Predictors of Self-Reported Depression in Korean Children 9 to 12 Years of Age

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Purpose: The aim of this study was to evaluate the relationships among various psychosocial factors, behavior problems, and depressive symptoms reported by parents, and to investigate self-reported depression in Korean children using a community sample. **Materials and Methods:** The sample consisted of 1279 children between 9 and 12 years of age. The children were evaluated using the Korean version of the Child Behavior Checklist (K-CBCL) and the Child Depression Inventory (CDI). **Results:** The average self-reported depression score as measured by the CDI was 12.34 (SD: 6.79), and a cut-off point of 19 identified approximately 14% of the children as depressed. The group difference was identified by the age at which younger children were found to have higher CDI scores. Univariate logistic regression analysis showed that the high-CDI group and the low-CDI group differed in all behavioral domains identified in the parent-reported subscales of the K-CBCL. Age and father's education level were also independently associated with the risk for childhood depression. In addition, results from the logistic regression analyses indicated that parental reporting of problem internalization, total behavior problems, and social competence were independent predictors of child depression not identified by the anxious/depressed subscale. **Conclusion:** It is believed that extensive behavioral problems reported by parents and several sociodemographic factors are related to childhood depression. However, parents tend to under-report depressive symptoms relative to what their own children report. Thus, clinicians must consider the self-reports of children related to depression in their diagnosis and intervention, because reports of depressive symptoms from children are more valid measures than those from parents.

Key Words: Child, depression, social environment

INTRODUCTION

Early-onset depression is a relatively common, enduring and recurrent condition. It has been shown that childhood depression may be a risk factor in the development of other psychological problems, as well as adulthood depression.[1,2] According to Harrington et al. although most instances of adult depression are not preceded by childhood depression, depressive symptoms in children increase the risk for affective disorders in adulthood.[3] In addition, it was found that most depressed children who were not treated at the proper time were likely to become depressed adults.[4] These findings suggest that early-onset depression is a potentially dangerous disease.

Despite the debilitating effects of childhood depression on development and mental health, little research has been conducted regarding the predictors and correlates of early-onset depression. A number of assumptions have been made regarding this occurrence. One is that the high prevalence of comorbidity impedes professionals when diagnosing the mood symptoms of children.[5,6] A systematic review using meta-analysis reported that anxiety disorder, conduct disorder, and oppositional defiant disorder were often accompanied with childhood depression.[7]

Another problem is that parents are not the most reliable reporters of depressive symptoms. Even if they tend to be reliable reporters of externalizing behaviors and tend to view depression as a deviant behavior problem,[8] they generally report fewer symptoms than do their children.[9] It has become increasingly evident that children eight years old and older are reliable reporters of their internal mood states.[10] Therefore, it has been

proposed that clinicians should pay attention to reports by both parents and children.

Studies using a children's self-reporting scale such as the Children's Depression Inventory (CDI) have been conducted mainly in North America and in Europe.[8,11-13] Children's self-reported depression scores differ in different countries; previous studies have shown that significantly higher depression scores are correlated with the variables of not living with both natural parents, a lower socioeconomic status, or having an unemployed parent.[10,14,15] However, many investigators have turned their attention to cultural background issues such as the style of emotional expression, the type of rearing, and educational practices.[16-18] The clinical presentation of childhood depression and the risk factors for depression identified in Western cultures cannot be assumed to be equivalent to those observed in other cultures.[19,20] The point at issue is particularly relevant when self-reported measurement is utilized, because the cultural context presumably influences the task-taking attitudes of individuals.

The early onset of depression is chronic and likely to persist into adulthood; therefore, identifying the risk factors of early-onset depression in Korean children is crucial for reducing adult depression. The objectives of this study are summarized below.

1) Report the prevalence of depression in Korean children
2) Examine the sociodemographic factors associated with child-reported levels of depression
3) Investigate the parental-reported factors associated with the child-reported levels of depression

MATERIALS AND METHODS

Materials

This study was based on an examination of 1324 Korean children between the ages of 9 and 12. The subjects were selected from among students attending several elementary schools in the city of Osan, South Korea, a city with a population of 120,000 located 50 kilometers (approximately 30 miles) southeast of Seoul. In April of 2005, with teachers acting as intermediaries, the investigators contacted families via letters that detailed the design of the study, explained its objectives and benefits, and gave assurances of confidentiality. The final study group consisted of 1279 children consisting of 633 boys and 646 girls. The data of 47 children were excluded because the children did not clarify their sociodemographic factors. There were no significant differences between the remaining participants and those who dropped out with regard to gender, age, or psychosocial factors.

In the first stage, the Korean version of the Child Behavior Checklist (K-CBCL) was given to the parents in order to assess the reported behavioral problems of a community sample of children.[21] The K-CBCL and other questionnaires were sent to the homes of the children and were collected within a week.

The Korean version of the Children's Depression Inventory (CDI), originating from Kovacs and Beck's Scale,[11,22] was also utilized. Korean researchers investigated the normative data, reliability, and factor structures of the CDI.[23] They found that the Korean form of Kovac's Children's Depression Inventory was reliable and useful for measurements in children of different ages. It was also found that the CDI mean scores for Korean children were higher than those in Kovac's original sample.

In the interest of time, students in the same classroom were collectively administered the Inventory. Both the children and their parents were also informed that their responses would remain anonymous and confidential.

Measures

Several self-report and interview measures are currently available to assess the severity of childhood and adolescent depression,[24] and the Children's Depression Inventory (CDI) is considerably consistent across samples of relatively different cultures.[10] In addition, many studies have verified that psychometric factors such as the internal consistency, test-retest reliability, and validity of this instrument are adequate.[25-27] Each of the 27 items is scored on a three-point scale (0: absent; 1: moderate; 2: severe) reflecting the increasing severity of symptoms. The child is

asked to indicate which statement describes him or her best in the two weeks immediately prior to the test. In this study, the total CDI score was dichotomized, and children with a total score greater than 19 were considered the clinical group.[22]

The Child Behavior Checklist (CBCL) is also a frequently-used questionnaire with 119 items providing parent-reported data on problem behavior in children. The CBCL scores were computed based on Korean normative samples.[28] A total problem behavior score was computed by summing the scores obtained for each item. In addition to the total problem score, the K-CBCL produces two broad-band syndromes and nine clinical scales. Externalizing behavior problems are composed of attention problems and aggressive and delinquent behavior; internalizing behavior comprises withdrawal, depressed behavior, and somatic complaints. The social functioning scale includes socialization and academic functioning in the K-CBCL. These scales provide information regarding the level of academic achievement as well as the social relationships of the children.

Demographic variables such as parental education level and socioeconomic status were collected via an additional questionnaire completed by the parents.

Statistical analysis

A high level of depression was defined as a CDI score greater than 19; all others were in the low-depression group. Initially, a χ^2-test was conducted in order to examine the age, gender, income, and parental education level differences between the high-depression and the low-depression groups.

The predictive associations between the dichotomous response variable with categories scoring under the clinical cut-off point and those scoring above the cut-off point of CDI scores along with relevant explanatory variables were investigated using a logistic regression analysis. Explanatory variables were used categorically. The odds ratio (OR) and 95% confidence intervals (95% CI) were calculated using a multivariate logistic regression analysis for all variables significant at the $p < 0.05$ level.

RESULTS

Table 1 shows the sample characteristics and mean and standard deviation of CDI scores according to the age and gender variables. Of the 1,279 children, 632 (49.5%) were boys and 647 (50.5%) were girls, with an average age of 10.21 and 10.33 years, respectively. The highest CDI mean scores were found in 9-year-old children, whereas the lowest scores were found in 11-year-old children.

Approximately 14% of the children were identified as belonging to the high-depression group. There was no significant difference between boys and girls ($\chi^2 = 0.23$, $p > 0.05$), but a significant age effect on the prevalence of the high-depression group was found ($\chi^2 = 10.65$, $p < 0.05$). Additionally, 81% of 9-year-old subjects showed a low level of depression, and the remaining 19% of subjects in this age group were classified into the high-depression group. In contrast, 88.5% of the 11-

Table 1. Prevalence of Gender, Age, and CDI Scores

		No. (%)	Age (Mean ± SD)	CDI (Mean ± SD)
Gender	Boys	632 (49.5)	10.31 ± 0.92	12.58 ± 6.91
	Girls	647 (50.5)	10.3 ± 0.96	12.10 ± 6.79
	Total	1,279 (100)	10.32 ± 0.94	12.33 ± 6.79
Age	9	310 (24.2)	-	13.12 ± 7.43
	10	368 (28.8)	-	12.45 ± 6.94
	11	478 (37.4)	-	11.79 ± 6.19
	12	123 (9.6)	-	12.10 ± 6.77

CDI, children's depression inventory.

Table 2. Prevalence of Clinical Level of CDI Scores by Gender and Age

	Low CDI No. (%)	High CDI No. (%)	χ^2
Gender			0.23
Boys	540 (85.4)	92 (14.6)	
Girls	558 (86.4)	88 (13.6)	
Age			10.65*
9	249 (80.6)	60 (19.4)	
10	317 (86.1)	51 (13.9)	
11	423 (88.5)	55 (11.5)	
12	109 (85.9)	14 (11.4)	
Total	1,098 (85.9)	180 (14.1)	

$*p < 0.05$.

Table 3. Background Characteristics of the Children

	Low CDI No. (%)	High CDI No. (%)	χ^2
Income			2.03
Low	301 (86.7)	46 (13.3)	
Middle	620 (84.8)	111 (15.2)	
High	177 (88.5)	23 (11.5)	
Father's education level			11.58[†]
≥ 13 years	427 (87.7)	60 (12.3)	
$9 < $ years $ \leq 12$	646 (85.7)	108 (14.3)	
≤ 9	25 (67.6)	12 (32.4)	
Mother's education level			8.29*
≥ 13 years	225 (88.2)	30 (11.8)	
$9 < $ years $ \leq 12$	839 (86.0)	137 (14.0)	
≤ 9	34 (72.3)	13 (27.7)	

$*p < 0.05$, $^†p < 0.01$.

year-olds were classified into the low-depression group (Table 2).

No significant family income effect on the prevalence of the high-depression group was found ($\chi^2=2.03$, $p > 0.05$), but the education levels of the father ($\chi^2=11.58$, $p < 0.01$) and the mother ($\chi^2=8.29$, $p < 0.05$) were strongly correlated with the prevalence of depression. Lower education levels of the father and mother were found at rates of 12 (32.4%) and 13 (27.7%) in the high-CDI group. These frequencies were higher than the expected frequencies of 5.2 and 6.6 for the father's education level and the mother's education level,

respectively (Table 3).

In Table 3, parent-reported factors of children's depression are investigated, and the results are shown in adjusted odd ratios at 95% confidence intervals. All significant odds ratios are reported. In a univariate logistic regression analysis, all parent-reported factors from the K-CBCL subscales were found to be related significantly to self-reported depression in children (Table 4).

According to a multiple logistic regression analysis, factors associated with childhood depression included age (OR = 0.76 - 0.78, $p < 0.01$), a high education level of the father (OR = 3.01 - 3.44, $p <$

Table 4. Factors Associated with Children Depression: Results of Univariate Logistic Regression Analysis for K-CBCL

	Odds ratio (95% CI)	*p* value
Withdrawn	1.32 (1.23 - 1.42)	0.00
Somatic complaints	1.20 (1.12 - 1.29)	0.00
Anxious/Depressed	1.19 (1.14 - 1.25)	0.00
Social problems	1.32 (1.23 - 1.41)	0.00
Thought problems	1.58 (1.37 - 1.82)	0.00
Attention problems	1.23 (1.17 - 1.30)	0.00
Delinquent behavior	1.30 (1.18 - 1.43)	0.00
Aggressive behavior	1.11 (1.01 - 1.15)	0.00
Internalizing problems	1.10 (1.08 - 1.13)	0.00
Externalizing problems	1.09 (1.06 - 1.12)	0.00
Total behavior problems	1.04 (1.03 - 1.05)	0.00
Social scale	0.65 (0.57 - 0.73)	0.00
School scale	0.44 (0.34 - 0.58)	0.00
Total competence scale	0.66 (0.60 - 0.74)	0.00

K-CBCL, Korean child behavior checklist; CI, confidence interval.

0.05), total behavioral problems (OR = 1.03, *p* < 0.01), total competence scale (OR = 0.76, *p* < 0.01), problem internalization (OR = 1.08, *p* < 0.01), social scale (OR = 0.78, *p* < 0.01), and school scale (OR = 0.59, *p* < 0.01). The remaining factors were not significant (Table 5).

DISCUSSION

The aim of this study was to investigate descriptive terms of self-reported depression in Korean children as well as to explore which sociodemographic factors, family factors, and parental-reported behavioral problems were strongly associated with levels of depression. In this study, the self-reported depression mean score as measured by Kovacs Children's Depression Inventory was 12.33 (standard deviation 6.79). A cut-off point of 19 identified approximately 14% of the children as depressed. Higher CDI scores have been found more frequently in some European and Asian countries[29,30] compared with Western countries.[10,12,22] Charman and Pervova (1996)[30] reported in samples from eastern Europe and Russia that in terms of the mean scores (mean 14.0, SD 5.6), 22.7% of participants in their study were above the cut-off point. In a study to assess the level of depression among different ethnic groups, it was found that Mexican-American adolescents appeared to be at a higher risk for depression compared with Anglo adolescents. It was concluded that depressive symptoms were positively related to deprived social economic status.[31] Accordingly, it can be assumed that high levels of depression in children are associated with impoverished circumstances. However, Japanese scholars have reported that Japanese adolescents responded to negatively-worded items; this finding may indicate a cultural difference.[18] They reasoned that Eastern people restrained the expression of positive affect. Moreover, a recent Korean study that verified a tripartite model of anxiety and depression in children and adolescents demonstrated that three factors (a low positive affect, a negative affect, and physiological hyperarousal) showed a higher correlation in the Korean sample than in a Western sample.[17] They proposed that because Korean culture was based on Confucianism, which emphasizes courtesy and good manners, people repressed emotional expression. Considering that the socioeconomic level in Japan and Korea is relatively high, it is reasonable to assume that expressions of negative

Table 5. Factors Associated with Children Depression: Results of Multiple Logistic Regression Analysis

	Odds ratio (95% CI)	*p* value
I. Analysis including Sum problems		
Gender	0.97 (0.69 - 1.36)	0.85
Age	0.78 (0.65 - 0.94)	0.01
Income		
High	0.71 (0.39 - 1.30)	0.27
Middle	1.18 (0.71 - 1.97)	0.52
Father's education level		
≥ 13 years	3.06 (1.23 - 7.65)	0.02
9 < years ≤ 12	1.18 (0.78 - 1.78)	0.44
Mother's education level		
≥ 13 years	1.87 (0.75 - 4.66)	0.18
9 < years ≤ 12	1.02 (0.61 - 1.68)	0.95
Total behavior problems	1.03 (1.02 - 1.04)	0.00
Total competence scale	0.76 (0.67 - 0.85)	0.00
II. Analysis including internalizing/externalizing problems		
Gender (male)	1.00 (0.71 - 1.40)	0.98
Age	0.78 (0.65 - 0.93)	0.01
Income		
High	0.69 (0.38 - 1.25)	0.22
Middle	1.17 (0.70 - 1.95)	0.54
Father's education level		
≥ 13 years	3.01 (1.20 - 7.57)	0.02
9 < years ≤ 12	1.14 (0.75 - 1.72)	0.54
Mother's education level		
≥ 13 years	1.97 (0.79 - 4.92)	0.15
9 < years ≤ 12	1.03 (0.62 - 1.70)	0.93
Internalizing problems	1.08 (1.05 - 1.12)	0.00
Externalizing problems	1.00 (0.97 - 1.04)	0.84
Social scale	0.78 (0.68 - 0.90)	0.00
School scale	0.59 (0.43 - 0.80)	0.00
III. Analysis including subscales		
Gender (male)	1.01 (0.72 - 1.42)	0.96
Age	0.76 (0.63 - 0.91)	0.00
Income		
High	0.77 (0.42 - 1.39)	0.38
Middle	1.25 (0.75 - 2.07)	0.40
Father education level		
≥ 13 years	3.44 (1.36 - 8.68)	0.01
9 < years ≤ 12	1.25 (0.83 - 1.88)	0.30
Mother education level		
≥ 13 years	1.89 (0.76 - 4.74)	0.17
9 < years ≤ 12	1.08 (0.66 - 1.78)	0.76
Withdrawn	1.10 (0.98 - 1.23)	0.12
Somatic complaints	1.03 (0.94 - 1.13)	0.56
Anxious/Depressed	1.05 (0.96 - 1.14)	0.29
Social problems	1.10 (0.99 - 1.23)	0.07
Thought problems	1.04 (0.84 - 1.29)	0.72
Attention problems	1.08 (0.98 - 1.19)	0.11
Delinquent behavior	0.99 (0.86 - 1.14)	0.88
Aggressive behavior	1.00 (0.94 - 1.06)	0.93

CI, confidence interval.

emotions, such as depression, are affected by social factors.

There was no marked differences in the CDI scores by gender in this study, which is consistent with studies that found that the ratio of childhood depression for boys and girls is 1:1; gender differences begin to appear in older adolescence.[32,33]

In the analysis of the results of this study, the level of depression differed depending on the age of the subjects, as well as on the level of education of the father and the mother. The findings regarding age and gender in depressed children and adolescents are inconsistent, however. Many authors have reported that the prevalence of depressive symptoms increases over time from childhood to adolescence,[34,35] while other studies have found that prepubescent children and older adolescents have higher depression scores.[8,36] Our results, which showed that younger children were found to have higher CDI scores, is in line with findings that suggest that the proportion of subjects that scored above cut-off score in CDI was significantly higher in elementary school students than Junior high school.[8,12] Several explanations are possible for this result: First, the data in the present study suggest that a subject's attitude toward depressive symptoms has an impact on the results. Poli et al.[8] explained that some young adolescents believe that depressive symptoms are a sign of weakness. In contrast, younger or older students can more easily accept their depressive feelings and express them more overtly. Similarly, younger subjects in the present study may be less reluctant to express depressive symptoms, because they are not highly self-conscious at their age. Second, it can be inferred that the course of psychopathology has an influence on this age effect. In a community-based research study, it was found that anxiety symptoms were more frequently reported in childhood and that the symptoms of depression were more frequently reported in adolescence.[36] It is possible, however, that 9-old-year children may confuse anxiety with depression. Third, according to Twenge and Nolen-Hoeksema,[32] depression scores for girls are stable from ages 8 to 11 and then increase between the ages of 12 to 16. Thus, the limited age range of the sample in the present study may explain why its results differ from those of some studies.

Univariate logistic regression analysis shows that the high-CDI group and the low-CDI group differ in all behavioral domains identified in the parent-reported K-CBCL. It is generally accepted that parents tend to report their children's depression as oppositional behavior, attention problems, crying, irritability, and somatic symptoms.[37] Consistent with other studies, the present study found that parents are more sensitive reporters of externalizing behaviors and have a tendency to interpret some depressive symptoms as other behavioral problems.

Multivariable logistic regression analysis revealed that age and the education level of the father were independently associated with the risk of childhood depression. These findings support previous findings which suggested that numerous socio-demographic factors are implicated in the early development of childhood depression.[38,39] In this study, information regarding the level of parental education and income was collected, and it was found that only a higher education level of the father decreases a child's odds of having a high CDI score. In contrast, low socioeconomic status has repeatedly been associated with behavioral problems in children,[40,41] and evidence that suggests that parental education level is related to problematic behavior has not been consistent.[40,42] According to Kalff et al.[14] parental education level and occupation are potentially important, because they have a considerable influence not only on the experience of economic hardship but also on the knowledge, experience, and rearing patterns of the parents. Therefore, it was postulated that a higher education level of the father was related to a decreased incidence of mental illness in children.

As shown in the logistic regression analysis, total behavioral problems, problem internalization, and the total competence scale including the social scale and the school scale measured by the K-CBCL were independent predictors for child depression, while the parent-reported anxiety/depression scale was not significant. Although the parental report did not discriminate depressive/anxious symptoms on the K-CBCL, parents were able to identify the total internalization of problems, which is predictive of high CDI scores,

showing that perhaps parents can also be useful reporters, since problem internalization has been shown to be correlated with depression.[43] Therefore, it appears that parents are aware of some internal states; parents have some perception of depressive symptoms, which makes the consideration of both parental and child reports important in clinical diagnosis.

Although the sample was considerably large and well-established instruments were used, this study's findings are limited. One limitation is the absence of information on psychiatric diagnoses. Given that this investigation utilized a large sample, person-to-person interviews using a structured diagnosing interview form were not feasible. Diagnostic formulation is necessary to obtain a more accurate concept of the prevalence of depression in young Korean children.

Other limitations include the restriction of the study to one geographical region in Korea and the study of children from 9 to 12 years of age only, thus introducing a generalization problem. The absence of teacher reports may be another limitation. Parents and children may differ in their opinions of a child's symptoms, especially when the children are in higher grades; therefore, teacher reports may contain important information. In addition, this study did not include the employment status of both parents; this constitutes another limitation. Although the number of dual-income couples was low when the K-CBCL was validated in Korea, the proportion of those working together for a living has increased markedly since that time.

In conclusion, these findings imply that self-reported depression scores measured by Kovac's Children's Depression Inventory in Korean children are slightly higher when compared to scores from some Western countries. Additionally, CDI scores are associated with the age of the child and the education level of the parent, with multiple behavior problems being reported by their parents as predictors of depression. Self-reported depression by children was correlated with parental reports of emotional problems, social and school adaptation not anxious/depressed scale, suggesting that parents are less perceptive in discriminating depression from other various emotional problems.

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