index (CFI), goodness of fit (GFI), and adjusted goodness of fit (AGFI). The RMSEA assesses closeness of fit, with values approximating 0.08, 0.05, and 0 indicating reasonable, close, and exact fits, respectively.[30] The values of the NFI, IFI, CFI, GFI, and AGFI may range from 0 to 1, with values over 0.9 indicating an acceptable fit.[31] In order to confirm the models obtained from the SEM, we performed multiple linear regression analyses using the scale scores included in the best fitting models as the independent and outcome variables. We additionally performed multiple linear regression analyses for all adult participants and for males and females separately. All analyses were tested with a significance level of $p<0.05$ (two-tailed).

RESULTS

Demographic characteristics

One thousand twenty-two adults, comprising 507 (49.6%) men and 515 (50.4%) women, participated in this study. Their age distribution was as follows: 24.9% in their 20s, 24.6% in their 30s, 21.4% in their 40s, 16.7% in their 50s, and 12.4% in their 60s. Among the total participants, 721 (70.5%) were married, and 506 (49.5%) had graduated from high school.

The ADHD, depression, and family functioning scores of adult participants, and the ADHD scores of their children

The mean scores of the K-ADHD-Current and -Past were 54.6±19.5 and 24.0±9.2, respectively. The mean CES-D-K score was 17.0±7.4, which is below the customary cutoff score of 23, a suggested threshold for indicating a major depressive disorder.[32] The mean subscores of cohesion and adaptability derived from the FACES III were 34.3±6.9 and 29.3±5.5, respectively. The mean K-ARS score of the children was 11.5±9.3.

Correlations among the ADHD, depression, and family functioning scores of adult participants, and the ADHD scores of their children

The K-ADHD-Current score of the adult participants positively correlated with their scores on the K-ADHD-Past, the CES-D-K, the FACES III adaptability, and the K-ARS of their children (Table 1). The K-ADHD-Current score correlated negatively with the FACES III cohesion subscore. The K-ARS score of the children also positively correlated with the scores on the K-ADHD-Past and the CES-D-K of the adult participants. The cohesion subscore from the FACES III again negatively correlated with the scores on the K-ADHD-Past and the CES-D-K.

Table 1. Pearson correlations among the ADHD, depression, and family functioning scores of adult participants, and the ADHD symptom score of their children

N=1,022	K-ADHD		CES-D-K	FACES III		K-ARS
	Past	Current		Cohesion	Adaptability	
K-ADHD-Past	1.00					
K-ADHD-Current	0.63***	1.00				
CES-D-K	0.34***	0.61***	1.00			
FACES III Cohesion	-0.06*	-0.18***	-0.35***	1.00		
FACES III Adaptability	0.07*	0.11***	-0.09**	0.68***	1.00	
K-ARS	0.46***	0.47***	0.42***	-0.13	0.12	1.00

*p<0.05, **p<0.01, ***p<0.001. ADHD: attention-deficit/hyperactivity disorder, K-ADHD-Past: a Korean ADHD questionnaire-Past childhood status, K-ADHD-Current: Korean ADHD questionnaire-Current adulthood status, CES-D-K: Korean version of the Center for Epidemiologic Studies Depression Scale, FACES III: Family Adaptability and Cohesion Evaluation Scale, K-ARS: Korean version of the ADHD Rating Scale
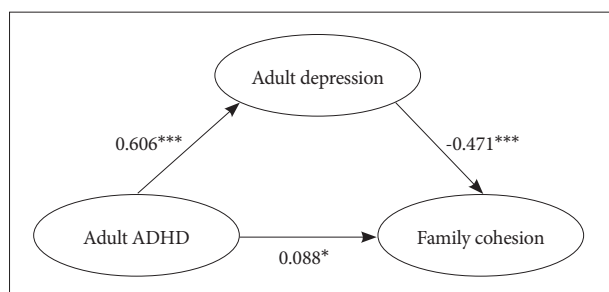
SEM among the ADHD, depression, and family functioning scores of adult participants, and the ADHD scores of their children

The final models of the SEM are shown in Figures 1 and 2. Adult ADHD (latent variable) was composed of the past childhood and current adulthood ADHD symptoms (i.e., the K-ADHD-Past and K-ADHD-Current scores, respectively). Adult ADHD was positively associated with the CES-D-K score, reflecting recent experience of depressive symptoms, which was in turn, negatively associated with the FACES III cohesion subscore, reflecting the emotional connectedness among members of the family (Figure 1, Table 2). These findings suggest that depressive symptoms mediate between symptoms of ADHD and family dysfunction. The proposed model showed an acceptable fit to the data (RMSEA=0.056, IFI=0.977, NFI=0.970, CFI=0.977, GFI=0.970, AGFI=0.952).

In the subsequent model including the offspring's ADHD symptoms, significant path from the adult ADHD to their children's ADHD symptoms was partially mediated by the CES-D-K scores of the parents (Figure 2, Table 2). This model demonstrated an acceptable fit to the data as well (RMSEA=0.083, IFI=0.943, NFI=0.903, CFI=0.942, GFI=0.902, AGFI=0.855).

Multiple linear regression analyses among the ADHD, depression, and family functioning scores of adult participants, and the ADHD scores of their children

Using the CES-D-K score as the outcome variable, the K-ADHD-Past and -Current scores showed significant associations. Using the cohesion subscore from the FACES III as the outcome variable, the CES-D-K scores but not the K-ADHD-Past and -Current scores showed significant association. Using the K-ARS score of the children as the outcome variable, the K-ADHD-Past and the CES-D-K scores showed sig-

nificant associations. These findings detailed in Table 3 are in accordance with the SEM results.

As supplemental tests, male and female adult participants were analyzed separately. Then, in males, only the K-ADHD-Past score (B=0.59, p=0.00, 95% CI=0.32, 0.85) remained significantly associated with the K-ARS score of their children. However, in females, the CES-D-K score (B=0.40, p=0.00, 95% CI=0.13, 0.66), and the cohesion (B=-0.38, p=0.03, 95% CI=-0.73, -0.03) and adaptability (B=0.50, p=0.01, 95% CI= 0.11, 0.89) subscores from the FACES III were significantly associated with the K-ARS score of their children (Supplementary Table 1, online).

DISCUSSION

The present study aimed to examine the patterns of interplay among ADHD symptoms, depression, and family functioning in a general population of adults. We used both the past childhood and current adulthood ADHD symptoms to construct the latent variable of adult ADHD, given that the presence of childhood ADHD symptoms is required for the diagnosis of ADHD in adults. As a result, adult ADHD was associated with depressive symptoms. Symptoms of adult ADHD being directly related to concurrent depression is in accordance with the reports on high comorbidity rates of ADHD and depression.[7,33] Depressive symptoms, in turn, mediated the relationship between ADHD symptoms in adults and cohesion among members of their family. In addition, depressive symptoms also mediated the relationship between

Figure 2. Structural equation modeling among the ADHD, depression, and family functioning scores of adult participants, and the ADHD symptom score of their children. All values are standardized regression weights. **p<0.01, ***p<0.001. The model showed an acceptable fit to the data (RMSEA=0.083, IFI=0.943, NFI=0.903, CFI=0.942, GFI=0.902, AGFI=0.855). ADHD: attention-deficit/hyperactivity disorder, RMSEA: root mean square error of approximation, IFI: incremental fit index, NFI: normed fit index, CFI: comparative fit index, GFI: goodness-of-fit index, AGFI: adjusted goodness-of-fit index.
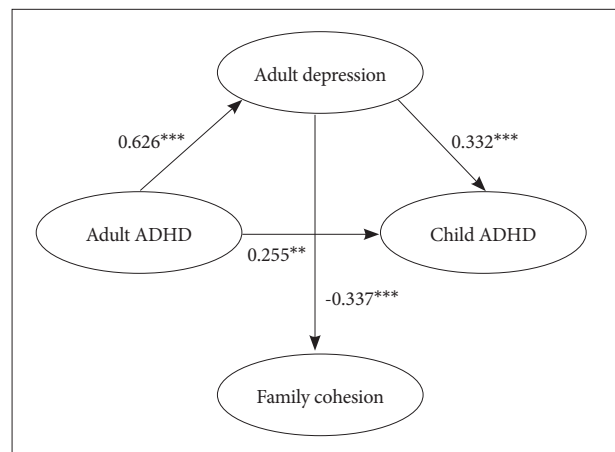

Figure 1. Structural equation modeling among the ADHD, depression, and family functioning scores of adult participants. All values are standardized regression weights. *p<0.05, ***p<0.001. The model showed an acceptable fit to the data (RMSEA=0.056, IFI=0.977, NFI=0.970, CFI=0.977, GFI=0.970, AGFI=0.952). ADHD: attention-deficit/hyperactivity disorder, RMSEA: root mean square error of approximation, IFI: incremental fit index, NFI: normed fit index, CFI: comparative fit index, GFI: goodness-of-fit index, AGFI: adjusted goodness-of-fit index.

Table 2. Structural equation modeling among the ADHD, depression, and family functioning scores of adult participants, and the ADHD symptom score of their children

N=1,022	B (SE)	CR	Effect		
			β	Indirect	Total
Model 1					
Adult ADHD → CES-D-K	0.040 (0.003)	12.298	0.606***		0.606
CES-D-K → FACES III Cohesion	-0.538 (0.052)	-10.318	-0.471***		-0.471
Adult ADHD → FACES III Cohesion	0.007 (0.003)	2.363	0.088*	-0.286	-0.197
Model 2					
Adult ADHD → CES-D-K	0.039 (0.006)	6.496	0.626***		0.626
CES-D-K → FACES III Cohesion	-0.267 (0.071)	-3.763	-0.337***		-0.337
CES-D-K → K-ARS	0.929 (0.278)	3.340	0.332***		0.332
Adult ADHD → K-ARS	0.044 (0.015)	2.852	0.255**	0.208	0.463
Adult ADHD → FACES III Cohesion				-0.211**	-0.211

*p<0.05, **p<0.01, ***p<0.001. ADHD: attention-deficit/hyperactivity disorder, B: unstandardized regression coefficient, β: standardized regression coefficient (direct effect), CR: critical ratio, CES-D-K: Korean version of the Center for Epidemiologic Studies Depression Scale, FACES III: Family Adaptability and Cohesion Evaluation Scale, K-ARS: Korean version of the ADHD Rating Scale, SE: standard error

Table 3. Multiple linear regressions among the ADHD, depression, and family functioning scores of adult participants, and the ADHD symptom score of their children

N=1,022	CES-D-K		FACES III Cohesion		K-ARS	
	B (SE)	95% CI	B (SE)	95% CI	B (SE)	95% CI
K-ADHD-Past	-0.06 (0.02)*	-0.11, -0.01	0.04 (0.02)	-0.01, 0.10	0.30 (0.10)**	0.09, 0.51
K-ADHD-Current	0.25 (0.01)***	0.23, 0.27	0.00 (0.01)	-0.02, 0.03	0.05 (0.05)	-0.04, 0.15
CES-D-K			-0.34 (0.03)***	-0.41, -0.28	0.27 (0.10)**	0.08, 0.47
FACES III Cohesion					-0.04 (0.09)	-0.22, 0.13

*p<0.05, **p<0.01, ***p<0.001. No variance inflation factor was greater than 1.66 (CES-D-K), 2.37 (FACES III Cohesion), and 3.39 (K-ARS), respectively. Adjusted R^2s were 0.37 (CES-D-K), 0.12 (FACES III Cohesion), and 0.27 (K-ARS), respectively. For all three models, p values for F statistics were below 0.001. ADHD: attention-deficit/hyperactivity disorder, B: unstandardized regression coefficient, CI: confidence interval, K-ADHD-Past: Korean ADHD questionnaire-Past childhood status, K-ADHD-Current: Korean ADHD questionnaire-Current adulthood status, CES-D-K: Korean version of the Center for Epidemiologic Studies Depression Scale, FACES III: Family Adaptability and Cohesion Evaluation Scale, K-ARS: Korean version of the ADHD Rating Scale, SE: standard error

adult ADHD symptoms and their children's ADHD symptoms.

Adult ADHD symptoms were both directly and indirectly related to ADHD symptoms found in their children. The direct relationship might reflect a genetic link, since the heritability of ADHD is among the highest compared to other psychiatric disorders.[9] Meanwhile, the indirect relationship, which was mediated by adult depression, is more complex to interpret. In an adoption study, parental major depression increased the risk for ADHD in both their biological and adopted children, suggesting that depressed parents cannot be ruled out as an environmental liability for the development of ADHD in their offspring.[34] Furthermore, studies have shown that severity of maternal depression positively correlates with, not only the mother's but also the father's, high ratings of their child's externalizing behaviors,[35,36] and treatment of maternal depression improves the mother-reported behavioral problems of their children.[37,38] Although the mechanisms underlying these results are not clearly explored, considering that

ADHD ratings in children were also based on parental reports in our study, similar mechanisms might be involved in our results directly linking depression in adults and ADHD in their children.

It is also noteworthy that depression was inversely associated with family cohesion, but no significant path was observed between family cohesion and the offspring's ADHD symptoms. When interpreting this negative finding, however, caution may need to be taken. In families with higher FACES III cohesion or adaptability scores, parents tended to underestimate the severity of ADHD symptoms in their children.[39] As the measures of the current study were based on self- or parent-reports, possible reporter bias may have affected the link between family cohesion and the children's ADHD symptoms.

The multiple regression analyses also replicated the results from our SEM. Interestingly, however, when regression analyses were performed separately in each sex, only the past

ADHD symptoms remained significantly associated in males (Supplementary Table 1, online). On the other hand, in mothers, their depressive symptoms and level of family functioning were significantly associated with their children's ADHD symptoms: this finding is perhaps related to the fact that mothers rather than fathers are usually the ones who spend much more time with their children in Korean families. Thus, their mood symptoms and perceived family functioning might more closely interact with the behavioral problems of their children. Clinically, in treating children with ADHD, perhaps more attention should be paid to the depressive symptoms of their mothers.

The major limitations of this study include the followings. First, it was a cross-sectional study, which had a key shortcoming in assessing the causal relationships. Prospective studies are required to confirm our inferences discussed above. Second, all of the measures in this study were self- or parent-reported, which are prone to reporter bias, and no formal diagnosis was made of either ADHD or depressive disorder. And third, considering the remarkably higher rates of comorbid major depressive disorder in community samples of ADHD youth,[40,41] ranging from 12% to 50%, it would have been more fruitful to evaluate symptoms of depression in the children as well.

Many have reported associations between ADHD, either in the parent or in the child, and disturbances in family functioning.[9-13,15,42] Accordingly, we had expected that symptoms of ADHD in our parents would somehow compromise their family life. As a result, both the direct and indirect paths were found to be significant between adult ADHD symptoms and the scores of the FACES III or their children's scores of the K-ARS. The indirect path was mediated by adult depressive symptoms. Considering that the majority of former studies on the relationship between adult ADHD and family dysfunction did not assess the role of depression, further studies including adequate assessment of mood symptoms are needed. As for clinical implications, when treating ADHD in adults, clinicians should pay attention to the presence or absence of depression.

Acknowledgments

REFERENCES

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition. Washington, DC: American Psychiatric Association; 1994.
2. Faraone SV, Biederman J. What is the prevalence of adult ADHD? Results of a population screen of 966 adults. J Atten Disord 2005;9:384-391.
3. Fayyad J, De Graaf R, Kessler R, Alonso J, Angermeyer M, Demyttenaere K, et al. Cross-national prevalence and correlates of adult attention-deficit hyperactivity disorder. Br J Psychiatry 2007;190:402-409.
4. Heiligenstein E, Conyers LM, Berns AR Miller MA. Preliminary normative data on DSM-IV attention deficit hyperactivity disorder in college students. J Am Coll Health 1998;46:185-188.
5. Kessler RC, Adler L, Barkley R, Biederman J, Conners CK, Demler O, et al. The prevalence and correlates of adult ADHD in the United States: results from the National Comorbidity Survey Replication. Am J Psychiatry 2006;163:716-723.
6. Kooij JJ, Buitelaar JK, van den Oord EJ, Furer JW, Rijnders CA, Hodiamont PP. Internal and external validity of attention-deficit hyperactivity disorder in a population-based sample of adults. Psychol Med 2005;35:817-827.
7. Sobanski E. Psychiatric comorbidity in adults with attention-deficit/hyperactivity disorder (ADHD). Eur Arch Psychiatry Clin Neurosci 2006;256(Suppl 1):i26-i31.
8. Murphy K, Barkley RA. Attention deficit hyperactivity disorder adults: comorbidities and adaptive impairments. Compr Psychiatry 1996;37:393-401.
9. Wilens TE, Faraone SV, Biederman J. Attention-deficit/hyperactivity disorder in adults. JAMA 2004;292:619-623.
10. Arnold EH, OLeary SG, Edwards GH. Father involvement and self-reported parenting of children with attention deficit hyperactivity disorder. J Consult Clin Psychol 1997;65:337-342.
11. Chronis-Tuscano A, Raggi VL, Clarke TL, Rooney ME, Diaz Y, Pian J. Associations between maternal attention-deficit/hyperactivity disorder symptoms and parenting. J Abnorm Child Psychol 2008;36:1237-1250.
12. Murray C, Johnston C. Parenting in mothers with and without attention-deficit/hyperactivity disorder. J Abnorm Psychol 2006;115:52-61.
13. Biederman J, Faraone SV, Monteaux MC. Impact of exposure to parental attention-deficit hyperactivity disorder on clinical features and dysfunction in the offspring. Psychol Med 2002;32:817-827.
14. Biederman J, Faraone SV, Mick E, Spencer T, Wilens T, Kiely K, et al. High-risk for attention-deficit hyperactivity disorder among children of parents with childhood-onset of the disorder: a pilot-study. Am J Psychiatry 1995;152:431-435.
15. Podolski CL, Nigg JT. Parent stress and coping in relation to child ADHD severity and associated child disruptive behavior problems. J Clin Child Psychol 2001;30:503-513.
16. DuPaul GJ, McGoey KE, Eckert TL, VanBrakle J. Preschool children with attention-deficit/hyperactivity disorder: impairments in behavioral, social, and school functioning. J Am Acad Child Adolesc Psychiatry 2001;40:508-515.
17. Ward MF, Wender PH, Reimherr FW. The Wender Utah Rating Scale: an aid in the retrospective diagnosis of childhood attention deficit hyperactivity disorder. Am J Psychiatry 1993;150:885-890.
18. Brown TE. Attention-Deficit Disorder Scales: Manual. San Antonio, TX: The Psychological Corporation; 1996.
19. Kim EJ. The validation of Korean adult ADHD scale (K-AADHDS). Korean J Clin Psychol 2003;22:897-911.
20. Kim H, Lee J, Cho S, Lee IS, Kim JH. A preliminary study on reliability and validity of the Conners adult ADHD rating scales-Korean version in college students. Korean J Clin Psychol 2005;24:171-185.
21. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. Appl Psychol Meas 1977;1:385-401.
22. Weissman MM, Sholomskas D, Pottenger M, Prusoff BA, Locke BZ. Assessing depressive symptoms in five psychiatric populations: a validation study. Am J Epidemiol 1977;106:203-214.
23. Cho MJ, Kim KH. Diagnostic validity of the CES-D (Korean version) in the assessment of DSM-III-R major depression. J Korean Neuropsychiatr Assoc 1993;32:381-399.
24. Cho MJ, Kim KH. Use of the Center for Epidemiologic Studies Depression (CES-D) scale in Korea. J Nerv Ment Dis 1998;186:304-310.
25. Olson DH, Portner J, Lavee Y. FACES III. St. Paul, MN: Family Social Science, University of Minnesota; 1985.
26. Olson DH. Circumplex Model VII: validation studies and FACES III.

Fam Process 1986;25:337-351.

27. DuPaul GJ. Parent and teacher ratings of ADHD symptoms - psychometric properties in a community-based sample. J Clin Child Psychol 1991;20:245-253.

28. DuPaul GJ, Power TJ, Anastopoulos AD, Reid R. The ADHD Rating Scale-IV: Checklists, Norms, and Clinical Interpretation. New York: Guilford Press; 1998.

29. So YK, Noh JS, Kim YS, Ko SG, Koh YJ. The reliability and validity of Korean Parent and Teacher ADHD Rating Scale. J Korean Neuropsychiatr Assoc 2002;41:283-289.

30. Browne MW, Cudeck R. Alternative ways of assessing model fit. Socio Meth Res 1992;21:230-258.

31. Schumacker RE, Lomax RG. A Beginner's Guide to Structural Equation Modeling. Mahwah, NJ: L. Erlbaum Associates; 1996.

32. Orr ST, Blazer DG, James SA, Reiter JP. Depressive symptoms and indicators of maternal health status during pregnancy. J Women Health 2007;16:535-542.

33. Alpert JE, Maddocks A, Nierenberg AA, O'Sullivan R, Pava JA, Worthington JJ 3rd, et al. Attention deficit hyperactivity disorder in childhood among adults with major depression. Psychiatry Res 1996;62: 213-219.

34. Tully EC, Iacono WG, McGue M. An adoption study of parental depression as an environmental liability for adolescent depression and childhood disruptive disorders. Am J Psychiatry 2008;165:1148-1154.

35. Boyle MH, Pickles AR. Influence of maternal depressive symptoms on ratings of childhood behavior. J Abnorm Child Psychol 1997;25:399-412.

36. Luoma I, Koivisto AM, Tamminen T. Fathers' and mothers' perceptions of their child and maternal depressive symptoms. Nord J Psychiatry 2004;58:205-211.

37. Gunlicks ML, Weissman MM. Change in child psychopathology with improvement in parental depression: a systematic review. J Am Acad Child Adolesc Psychiatry 2008;47:379-389.

38. Modell JD, Modell PJG, Wallander J, Hodgens PB, Duke PL, Wisely PD. Maternal ratings of child behavior improve with treatment of maternal depression. Fam Med 2001;33:691-695.

39. Lee JH, Lee SM, Kim JW. Relationship between ADHD assessment by parents and teacher and family functioning. J Emot Behav Disord 2013; 29:197-211.

40. Angold A, Costello EJ, Erkanli A. Comorbidity. J Child Psychol Psychiatry 1999;40:57-87.

41. Daviss WB. A review of co-morbid depression in pediatric ADHD: etiology, phenomenology, and treatment. J Child Adolesc Psychopharmacol 2008;18:565-571.

42. Johnston C, Mash EJ. Families of children with attention-deficit/hyperactivity disorder: review and recommendations for future research. Clin Child Fam Psychol Rev 2001;4:183-207.