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The association between adverse childhood experiences and self-harm among South Korean children and adolescents: a cross-sectional study

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Purpose: Adolescent self-harm is a public health problem. Research suggests a link between adverse childhood experiences (ACEs) and self-destructive behaviors. Few studies, however, have examined the effects of ACEs on self-harm among Asian adolescents. This study explored the association between lifetime ACEs and a history of self-harm among Korean children and adolescents in elementary, middle, and high schools. **Methods:** A cross-sectional, retrospective medical record review was conducted on a dataset of a national psychiatrist advisory service for school counselors who participated in the Wee Doctor Service from January 1 to December 31, 2020. The data were analyzed using multiple logistic regression to predict self-harm. **Results:** Student cases (n=171) were referred to psychiatrists by school counselors for remote consultation. Multiple logistic regression analyses revealed that the odds of self-harm were higher among high school students (adjusted odds ratio [aOR]=4.97; 95% confidence interval [CI]=1.94-12.76), those with two or more ACEs (aOR=3.27; 95% CI=1.43-7.47), and those with depression (aOR=3.06; 95% CI=1.32-7.10). **Conclusion:** The study's findings provide compelling evidence that exposure to ACEs can increase vulnerability to self-harm among Korean students. Students with a history of ACEs and depression, as well as high school students, require increased attention during counseling. School counselors can benefit from incorporating screening assessment tools that include questions related to ACEs and depression. Establishing a systematic referral system to connect students with experts can enhance the likelihood of identifying self-harm tendencies and offering the essential support to prevent self-harm.

Key words: Self-injurious behavior; Adverse childhood experiences; Child; Adolescent; Korea

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INTRODUCTION

Adolescent suicide is a major public health problem among adolescents in South Korea [1]. Self-harm has been recognized as a key predictor of suicidal behavior [2]. Self-harm refers to a deliberate behavior by an individual to cause harm to themselves that results in a nonfatal outcome [2]. Although the prevalence of adolescent self-harm worldwide varies due to differences in definitions of the phenomenon between and within countries, its overall lifetime prevalence among adolescents is estimated to be 10%, and female adolescents are more likely to report self-harm than male adolescents [2,3].

Adverse childhood experiences (ACEs) refer to early-life exposure to violence, physical and sexual abuse, neglect, and a household environment in which a household member had struggled with substance abuse, mental disorders, parental

separation, or imprisonment [4]. Studies have shown that ACEs could lead to negative health consequences in adulthood, such as alcoholism, substance use disorder, depression, and suicidal ideation [4,5]. Research on ACEs has also reported a strong graded relationship between ACEs and negative health outcomes, such that the more ACEs individuals are exposed to, the greater the risk of physical and mental health problems in later life [4]. Unfortunately, few studies have examined the proximal effects of ACEs on behavioral problems during adolescence [6].

Although a strong relationship exists between exposure to ACEs and a range of behavioral problems, variations in the prevalence of ACE exposure and in behavioral problems by subgroup characteristics (e.g., race and ethnicity, gender, or maternal education) have been reported [6]. Studies of self-harm have consistently shown that the rates of self-harm are higher among female adolescents than they are among male adolescents [2]. Yet, there is not enough evidence to indicate whether one gender is more exposed to ACEs than the other or whether one gender is more susceptible to the impact of ACEs than the other [7]. Scant research has been dedicated to self-harm among children, and little is known about gender differences in childhood behavioral problems among those who have been exposed to ACEs.

Developmental research indicates that exposure to maltreatment during childhood may create a risk of insecure child-caregiver relationships during adolescence and adulthood [8]. The literature further suggests that children who have an insecure attachment to their caregivers may have difficulties regulating their intense emotions; this presents as externalizing behavioral problems such as self-harm, suicidality, substance abuse, and aggression [9,10].

The link between exposure to ACEs and an array of behavioral problems among children and adults has been well established [4,11]. However, most studies have been conducted in Western societies. Few studies have examined the impact of ACEs on Asian adolescents. Examining the influence of ACEs among Asian populations is critically important because different cultural contexts may affect patterns of ACE occurrence and the extent to which individuals are susceptible to adversity [12]. For example, some researchers have suggested that the prevalence of child physical abuse in Asian countries, where strict parenting is espoused, is significantly higher than in Western countries [13].

To address these issues, we investigated the associations between lifetime exposure to ACEs and a lifetime history of self-harm among a sample of Korean children and adolescents in K-12 schools. We also explored the specific and cumulative effects of ACEs on self-harm among male and female adolescents. Based on the literature, we predicted that more ACEs would be positively associated with self-harm history among Korean children and adolescents. However, we could not predict gender differences in the association of ACEs with adolescents' history of self-harm because the findings in the literature are inconsistent.

METHODS

Ethics statement: This study received an Institutional Review Board (IRB) review exemption from the IRB of Inha University (No. 201027-1AR) due to the use of secondary data with anonymity.

1. Study Design and Data Source

A retrospective cross-sectional secondary data analysis was conducted on a dataset from the Wee Doctor program, which offers national, remote, psychiatrist advisory services to school counselors. This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines [14]. Since 2009, the Ministry of Education has initiated a nationwide student safety integration system, called the Wee Project, for children and adolescents facing emotional and school maladjustment crises. As of 2020, dedicated counseling professionals for the Wee Project are stationed in 14.2% of elementary schools, 52.0% of middle schools, and 52.9% of high schools across the country [15]. The Wee Doctor program is a remote video consultation initiative by psychiatrists to assist on-site counselors participating in the Wee Project. They offer advice on counseling techniques and the necessity of referrals to specialized institutions. The data used in this study consists of medical records related to online consultations [16]. The analytic sample (n=171) comprised of Korean students from elementary, middle, and high schools who were referred by school mental health counseling services to psychiatrists for remote psychiatric consultations between January 1 and December 31, 2020.

2. Study Variables

1) Self-harm

The Wee Doctor database contained clinical data on adolescents' lifetime history of self-harm. In this study, self-harm was conceptualized as a collective term that refers to any self-injurious behavior including self-poisoning, with or without suicidal intention. The lifetime history of self-harm was classified as either "seen" (coded as 1) or "not seen" (coded as 0), depending on whether these histories were recorded in the counseling records. Data on how frequently self-harm occurred were not available.

2) Adverse childhood experiences

Nine categories of childhood exposures to adversity [17] were used for our analysis. Using the Adverse Childhood Experiences Questionnaire, which was developed by Felitti et al. [18], Hammond and colleagues [17] identified ACEs in the medical records of adult war veterans. Their study showed the feasibility of text mining to extract ACE exposure data from free texts found in medical records. Like Hammond et al., we treated physical and emotional neglect as a single category because it was practically impossible to differentiate these two types of neglect in our counseling notes. Following the approach of Marie-Mitchell and O'Connor [19], we counted each type of documented ACE and summed the numbers for each individual. We also dichotomized the exposure to ACEs as low risk (0-1) or high risk (2 or more).

3) Covariates

Demographic data included age, gender, region, and history of hospital visits for psychiatric issues. Region was categorized as 0 if urban and 1 if rural. Potential self-harm-related covariates included parental death, depression, bullying, pressure on grades, body image, serious physical symptoms, financial hardship, school absenteeism, violent behaviors, anxiety, and overuse of online games. These variables were categorized as either "seen" (coded as 1) or "not seen" (coded as 0) based on whether these histories were documented in the counseling records.

3. Data Collection

Data were obtained from the consultation program's online system, which is managed by the institution responsible for its development and operation. Data retrieval and the coding process were performed by two independent researchers and referred to a third person if there was any discrepancy.

4. Data Analysis

Data analysis was performed with SPSS ver. 28.0 (IBM Corp). We used descriptive statistics with frequency and percent for categorical variables and mean and standard deviation for continuous variables. The comparison of the variables between children and adolescents with or without a history of self-harm was tested with the x^2 or t-test. Multiple logistic regression was used to predict a history of self-harm. Statistical significance was determined with alpha level of .05 using two-tailed tests.

RESULTS

Data on 171 Korean children and adolescents were analyzed. The mean age was 12.3±3.4 years old (Table 1). More than half of the sample were male (54.4%) and attended middle school or above (51.5%). Most of them lived in an urban area (61.4%). Of that group, 36.3% presented a history of self-harm (Table 1). Students with a history of self-harm were older (14.0±3.0 vs. 11.4±3.2 years old). Female students reported a history of self-harm more frequently than their male counterparts (50.0 vs. 24.7%). High school students (61.8%) exhibited a higher proportion of reported self-harm than middle (46.3%) and elementary school students (19.3%).

Table 2 presents a frequency comparison of ACEs among children and adolescents using their histories of self-harm. The data show that 62.0% had at least one ACE; the most frequently reported ACEs were undifferentiated neglect (28.7%), parental divorce (26.3%), and emotional abuse (14.6%). Child-

Table 1. Demographic Comparison by History of Self-harm (*N*=171)

Variables	Categories	n (%)	Self-harm		x^2 or t	*p*
			Yes	No		
			n (%) or M±SD	n (%) or M±SD		
Total		171 (100.0)	62 (36.3)	109 (63.7)		
Sex	Male	93 (54.4)	23 (24.7)	70 (75.3)	11.72	.001
	Female	78 (45.6)	39 (50.0)	39 (50.0)		
Age (year)		12.3±3.4	14.0±3.0	11.4±3.2	5.17	<.001
School type	Elementary school	83 (48.5)	16 (19.3)	67 (80.7)	20.12	<.001
	Middle school	54 (31.6)	25 (46.3)	29 (53.7)		
	High school	34 (19.9)	21 (61.8)	13 (38.2)		
Region	Urban	105 (61.4)	41 (39.0)	64 (61.0)	0.92	.338
	Rural	66 (38.6)	21 (31.8)	45 (68.2)		

M, mean; SD, standard deviation.

Table 2. Frequency Comparison of Types of ACEs by History of Self-harm (*N*=171)

Types of ACEs	Categories	Total	Self-harm		x^2	*p*
			Yes	No		
		n (%)	n (%)	n (%)		
Physical abuse	Yes	21 (12.3)	12 (57.1)	9 (42.9)	4.52	.034
	No	150 (87.7)	50 (33.3)	100 (66.7)		
Sexual abuse	Yes	4 (2.3)	2 (50.0)	2 (50.0)	0.34	.563
	No	167 (97.7)	60 (35.9)	107 (64.1)		
Emotional abuse	Yes	25 (14.6)	14 (56.0)	11 (44.0)	4.94	.026
	No	146 (85.4)	48 (32.9)	98 (67.1)		
Undifferentiated neglect	Yes	49 (28.7)	19 (38.8)	30 (61.2)	0.19	.664
	No	122 (71.3)	43 (35.2)	79 (64.8)		
Parental divorce	Yes	45 (26.3)	19 (42.2)	26 (57.8)	0.94	.332
	No	126 (73.7)	43 (34.1)	83 (65.9)		
Mental illness in a household member	Yes	17 (9.9)	6 (35.3)	11 (64.7)	0.01	.931
	No	154 (90.1)	56 (36.4)	98 (63.6)		
Substance abuse in a household member	Yes	7 (4.1)	4 (57.1)	3 (42.9)	1.38	.241
	No	164 (95.9)	58 (35.4)	106 (64.6)		
Witnessing violence toward the mother	Yes	19 (11.1)	6 (31.6)	13 (68.4)	0.20	.653
	No	152 (88.9)	56 (36.8)	96 (63.2)		
Having an incarcerated family member	Yes	3 (1.8)	0 (0.0)	3 (100.0)	1.74	.188
	No	168 (98.2)	62 (36.9)	106 (63.1)		
Cumulative no. of ACEs	0	65 (38.0)	23 (35.4)	42 (64.6)	8.15	.017
	1	49 (28.7)	11 (22.4)	38 (77.6)		
	≥2	57 (33.3)	28 (49.1)	29 (50.9)		

ACEs, adverse childhood experience.

ren and adolescents with a history of self-harm experienced more physical abuse (57.1% vs. 42.9%; x^2=4.52, p=.034) and emotional abuse (56.0% vs. 44.0%; x^2=4.94, p=.026). The cumulative frequency of ACEs was found to be statistically significantly different between the two groups of students (x^2=8.15, p=.017). Table 3 shows a frequency comparison of covariates by history of self-harm. The most frequently reported covariates were school absenteeism (36.3%), violent behavior (33.3%), and anxiety (32.7%). Children and adolescents with a history of self-harm were more likely to present with a history of depression (55.6% vs. 44.4%, x^2=12.72, p<.001).

Multiple logistic regression analyses revealed three predictors of a history of self-harm among Korean children and adolescents (Table 4). After adjusting for demographic data and covariates, children and adolescents who (a) attended high school (adjusted odds ratio [aOR]=4.97; 95% confidence interval [CI]=1.94-12.76), (b) had a history of two or more ACEs (aOR=3.27; 95% CI=1.43-7.47), and (c) had depression (aOR=3.06; 95% CI=1.32-7.10) were three to five times more likely to have a history of self-harm compared to those who did not.

DISCUSSION

This study explored the association between ACEs and self-harm among Korean children and adolescents. We found that 36.3% of the sample reported a history of self-harm, which substantially exceeded the rates of self-harm reported by adolescents in previous studies [20]. In their population-based cohort study, Moran and colleagues investigated the natural history of self-harm among adolescents aged 14 to 15 until the age of 29 years and found that 8.3% of youth reported self-harm during their adolescent years. They also reported that the prevalence of self-harm was closely related to distribution of age and gender. They reported that the prevalence of self-harm was highest during late adolescence and decreased in young adulthood (2.6%). The gender-specific prevalence of self-harm was 10% among boys and 6% among girls. Furthermore, research [21] that demonstrated the potential of the COVID-19 pandemic to increase rates of self-harm or presentation of suicidal ideation in emergency departments may partially explain these differences because our study was conducted during the COVID-19 period.

Table 3. Frequency Comparison of Covariates by History of Self-harm (*N*=171)

Covariates	Categories	Total	Self-harm		x^2	*p*
			Yes	No		
		n (%)	n (%)	n (%)		
Hospital visit for mental health issue	Yes	41 (24.0)	13 (31.7)	28 (68.3)	0.48	.487
	No	130 (76.0)	49 (37.7)	81 (62.3)		
Parental death	Yes	9 (5.3)	2 (22.2)	7 (77.8)	0.81	.368
	No	162 (94.7)	60 (37.0)	102 (63.0)		
Depression	Yes	54 (31.6)	30 (55.6)	24 (44.4)	12.72	< .001
	No	117 (68.4)	32 (27.4)	85 (72.6)		
Bullying	Yes	11 (6.4)	2 (18.2)	9 (81.8)	1.66	.197
	No	160 (93.6)	60 (37.5)	100 (62.5)		
Pressure on grades	Yes	13 (7.6)	7 (53.8)	6 (46.2)	1.88	.170
	No	158 (92.4)	55 (34.8)	103 (65.2)		
Body image issue[a)]	Yes	5 (2.9)	4 (80.0)	1 (20.0)	4.26	.059
	No	166 (97.1)	58 (34.9)	108 (65.1)		
Serious physical symptoms	Yes	49 (28.7)	18 (36.7)	31 (63.3)	0.01	.934
	No	122 (71.3)	44 (36.1)	78 (63.9)		
Financial hardship	Yes	19 (11.1)	8 (42.1)	11 (57.9)	0.32	.574
	No	152 (88.9)	54 (35.5)	98 (64.5)		
School absenteeism	Yes	62 (36.3)	21 (33.9)	41 (66.1)	0.24	.624
	No	109 (63.7)	41 (37.6)	68 (62.4)		
Violent behaviors	Yes	57 (33.3)	15 (26.3)	42 (73.7)	3.66	.056
	No	114 (66.7)	47 (41.2)	67 (58.8)		
Anxiety	Yes	56 (32.7)	21 (37.5)	35 (62.5)	0.06	.814
	No	115 (67.3)	41 (35.7)	74 (64.3)		
Online game overuse	Yes	17 (9.9)	6 (35.3)	11 (64.7)	0.01	.931
	No	154 (90.1)	56 (36.4)	98 (63.6)		

[a)]Fisher's exact test.

We also found that self-harm was more commonly reported by female adolescents than by male adolescents. This is consistent with the findings of general population studies [20,21]. However, there were no gender differences in the association of ACEs with self-harm when adjusting for covariates in multivariate logistic regression. Our results were not aligned with prior findings that reported gender differences in the effects of specific childhood traumatic experiences on various internalizing or externalizing symptoms [22]. There may be specific cultural factors that offset the gender-based differential symptomatology associated with childhood exposure to adversity.

In our study, the proportion of students who disclosed experiencing any form of ACEs closely resembled previously reported figures [12]. Nevertheless, the potential for underreporting must be acknowledged, given that students frequently met with their counselors alongside their parents, and neither the counselors nor the medical professionals utilized standardized tools to evaluate ACEs. It is important to note that the assessment of ACEs is infrequently conducted within clinical and school settings in Korea [23]. Our results revealed a graded relationship between cumulative lifetime exposure to adversity and the incidence of self-harm: 49.1% of adolescents with two or more ACEs reported a history of self-harm, while 29.8% of adolescents with 0-1 ACEs reported a history of self-harm. This finding is consistent with a previous study that examined the impact of ACEs on suicide attempts among adolescents [24]. This shows that the number of ACEs may be a risk factor for self-harm among children and adolescents.

Furthermore, Marie-Mitchell and O'Connor [19] raised the possibility of using preexisting records to assess ACEs among children and adolescents. They obtained the self-reported data of parents and conducted a medical record review of children to identify suspected maltreatment, domestic violence,

Table 4. Logistic Regression to Predict Self-harm Among South Korean Children and Adolescents (*N*=171)

Variables	B	SE	aOR (95% CI)	*p*
Demographics				
Gender, girls[a)]	0.77	0.43	2.15 (0.93–5.00)	.074
Region, urban[b)]	0.24	0.38	1.28 (0.60–2.71)	.524
School types, high schools[c)]	1.60	0.48	4.97 (1.94–12.76)	.001
ACEs, ≥2[d)]	1.19	0.42	3.27 (1.43–7.47)	.005
Covariates[e)]				
Hospital visit for mental health issue	-0.48	0.47	0.62 (0.25–1.56)	.309
Parental death	-1.23	0.96	0.29 (0.04–1.91)	.199
Depression	1.12	0.43	3.06 (1.32–7.10)	.009
Bullying	-0.77	0.95	0.46 (0.07–2.98)	.416
Pressure on grades	0.79	0.74	2.19 (0.51–9.43)	.291
Body image issue	1.51	1.32	4.51 (0.34–60.14)	.255
Serious physical symptoms	-0.45	0.44	0.64 (0.27–1.52)	.309
Financial hardship	0.50	0.62	1.65 (0.49–5.59)	.420
School refusal	-0.46	0.42	0.63 (0.27–1.44)	.274
Violent behaviors	0.13	0.46	1.14 (0.46–2.82)	.778
Anxiety	-0.49	0.44	0.61 (0.26–1.46)	.270
Online game overuse	-0.04	0.66	0.96 (0.26–3.48)	.948
Model summary	Nagelkerke R^2=0.323, x^2=46.004, $p<.001$			

[a)]Ref. boys; [b)]Ref. rural; [c)]Ref. elemental or middle schools; [d)]Ref. ACEs < 2; [e)]Ref. covariates=no; ACEs, adverse childhood experiences; aOR, adjusted odds ratio; CI, confidence interval; SE, standard error.

substance use, mental illness, criminal behavior, and single parenting. The researchers did not present the results of psychometric evaluation. However, they did show that there were statistically significant differences in behavioral problems, developmental delay, and injury and obesity between the low- and high-risk groups and indicated that medical record review was a feasible method for screening purposes.

Finally, we noticed that students with a history of depression were 3 times more likely to present self-harm than those without a history. This finding is consistent with previous research [20] finding that youth with a history of depression or anxiety were 3.8 times more likely to present self-harm. In our statistical model, depression was an independent contributor to self-harm. This finding is significant because depression may have worsened as a result of the COVID-19 pandemic, potentially accelerating self-harm. In their natural experimental study, Mansfield et al. compared the mental health of adolescents before and during the COVID-19 pandemic using two randomized controlled trials [25]. They reported that the COVID-19 group presented more depressive symptoms and estimated that 6% of students would not have presented high depressive symptoms if the pandemic had not occurred. The researchers also noticed that female students were more vulnerable to the negative impact of the pandemic on their mental health than male students. Woo and their colleagues conducted a comprehensive cross-sectional survey across the nation [26]. Their findings also indicated an elevation in feelings of sadness and instances of suicidality among Korean adolescents during the COVID-19 pandemic period.

This study has several limitations. First, since the data were retrieved from consulting records for counseling purposes, not research, misclassification bias could have been an issue. Marie-Mitchell and O'Connor [19] raised the possibility of using preexisting records to assess ACEs among children and adolescents. They obtained the self-reported data of parents and conducted a medical record review of children to identify suspected maltreatment, domestic violence, substance use, mental illness, criminal behavior, and single parenting. The researchers did not present the results of psychometric evaluations. However, they did show that there were statistically significant differences in behavioral problems, developmental delay, and injury and obesity between the low- and high-risk groups and indicated that medical record review was a feasible method for screening purposes. Furthermore, the frequency and intensity of ACEs were not considered in our analysis because no such data were available in the consultation records. These variables may have stronger relationships with the lifetime history of self-harm among adolescents than the lifetime exposure to ACEs. Second, because our results were based on cross-sectional data, causality in the observed associations cannot be inferred. However, we believe that the possibility of reverse causality (i.e., self-harm occur-

ring before children are exposed to adversity) may be low. Third, our results are based on a small and somewhat selective sample of referred counseling cases that school counselors deemed to be beyond their expertise. Thus, the generalizability of our findings to other populations is limited. Finally, our sample comprised children and adolescents who were seen by school counselors. We probably underestimated the actual prevalence of self-harm among this population because some students may have gone to other services or never sought help of any kind in the first place.

CONCLUSION

The study's findings provide compelling evidence that exposure to ACEs can increase vulnerability to self-harm among the K-12 Korean population. The former significantly predicted the odds of the latter. The development and assessment of school-based interventions to screen for ACE exposure and depressive symptoms, coupled with an awareness campaign educating school professionals and students on the impact of ACEs, should be a priority to prevent self-harm among children and adolescents. Further research is needed to better understand subtypes of students who self-harm and the factors associated with different types of self-harm.

Our findings have several implications for preventing self-harm. The high number of children and adolescents with a history of ACEs in this study indicates the need to implement a screening program that can identify students at risk of self-harm. This is critical because only a small proportion of adolescents who engage in self-harm seek help, and most youth go unnoticed and unreported. For high-risk individuals, school counselors can be valuable assets because they can provide an initial psychosocial intervention. Training school professionals (e.g., teachers, school counselors, and school nurses) to recognize risk factors (i.e., ACEs) and warning signs of self-harm should be an integral component of prevention efforts. Our finding that being in high school and being treated for depression were predictors of a self-harm history suggests that school-based strategies should include screening youth, especially high school students, for depression.

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Authors' contribution

Conceptualization: all authors; Data collection, Formal analysis: all authors; Writing-original draft: all authors; Writing-review and editing: all authors; Final approval of published version: all authors.

Conflict of interest

Min Sohn has been an editor of *Child Health Nursing Research* since 2021. She was not involved in the review process of this article. No existing or potential conflict of interest relevant to this article was reported.

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Data availability

Please contact the corresponding author for data availability.

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