

# ADHD, suicidal ideation, depression, anxiety, self-esteem, and alcohol problem in Korean juvenile delinquency

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## Abstract

The purpose of this study is to evaluate the prevalence rates of externalizing symptom, ADHD, as well as internalizing symptoms, depression, anxiety, suicidal ideation, self-esteem, and alcohol problem in Korea juvenile delinquency for the first time in Korea. A case-control study design was used. It also examined the associations with ADHD, suicidal ideation, depression, anxiety, self-esteem, and alcohol problem between the Juvenile Delinquency group and the comparison group in Korea.

A series of questionnaires were provided to a total of 251 participants (149 from the juvenile delinquency group and 102 from the comparison group) from October 2015 to December 2015 in Korea. All participants were evaluated using KARS, SSI, BDI, BAI, RSI, and CAGE. This study showed the relationship between ADHD, suicidal ideation, depression, anxiety, self-esteem, and alcohol problem in Korean juvenile delinquency. Also this study showed that ADHD and self-esteem were important factors in predicting juvenile delinquency. Therefore, in order to prevent juvenile delinquency, special attention, and consideration are needed for adolescents with high ADHD or low self-esteem.

**Abbreviations:** BAI = Beck's Anxiety Inventory, BDI = Beck's Depression Inventory, CAGE = alcohol questionnaire (Cut-down, Annoyed, Guilty-feeling, Eye-opening), KARS = Korean ADHD Rating Scales, RSI = Rosenberg's Self-esteem Inventory, SSI = Beck Scale for Suicidal Ideation.

**Keywords:** ADHD, alcohol problem, anxiety, depression, Korean juvenile delinquency, self-esteem, suicidal ideation

## 1. Introduction

Rates of juvenile delinquency have drastically increased in the last few decades, and its pattern has become more varied. Since juvenile delinquency acts are committed more often at a lower age, repeatedly take place, and are often perpetrated as a group, they are recognized as a severe social problem. Since 2015, the proportion of juvenile crime is increasing, and interest and boundaries are needed.<sup>[1]</sup> According to a criminal data analysis of

the Public Prosecutors Office in 2017, the number of juvenile delinquency has been increasing after in 2005. Juvenile delinquency in between 10 and 18 age in 2016 has increased to 7.0% and it shows 76,000 people. Also, it accounts for 3.8% from the criminal in total.<sup>[2]</sup> In reference to an age group, the amounts of young offenders in between 14 and 15 age in 2017 has increased to 12.5% since last year and it shows 56,515 people.<sup>[3]</sup>

The reasons for juvenile delinquency have been classified as economic reasons, revenge, curiosity, temptation, accidental incidents, dissatisfaction with reality, and carelessness. The most frequent criminal reason for juvenile delinquency in the last decade was "accidental incident," indicating the danger of the extemporaneous and impulsive patterns of juvenile behavior.<sup>[4]</sup> With respect to juvenile delinquency, many researchers have recently suggested various factors including emotional factors such as depression, anxiety, and low self-esteem, as well as cognitive behavior factors such as Attention Deficit Hyperactivity Disorder (ADHD) and impulsiveness.<sup>[5]</sup> Loeber et al<sup>[6]</sup> suggested that oppositional defiant disorder and ADHD were the childhood factors having the highest correlation with teenage juvenile delinquency. Many longitudinal studies have suggested childhood behavioral problems and hyperactivity as strong predictive factors of juvenile delinquency. In addition, childhood emotional problems as well as behavioral problems have been reported to be important risk factors of juvenile delinquency. Lyan et al<sup>[7]</sup> reported that affective disorder is a major factor contributing to or deteriorating delinquency and disruptive behavior which may cause suicide, indicating that affective disorder needs to be treated positively. Heaven et al<sup>[8]</sup> also reported that depression and delinquency score are correlated with each other in a study

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conducted with 276 adolescents at an average age of 15 and with 274 parents in the control group. In that study, the personality characteristics of adolescents showed the highest correlations with their delinquency scores. A previous report showed that 5% to 61% of arrested or detained people had depression.<sup>[9]</sup> Mallet et al<sup>[10]</sup> conducted a study with 555 juvenile delinquents and reported that depression or the diagnosis of bipolar disorder may be predictors of later juvenile delinquency. In that study, abuse experience was not found to be correlated with juvenile delinquency. McCarty et al<sup>[11]</sup> reported that depression affects juvenile delinquency independently or interactively with stress life events and low parental support. In their review study, Pratt et al<sup>[12]</sup> stated that attention deficit or attention deficit accompanying hyperactivity is correlated with criminal behavior or delinquent behavior, and bio-sociological and neuropsychological evidence showing the correlation of ADHD with crime and delinquency has been continuously reported as well. Herrenkohl et al<sup>[13]</sup> reported based on the cohort data of Seattle Social Development Project on adolescents at ages between 10 and 18 that not only hyperactivity (as reported by parents) but also low academic performance, peer delinquency, and drug abuse predicted delinquency.

The Copenhagen Perinatal Project showed that hyperactivity at ages between 11 and 13 was significantly correlated with violence at the age around 22.<sup>[14]</sup> A longitudinal study conducted by Klinteberg et al<sup>[15]</sup> with 540 male children in Örebro, Sweden, showed that hyperactivity and alcohol problems at the age of 13 predicted violent crime at ages between 25 and 26. In particular, motor restlessness and inattention in men were highly correlated with violence. It has been reported that impulsiveness and ADHD are strongly correlated with delinquency.<sup>[16]</sup> Also, Personal risk factors correlated with juvenile delinquency or conduct disorder include low self-esteem,<sup>[17]</sup> depression, moral judgment,<sup>[18]</sup> empathy,<sup>[19]</sup> intelligence, and academic accomplishment. In a study of New Zealand, adolescents aged 15 to 16 years, a study examining the relationship between drinking and delinquency, ad who responded that they drink both boys and girls, 3.2 times more likely to commit violent flight And revealed a direct cause-and-effect relationship between youth drinking and violence.<sup>[20,21]</sup>

Among the studies conducted in Korea, Hong et al<sup>[22]</sup> reported in a study conducted with 431 high school students that delinquency is correlated with emotional properties such as depression and anxiety. However, no correlation of externalized behavior with delinquency was found in that study. A recent study conducted in Korea also showed that juvenile delinquency was accompanied by emotional problems such as depression and anxiety. However, there has not been a report showing that juvenile delinquency accompanies not only emotional problems but also behavioral problems such as impulsiveness. No studies have shown that juvenile delinquency in Korea is correlated with psychiatric disorders such as ADHD and emotional problems.

This study is the first study conducted with juvenile delinquents in Korea with respect to the correlation of juvenile delinquency with not only emotional problems such as depression and anxiety, but also psychiatric disorders such as ADHD.

Also, we investigated the symptoms differences of ADHD, suicide ideation, anxiety, depression, self-esteem, and alcohol problem among juvenile delinquents and control group.

## 2. Methods

### 2.1. Ethical review

This study was approved by the Institutional Review Board of Dankook University Hospital. We received written informed consent from all subjects prior to the beginning of this study was carried out. We offered a full explanation verbally and a short form document to explain the purpose and process of this study with participants directly. We also obtained the participant's voluntary agreement to participate.

### 2.2. Participants

The subjects of this study were adolescents who visited the Cheonan Probation and Parole Office from October to December 2015 in Korea. A self-report questionnaire survey was administered to adolescents residing in the subject region. An explanation of the purpose of this study was given to the adolescent subjects or their guardians. The research method was reviewed and approved by the Hospital Ethics Committee of Dankook University Hospital. The investigators fully explained the purpose and contents of this study to juvenile delinquents in OO located in Cheonan city from October 2015 to December 2015, and the subject group was selected based on consultation with juvenile delinquents who had consented to fill out a survey.

This study surveyed 269 adolescents and among them, 18 persons who showed unfaithful responses were excluded. Thus, the juvenile delinquents group (N=149) and the comparison group (N=102) included a total of 251 persons residing in the research target area.

### 2.3. Measures

**2.3.1. Epidemiological questionnaire.** The questionnaire contains questions on sex, age, and previous disease history.

**2.3.2. Korean ADHD rating scales (KARS).** Based on the diagnostic criteria for ADHD in DSM-IV, a rating scale action developed by DuPaul. Discrimination to discriminate between ADHD patients and control groups was demonstrated to be reasonably high. And it is made in 18 questions. It is efficient for distinguishing three subtypes of ADHD (inattentive type, hyperactive-impulsive type, combination type). Each question gains scores from 0 to 3 points, and scores of 2 points or more are regarded as abnormal compared to the development stage of the child. Odd questions are designed to be able to evaluate carelessness and even questions are configured to be able to evaluate hyperactivity and impulsivity. Korea standardization has been conducted by Kim Young Shin, etc, and if it is 18 points or more in parent evaluation, it can be screened out with ADHD.<sup>[23]</sup> The internal consistency (Cronbach's  $\alpha$ ) of this study was 0.94.

**2.3.3. Beck scale for suicidal ideation.** The 19-item Beck scale for suicidal ideation (SSI)<sup>[24]</sup> was used to evaluate the intensity of the subjects' specific attitudes, behaviors, and plans of committing suicide; it was translated into Korean by Shin<sup>[25]</sup> SSI assess the wish to die/live, reason for living/dying, and active/passive suicidal desire, etc. Each question consists of three points scale ranging from 0 to 2, and was rated according to the intensity of the suicidality. The total score ranges from 0 to 38 points. The first five questions measured attitudes toward living/dying, question 6 through 19 measured the contents of suicide attempt. The internal consistency (Cronbach's  $\alpha$ ) of this study was 0.92.

**2.3.4. Beck's depression inventory.** This Beck's depression inventory (BDI) was developed by Beck to assess the degree of adult depression and is widely used worldwide.<sup>[26]</sup> It is composed of 21 items that include the cognitive, emotional, and physical symptoms of depression, and responds to specific sentences expressing the degree of symptom rather than the Likert scale, thus confusing the respondents in quantifying their psychological state. As the self-report scale, each item ranges the score from 0 to 3, and the higher the score, the more severe the depression. Lee YH and Song JY standardized the Beck Depression scale in Korea, and suggested 10 or more depressed states, 16 or more depressed states, and 24 or more depressed states and found an internal reliability of 0.89.<sup>[27]</sup> The internal consistency (Cronbach's  $\alpha$ ) of this study was 0.88.

**2.3.5. Beck's anxiety inventory.** Beck's anxiety inventory (BAI) was a useful assessment tool to measure clinical anxiety. It also has the advantage of measuring the anxious state of adults never having been diagnosed with a psychiatric disorder. It was developed by Beck et al<sup>[28]</sup> and translated into Korean by Yook and Kim, the internal reliability of the Korean version was found to be 0.91.<sup>[29]</sup> In the case of the anxiety inventory scale, scores 22 to 26 indicate slightly high anxiety, scores 27 to 31 indicate considerably high anxiety, and scores 32 or higher indicate extremely high anxiety. The internal consistency (Cronbach's  $\alpha$ ) of this study was 0.92.

**2.3.6. Rosenberg's self-esteem inventory.** Rosenberg's self-esteem inventory (RSI) was a tool that measures the degree of self-esteem, the self-acceptance pattern for an individual, and overall self-esteem. The inventory was devised by Rosenberg in the United States, and Lee<sup>[30]</sup> translated and standardized this for Korea. This scale consists of 10 questions, half of which are positive self-esteem and half of which are negative self-esteem. Each item ranges 0 to 3 points and a total score is 0 to 30 points. Higher scores indicate higher self-esteem. In previous study, internal reliability was 0.79,<sup>[31,32]</sup> the internal consistency (Cronbach's  $\alpha$ ) of this study was 0.73.

**2.3.7. Cut-down, annoyed, guilty-feeling, eye-opening alcohol questionnaire.** This tool was developed by Mayfield<sup>[33]</sup> and tested reliability by Park et al<sup>[34]</sup> in Korea. Cut-down, annoyed, guilty-feeling, eye-opening (CAGE) (an acronym for attempts to Cut back on drinking, being annoyed at criticisms about drinking, feeling guilty about drinking, and using alcohol as an eye opener) was a four-item scale designed as a screening instrument for alcohol problem. Potential alcohol abuse was assessed with the CAGE questionnaire.<sup>[35]</sup> It consists of 4 questions. The example is measured at 1 point, No is measured at 0 point, and if it is 2 points or more, it considered to indicate potential alcohol problem. In previous study,<sup>[34]</sup> internal

reliability was 0.72, The internal consistency (Cronbach's  $\alpha$ ) of this study was 0.62.

**2.4. Statistical analyses**

The data were processed using SPSS 21.0 (Korean version). In the statistical analysis, a cross tabulation analysis was used to compare the frequencies of sex and *t* test was used to compare age, etc. For the analysis of the KARS, SSI, BDI, BAI, RSI, and CAGE score between both groups, a ANCOVA test were used. Also logics to investigate the impact of Korean juvenile delinquency KARS, SSI, BDI, BAI, RSI, and CAGE score on crime. Logistic regression analysis was performed. When the *P*-value was less than .05, it was considered significant.

**3. Results**

**3.1. Demographic characteristics of the study subjects**

The final study participants were 251 people. The juvenile delinquency group was sample of 149 youth (113 male and 36 female). And the comparison group was sample of 102 youth (60 male and 42 female). The average age of juvenile delinquency group was 16.81±1.12 years old, and the average age of comparison group was 23.23±1.67 where there was significant difference (*F*=13.30, *P*=.004) (Table 1).

**3.2. The ANCOVA test result of the study**

The juvenile delinquency group had a total KARS score of 27.90±9.96, and the comparison group had a total KARS score of 23.86±5.54. Thus, there was a significant difference between the groups (*F*=6.55, *P*=.011). The juvenile delinquency group showed a total SSI score of 3.90±6.21, and the comparison group showed a total SSI score of 3.05±4.65. Thus, there was a significant difference found between the groups (*F*=4.01, *P*=.46). The juvenile delinquency group showed a total BDI score of 10.29±8.94 and the comparison group showed total BDI score of 7.76±6.48. Thus, there was a significant difference between the groups (*F*=9.38, *P*=.002). The juvenile delinquency group had a total BAI score of 8.18±9.04 and the comparison group had a total BAI score of 6.25±6.79. Thus, there was a no significant difference between both groups (*F*=3.22, *P*=.74). The juvenile delinquency group had a total RSI score of 28.30±4.91 and the comparison group had a total RSI score of 30.68±5.35. Thus, there was significant difference found between the groups (*F*=10.24, *P*=.002). The juvenile delinquency group had a total CAGE score of 1.34±1.21 and the comparison group had a total CAGE score of 1.01±1.16. Thus, there was a no significant difference found between the groups (*F*=3.21, *P*=.057) (Table 2).

**Table 1**  
Epidemiological characteristics between juvenile delinquency group (N = 149) and comparison group (N = 102) in Korea.

Variables	Juvenile delinquency group (n=149)	Comparison group (n=102)	F or $\chi^2$	P
	Mean ± S.D.	Mean ± S.D.		
Age <sup>a</sup>	16.81 ± 1.12	23.23 ± 1.67	13.303	.004
Sex <sup>b</sup> (N, %)			26.03	.000
Female	36 (24.2%)	42 (41.2%)		
Male	113 (75.8%)	60 (58.8%)		

These data represent mean±S.D., by independent t test,<sup>a</sup> or N (%), by chi-square test,<sup>b</sup> significant *P* value < .05.

**Table 2**  
**Bivariate correlation between the main independence variables and the dependence variable (juvenile delinquency Group in Korea).**

	1	2	3	4	5	6	7	8
1. Sex								
2. Age	0.87							
3. KARS	-0.22**	0.12						
4. SSI	-0.19*	-0.00	0.19*					
5. BDI	-0.31**	0.07	0.43**	0.51**				
6. BAI	-0.24**	0.08	0.54**	0.38**	0.64**			
7. RSI	0.19*	-0.17*	-0.38**	-0.40**	-0.58**	-0.43**		
8. CAGE	-0.20*	0.16	0.28**	0.08	0.24**	0.33**	-0.06	

BAI = Beck Anxiety Inventory, BDI = Beck Depression Inventory, CAGE = alcohol questionnaire (cut-down, annoyed, guilty-feeling, eye-opening), KARS = Korean ADHD Rating Scales, RSI = Rosenberg self-esteem inventory, SSI = Beck Scale for suicidal ideation.  
 These data represent significant *P* value \**P* < .05, \*\**P* < .01.

**Table 3**  
**Score of ADHD, suicidal ideation, depression, anxiety, self-esteem, and problem drinking of juvenile delinquency group and comparison group in Korea.**

Rating scale	Juvenile delinquency group (n = 149)		Comparison group (n = 102)		<i>F</i>	<i>P</i>
	Mean ± S.D.		Mean ± S.D.			
KARS	27.90 ± 9.96		23.86 ± 5.54		6.55	.011*
Inattention	14.73 ± 5.73		12.71 ± 3.72		6.55	.011*
Hyperactivity	13.17 ± 4.53		11.16 ± 2.44		5.23	.023*
SSI	3.90 ± 6.21		3.05 ± 4.65		4.01	.046*
BDI	10.29 ± 8.94		7.76 ± 6.48		9.38	.002**
BAI	8.18 ± 9.04		6.25 ± 6.79		3.22	.074
RSI	28.30 ± 4.91		30.68 ± 5.35		10.24	.002**
CAGE	1.34 ± 1.21		1.01 ± 1.16		3.21	.057
Cut-down	.60 ± .50		.43 ± .50		5.10	.025*
Annoyed	.17 ± .37		.12 ± .32		0.004	.950
Guilty	.26 ± .44		.19 ± .40		3.21	.074
Eye-opener	.32 ± .47		.28 ± .45		0.86	.354

BAI = Beck Anxiety Inventory, BDI = Beck Depression Inventory, CAGE = alcohol questionnaire (cut-down, annoyed, guilty-feeling, eye-opening), KARS = Korean ADHD Rating Scales, RSI = Rosenberg self-esteem inventory, SSI = Beck Scale for suicidal ideation.  
 These data represent mean ± S.D., ANCOVA adjusted for age, sex by general linear model, significant *P* value \**P* < .05, \*\**P* < .01.

**3.3. The logistic regression result of the study**

In the logistic regression model of the juvenile delinquency group and the comparison group in Korea, the relative risk of ADHD was 1.05 times higher (confidence interval 1.01–1.10), which showed a statistical significance ( $\chi^2 = 5.24, P = .022$ ) (Table 3). The relative risk of self-esteem was 0.93 times higher (confidence interval 0.87–0.99), which also showed a statistical significance ( $\chi^2 = 4.71, P = .03$ ) (Table 4).

**4. Discussion**

Heaven<sup>[8]</sup> reported that depression is correlated with delinquency score. Mallet<sup>[10]</sup> also reported that depression or bipolar disorder

is correlated with juvenile delinquency. McCarty et al<sup>[11]</sup> reported that depression affects juvenile delinquency interactively with stressful life events and low parental support. In contrast, Burke et al<sup>[36]</sup> conducted a long-term cohort study with 177 boys at ages between 7 and 12 up until the time they became 18 and reported that ADHD was correlated with later oppositional defiant disorder, but that depression was not shown to be correlated with later conduct disorder. This study showed that depression did not affect conduct disorder but suggested that conduct disorder or delinquent behavior may affect depression indirectly through such factors as psychosocial impairment. Loeber et al<sup>[37]</sup> also reported in a 3-year cohort study conducted with male children in fourth to seventh grades that depression and anxiety were

**Table 4**  
**Parameter estimates for logistic model of juvenile delinquency group and control group in Korea.**

Variables	Parameter estimate	Standard error	Chi-square	df	<i>P</i>	Odds ratio
KARS	0.05	0.02	5.24	1	.022*	1.05 (1.01–1.10)
SSI	0.001	0.03	0.002	1	.97	1.00 (0.95–1.06)
BDI	0.004	0.03	0.11	1	.92	1.00 (0.95–1.06)
BAI	-0.02	0.03	1.36	1	.24	0.97 (0.92–1.02)
RSI	-0.07	0.03	4.71	1	.03*	0.93 (0.87–0.99)
CAGE	0.001	0.12	0.81	1	.97	1.00 (0.95–1.06)

BAI = Beck Anxiety Inventory, BDI = Beck Depression Inventory, CAGE = alcohol questionnaire (cut-down, annoyed, guilty-feeling, eye-opening), KARS = Korean ADHD Rating Scales, RSI = Rosenberg self-esteem inventory, SSI = Beck Scale for Suicidal Ideation.  
 These data represent logistic regression model, significant *P* value \**P* < .05.

correlated with ADHD rather than with conduct disorder. In this study, depression showed a significant correlation with juvenile delinquency, which is consistent with the study conducted by Heaven et al<sup>[8]</sup> and Burke and Loeber.<sup>[38]</sup> Kokkinos<sup>[17]</sup> reported that low self-esteem is a risk factor of juvenile delinquency or conduct disorder. In this study, a significant correlation was also found between juvenile delinquency and self-esteem. And also no significant correlation was found between anxiety and juvenile delinquency in this study, which is not consistent with the result of Loeber.<sup>[38]</sup> A review study by Pratt<sup>[12]</sup> showed that attention deficit is correlated with criminal behavior or delinquent behavior, and biological evidence showing the correlation of ADHD with crime and delinquency has been continuously reported. In addition, the cohort studies conducted by Loeber et al<sup>[38]</sup> and Burke et al<sup>[31]</sup> as well as others have continuously reported that ADHD is correlated with delinquency, conduct disorder, or oppositional defiant disorder. However, there has not been a study showing the correlation between delinquency and oppositional defiant disorder in Korea. This study showed a significant correlation between ADHD and juvenile delinquency for the first time in Korea, and the result is consistent with other previous studies. The result of this study that ADHD was identified as a risk factor of delinquency in addition to depression indicates that the risk factors of juvenile delinquency in Korea have changed over time. In this paper, one of the four sub-scales of CAGE appeared, although it was not displayed as statistically significant for the overall alcohol problem score. This is in line with the results of previous studies where adolescent alcohol problem is said to have adverse effects on physical, psychological, and social development, such as academic performance problems, dangerous sexual activity, delinquency, and suicide.<sup>[39,40]</sup>

The economic growth of Korea from a developing country to an advanced country might have extended the risk factors of delinquency from emotional problems such as deficit and loss to cognitive-behavioral problems such as impulsiveness and attention deficit. The characteristics of nuclear families, which are different from those of extended families, may make it difficult for parents to discipline a child's externalized behavior. Herrenkohl et al<sup>[13]</sup> reported that not only hyperactivity (as reported by parents) but also low academic performance, peer delinquency, and drug abuse predicted delinquency. Bor et al<sup>[19]</sup> reported in a large-scale cohort study that not only inattention but also aggressiveness and marital instability increased the risk of adolescent antisocial behavior. Furthermore, psychosocial risk factors including low intelligence and low academic performance, inconsistent parental discipline, single parent, maternal drug abuse, and low social economic status (SES) have been suggested as risk factors of delinquency.<sup>[41]</sup>

This study has some limitations as follows. First, the various risk factors identified in previous studies were not systematically assessed in this study. Additionally, the crime types of juvenile delinquents were not classified as violent behavior and nonviolent behavior in this study. Second, this study used a self-report questionnaire, there could be a false positive or false negative bias. In order to reduce this effect, previous disease history was used as a control factor during analysis, but the data on medical history could not be sufficiently collected. Third, it was a cross-sectional research, and thus the causal relationship between the groups could not be suggested. Only the correlations of ADHD, suicidal ideation, depression, anxiety, and self-esteem were suggested. Also, it is necessary to confirm the prevalence of comorbid mental disorders because the delinquent adolescents

with mental disorders may show more specific characteristics than the delinquent adolescents without mental disorders. However, we did not evaluate the prevalence of mental disorders in delinquent adolescents.

Fourth, it is difficult to generalize this study because it is aimed at juvenile delinquents on the residing in one city. The data of the delinquency youths and the comparison youths were collected in middle sized cities with populations of about 600,000. Thus, it was difficult to reflect the characteristics of metropolitan cities or rural cities based on these results.

Despite these limitations, the results of this study have two significances. First, there was no previous study in East Asia. This study showed the relationship between ADHD, suicidal ideation, depression, anxiety, self-esteem, and problem drinking in Korean juvenile delinquency. Thus, basic data can be provided in developing and treating programs for delinquent adolescents. Second, there is much research in Europe and North America, but there are no studies on the causality of and juvenile delinquency in East Asia. The results showed that ADHD and self-esteem were important variables in predicting juvenile delinquency. Therefore, in order to prevent juvenile delinquency, special attention and consideration are needed for adolescents with high ADHD or low self-esteem.

In the future, a well-structured delinquency/comparison group study needs to be performed by correcting for gender, age, medical history, and area distribution. We look forward to researching juvenile delinquency studies that have made up a number of limitations of this study.

## Author contributions

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