



# Study on Awareness of Suicide and Suicide Prevention Among Community Youth

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**Objectives:** South Korea has the highest suicide rate among Organisation for Economic Co-operation and Development countries; there is an increasing trend in suicide attempts among middle and high school students. Various factors contribute to the risk of suicide among adolescents, and the perception of suicide prevention has emerged as a significant factor. This study aimed to investigate the association between emotional and behavioral difficulties among middle and high school students and their perceptions of suicide prevention and to explore differences in suicide perception according to age.

**Methods:** A survey was conducted among community middle and high school students, including 530 participants, between 2020 and 2021. Emotional and behavioral difficulties were assessed using the Strengths and Difficulties Questionnaire-Korean version, and participants were asked to complete a questionnaire on the importance and possibility of suicide prevention. A correlation test and analysis of variance were used to examine the relationships between the variables, and suicide awareness was compared according to age.

**Results:** The participants who displayed higher strength or lower difficulty were more likely to respond positively to suicide prevention measures. They also exhibited high strength and low difficulty levels, thus agreeing with the importance of suicide prevention. Regarding age-related perceptions of suicide, adults aged 20–29 years reported the lowest probability of suicide prevention.

**Conclusion:** Suicide perceptions influence the incidence of suicide. Therefore, active societal engagement through suicide prevention campaigns and related education is essential to improve such perceptions. Continuous attention and support are required to address this issue.

**Keywords:** Suicidality; Adolescence; Suicide prevention; Emotional problem; Peer problem.

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## INTRODUCTION

Suicide is a leading cause of mortality worldwide. According to the World Health Organization, more than 70000 individuals die by suicide annually, representing approximately 1% of all deaths [1]. South Korea has the highest suicide rate among Organisation for Economic Co-operation and Development countries. In 2022, approximately 13000 individuals died by suicide. Since 2011, suicide has been the most prevalent cause of death among individuals aged 9–24 years in South Korea. In 2019, the suicide rate remained consistently high at 9.9 deaths per 100000 individuals. In addition, the rates of suicide attempt and percentage of middle and high school students who had attempted suicide in the past 12 months—were 3.8% and 2.5%, respectively, in 2023 [2],

which were higher than those in the previous year (middle school students: 3.0%, high school students: 2.3%). Despite the high rates of suicide, serious threats to adolescent life, and increased attention toward adolescent suicide [3], no significant positive change has been observed in suicide rates among Korean youth. Suicide negatively affects not only individuals but also the people around them, including family and friends; therefore, intensive social attention is needed.

According to studies on Korean adolescent suicides, there have been more cases of suicide among male students [4]. Additionally, among the students who died by suicide, 9.4% had a history of attempted suicide, 13.4% had attempted self-harm, and 12.8% were acquaintances of suicide deaths. In South Korea, a highly competitive education system and stressful academic environment may be considered factors that contribute to youth suicide. Academic stress and depression are positively correlated [5,6], showing a strong association between suicidal ideation and attempts [7,8]. In addition,

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negative social perceptions of mental illness, known as “social stigma,” are associated with increased rates of suicidal ideation and attempts among adolescents [9,10].

The risk factors for adolescent suicide are diverse and are affected by various factors, including individual, familial, and school-related factors [11]. Childhood abuse, mental illness, previous suicide attempts, family history, companionship, family relationships, impulsiveness, substance abuse, and gender identity have all been reported as risk factors. Mental illness can negatively affect daily life, such as academic performance and peer relationships during adolescence, and this deterioration exacerbates mental illness. If this vicious cycle persists, it can increase the risk of suicide. Furthermore, the risk of suicide can increase in certain situations such as socioeconomic crises or the COVID-19 pandemic. The onset and exacerbation of major depressive disorders during the pandemic were associated with an increased risk of suicide. According to previous studies, suicide rates and the risk of self-harm increased in the general population during the pandemic [12].

In addition to these risk factors, another crucial aspect is the perception of suicide and suicide prevention. The perception of suicide prevention is believed to be associated with seeking help from others when experiencing suicidal impulses, which is a factor that can help prevent suicide. According to a survey conducted in 2021 by the Ministry of Gender Equality and Family, 46% of adolescents who have been admitted to or used crisis youth support organizations have considered suicide, and 27.5% have reported experiencing suicide in the past year [13]. The most prevalent reason adolescents who attempted suicide avoided disclosing their attempts was irrelevant, accounting for 39% of the responses. In South Korea, there are various support organizations for adolescent suicide prevention, such as Youth Helpline 1388, Youth Counseling Welfare Centers, and Wee Classes. When surveyed for crisis adolescents’ awareness of these youth support institutions, approximately 80% of adolescents were aware of them. However, approximately 30%–60% of individuals had actually used them, which was lower than their awareness [14]. This is associated with the perception that informing others about suicidal thoughts is futile, which is also related to the perception of suicide prevention.

Hence, this study aimed to identify vulnerable groups by analyzing the correlation between adolescents’ emotional and behavioral characteristics and their perceptions of suicide prevention. Furthermore, perceptions of suicide prevention influence the likelihood of seeking help when suicidal impulses arise. Therefore, this study emphasized the need for education on suicide prevention and campaigns for vulnerable groups. Thus, we tested the following hypotheses: 1) adolescents experiencing emotional and behavioral challenges

recognize the low importance of suicide prevention, and 2) there are differences in the perceptions of suicide prevention based on sex and age.

## METHODS

### Participants

A survey was conducted among middle and high school students living in Ansan City and was administered online and offline by the city’s Suicide Prevention Center. An offline survey was conducted among the participants regarding suicide prevention education and promotional campaigns in public places such as schools; an online survey was conducted using Internet-based questionnaires through the promotion of social media platforms (e.g., social networking system or SNS). Both surveys were conducted using Google Forms questionnaires. The survey had no specific inclusion/exclusion criteria, and any adolescents living in Ansan City could participate. Participants who were adequately informed of the purpose and methods of the protocol and who consented to participate were included in the study. A total of 246 middle and 284 high school students participated in this study, all of whom were included in the analysis.

### Clinical measures

Sociodemographic information such as sex and school was collected from participants who completed a questionnaire on their perceptions of suicide. The questionnaire assessed the perception of the importance and possibility of suicide prevention. The importance of suicide prevention was structured into four items: agree, uncertain, indifferent, and disagree. The possibility of suicide prevention was structured on a scale of 1–5, with higher scores indicating a higher belief in the preventability of suicide.

### Strengths and difficulties

Mental health problems were assessed using the Strengths and Difficulties Questionnaire-Korean version (SDQ-KR). The SDQ-KR consists of 25 questions divided into a scale for strengths (prosocial behavior; five items) and a scale for difficulties (hyperactivity, emotional symptoms, conduct problems, and peer problems; each with five items) [15,16]. Each item is rated on a 3-point scale: not true, somewhat true, and certainly true, which are scored from 0 to 2 points. The total score for strength was 10 points, where a higher score was more desirable; and the total difficulty score was 40 points, where a lower score was preferable. The SDQ has demonstrated satisfactory reliability and validity in the UK [17], Sweden [18], Finland [19], and Germany [20]. Studies using the SDQ-KR have demonstrated its high reliability and validity [21].

### Statistical analysis

Chi-square tests and analyses were used to compare the participants' socioeconomic information, perceptions of suicide prevention, and strengths and difficulties. Pearson's correlation test was used to investigate the correlations between age, total strength scores, total difficulty scores, and scales. The Spearman's correlation test was used to compare the possibility of suicide prevention with other variables. The relationships between the importance and possibility of suicide prevention, total strength, difficulty scores, and scales were compared using an analysis of variance, followed by a Bonferroni post-hoc analysis. All statistical analyses were conducted using the Statistical Package for the Social Sciences version 27.0 (IBM Corp., Armonk, NY, USA).

### Ethics statement

The study protocol was approved by the Institutional Review Board of Korea University Medical Center, Ansan Hospital, Gyeonggi-do, Korea (No. 2020AS0138). All the participants provided informed consent for online or offline participation.

## RESULTS

### Sociodemographic characteristics

The average age for male and female were  $15.29 \pm 1.97$  and  $15.05 \pm 1.95$  years, respectively. Although the mean age of male was slightly higher than that of female, the difference was not statistically significant. There were no significant differences in the school distribution between male and female. In terms of perceptions of suicide prevention, the percentage of male who believed that suicide should be prevented was 75.7%, whereas that of female was 79.3%, indicating a higher agreement among female. However, the percentage of disagreement was also slightly higher among female (6.2%) than among male (4.3%). The percentages of male and female responding that suicide prevention was (absolutely) possible were 58.8% and 61.1%, respectively, indicating a higher agreement among female. However, among those who responded that suicide prevention was absolutely possible, the percentage was higher among male (23.9%) than among female (15.6%). The percentage of male (12.9%) who responded that suicide prevention was (absolutely) impossible was higher than that of female (9.1%).

In the SDQ-KR scores for strengths, male scored  $6.52 \pm 2.23$  points, whereas female scored  $7.12 \pm 1.91$  points. In the total difficulty scores, male ( $13.13 \pm 7.17$ ) scored higher than female ( $12.14 \pm 6.46$ ); however, the difference was not statistically significant. In terms of each item of difficulty, conduct problems were scored at  $3.02 \pm 2.03$  for male and  $2.31 \pm 1.52$  for female. Similarly, peer problems were scored at  $2.97 \pm 2.00$  for

male and  $2.27 \pm 1.71$  for female. In both cases, male showed significantly higher average scores than female. In terms of hyperactivity, although male showed higher average scores than female, the difference was not statistically significant. However, in emotional symptoms, female scored significantly higher ( $4.01 \pm 2.81$ ) than male ( $3.45 \pm 2.61$ ). Correlations were found between age, total difficulty scores, emotional symptoms, conduct problems, and peer problems; however, no statistically significant correlation was observed between age and the possibility of suicide prevention (Table 1).

### Correlation between perceptions of suicide prevention and strengths and difficulties

The analysis revealed a positive correlation between strength and the possibility of suicide prevention ( $r=0.240$ ,  $p<0.01$ ). Conversely, the total difficulty score ( $r=-0.203$ ) and individual components (hyperactivity  $r=-0.176$ , emotional problem  $r=-0.136$ , conduct problem  $r=-0.149$ , and peer problem  $r=-0.187$ ) showed a negative correlation with the possibility of suicide prevention; all these correlations were statistically significant ( $p<0.01$ ) (Table 2).

### Differences in perceptions of suicide prevention based on strengths and difficulties

The participants were divided into five groups based on perceptions on the possibility of suicide prevention: absolutely impossible, impossible, uncertain, possible, and absolutely possible. Analysis of the average scores for strengths, difficulties, and subcomponents of difficulties revealed significant differences between the groups. For strengths, the lowest average score was found in the group that answered that suicide prevention was absolutely impossible ( $6.12 \pm 2.03$ ), and the highest average score was found in the group that reported that suicide prevention was absolutely possible ( $7.58 \pm 1.96$ ), with the post-hoc analysis also showing a significant difference. However, in the case of difficulties, both the total and individual subcomponent scores showed the highest scores in the participants who answered that suicide prevention was absolutely impossible, and the lowest average scores in the participants who reported that suicide prevention was possible. In the post-hoc analysis of difficulties, significant differences were observed among the absolutely impossible, impossible, and possible groups; however, no significant differences were found in emotional problems (Table 3).

There was also a significant difference between each score in the importance of suicide prevention; when the need to prevent suicide was agreed, strengths showed a higher total score ( $7.06 \pm 2.06$ ). By contrast, difficulties, both in the total score ( $11.87 \pm 6.74$ ) and individual subcomponents (hyperactivity= $3.37 \pm 2.28$ , emotional problem= $3.60 \pm 2.77$ , conduct

**Table 1.** Demographic data and awareness of suicide

Variables	Male (n=255)	Female (n=275)	$\chi^2$ or t	p
Age (yr)	15.29±1.97	15.05±1.95	1.45	0.148
Job			0.34	0.560
Middle school student	115 (45.1)	131 (47.6)		
High school student	140 (54.9)	144 (52.4)		
Importance of suicide prevention			9.74	0.021
Agree	193 (75.7)	218 (79.3)		
Unsure	31 (12.2)	34 (12.4)		
Indifferent	20 (7.8)	6 (2.2)		
Disagree	11 (4.3)	17 (6.2)		
Possibility of suicide prevention			10.34	0.040
Absolutely impossible	9 (3.5)	8 (2.9)		
Impossible	24 (9.4)	17 (6.2)		
Unsure	72 (28.2)	82 (29.8)		
Possible	89 (34.9)	125 (45.5)		
Absolutely possible	61 (23.9)	43 (15.6)		
Strengths sum	6.52±2.23	7.12±1.91	-3.32	0.001
Difficulties sum	13.13±7.17	12.14±6.46	1.66	0.099
Emotional problems sum	3.45±2.61	4.01±2.81	-2.39	0.017
Conduct problems sum	3.02±2.03	2.31±1.52	4.54	<0.001
Hyperactivity sum	3.68±2.21	3.54±2.41	0.68	0.497
Peer problems sum	2.97±2.00	2.27±1.71	4.34	<0.001

Data are presented as mean±standard deviation or n (%).

**Table 2.** Correlation coefficients between age and strengths score, difficulties score, and the possibility of suicide prevention

	Age	Strengths	Difficulties	Hyperactivity	Emotional problems	Conduct problems	Peer problems	Suicide prevention
Age	1							
Strengths	-0.001	1						
Difficulties	0.157*	-0.153*	1					
Hyperactivity	0.062	-0.187*	0.627*	1				
Emotional problems	0.174*	0.026	0.642*	0.352*	1			
Conduct problems	0.112*	-0.163*	0.638*	0.435*	0.369*	1		
Peer problems	0.178*	-0.224*	0.588*	0.317*	0.364*	0.441*	1	
Suicide prevention	-0.039	0.240*	-0.203*	-0.176*	-0.136*	-0.149*	-0.187*	1

\*p<0.01

problem=2.49±1.74, and peer problem=2.41±1.81), showed lower average scores for those who agreed with the need to prevent suicide than those of the others (Table 4).

## DISCUSSION

This study aimed to investigate the mental health problems and perceptions of suicide prevention among middle and high school students in a local community using a community-based survey. We found a positive correlation between strength and the possibility of suicide prevention, whereas difficulty showed a negative correlation. In the analysis of the

possibility of suicide prevention and difficulties, difficulties were generally lower in the group that reported that suicide prevention was (absolutely) possible. The correlation analysis revealed a relationship between a positive position in suicide prevention and lower levels of difficulty. Regarding the importance of suicide prevention, strength had the lowest average score in the group that answered that they were indifferent about the importance of suicide prevention, and difficulties showed the highest average score in the group that reported that they were unsure about the importance of suicide prevention. As strength comprises socially oriented behaviors, lower scores may suggest an indifferent attitude to-

**Table 3.** Comparison of variables according to the possibility of suicide prevention possibility of suicide prevention

Variables	Absolutely impossible (n=17) <sup>a</sup>	Impossible (n=41) <sup>b</sup>	Unsure (n=154) <sup>c</sup>	Possible (n=214) <sup>d</sup>	Absolutely possible (n=104) <sup>e</sup>	F	p	Bonferroni
Strengths sum	6.12±2.03	6.15±2.16	6.32±1.98	7.03±2.09	7.58±1.96	8.12	<0.001	a, b, c<d<e
Difficulties sum	17.59±6.62	15.63±5.93	13.60±6.47	11.22±6.30	12.02±7.79	7.90	<0.001	a, b>d, e, c>d
Hyperactivity	5.12±2.29	4.63±2.20	3.84±2.20	3.27±2.32	3.31±2.33	5.97	<0.001	a, b>d, e
Emotional problems	5.24±2.54	4.37±2.71	3.99±2.63	3.44±2.62	3.51±3.03	2.99	0.019	-
Conduct problems	3.47±2.04	3.37±1.73	2.83±1.76	2.28±1.60	2.76±2.15	5.39	<0.001	b, c>d
Peer problems	3.76±2.46	3.27±1.87	2.95±1.85	2.23±1.69	2.44±1.97	6.84	<0.001	a, b, c>d

Data are presented as mean±standard deviation.

**Table 4.** Comparison of variables according to the importance of suicide prevention importance of suicide prevention

Variables	Agree (n=411) <sup>a</sup>	Unsure (n=65) <sup>b</sup>	Indifferent (n=26) <sup>c</sup>	Disagree (n=28) <sup>d</sup>	F	p	Bonferroni
Strengths sum	7.06±2.06	6.14±1.98	5.81±2.04	6.04±2.20	7.77	<0.001	a>b, c
Difficulties sum	11.87±6.74	16.68±6.46	14.15±6.32	12.68±5.93	10.26	<0.001	a, d<b
Hyperactivity	3.37±2.28	4.92±2.17	4.08±2.15	3.64±2.42	9.22	<0.001	a<b
Emotional problems	3.60±2.77	4.82±2.65	3.31±2.28	3.71±2.28	3.99	0.008	a<b
Conduct problems	2.49±1.74	3.43±1.94	3.42±2.27	2.50±1.53	6.88	<0.001	a<b
Peer problems	2.41±1.81	3.51±1.92	3.35±1.72	2.82±2.09	8.38	<0.001	a<b

Data are presented as mean±standard deviation.

ward suicide prevention. Additionally, according to previous study, prosocial behavior may protect against negative emotions [22] such as depression and anxiety [23,24], and high levels of prosocial behavior were associated with lower levels of anxiety and depression [25]. Therefore, low strength may be associated with depression. The low strength of participants who reported that they were indifferent toward the importance of suicide prevention can be considered an expression of thoughts that one may not want to pay attention to suicide prevention.

Previous studies have reported that the perception of suicide influences suicidal behavior [26,27]. Factors associated with the perception of suicide include depression, family or peer suicide, societal attitudes, and various media exposure [28]. In particular, exposure to celebrity suicides or suicide-related works through the media can lead to an increase in suicide rates, which is known as the “Werther effect” or “copycat phenomenon” [29]. In Korea, after the suicides of three famous singers and actors, an increase in suicide rates was observed among individuals aged 10–29 years [30]. Furthermore, after exposure to non-suicidal self-injury (NSSI) in the media, there was an increase in emergency department visits for NSSI among individuals aged 10–29 years [31], suggesting that the media may affect behaviors such as suicide, NSSI, and the perception of suicide. Depending on the perception of suicide, there may be a difference in suicide risk; when societal awareness of suicide is low, the suicide rate may be high.

According to the results of a suicide prevalence survey conducted in Korea, 39.8% of the participants disagreed with the statement, “Suicide cannot be prevented,” making it the most common response, whereas 27.4% agreed [32]. A high percentage of respondents agreed with the possibility of suicide prevention, followed by those who were unsure. Similarly, in response to the question on not interfering with someone else’s suicide, a high percentage of respondents disagreed, followed by those who were unsure.

A study conducted among adults living in Ansan City, using the same questionnaire, showed a positive correlation between age and the possibility of suicide prevention [33]. Analysis of the possibility of suicide prevention by age, based on surveys conducted on adolescents and adults, revealed significant differences. In the teenage group, the average score was 3.64, decreasing to 3.45 in their 20s, and displaying a subsequent rise thereafter, thus showing a pattern in which the lowest average was observed for those in their 20s. In addition, when classified into middle school students, high school students, and adults, there was no significant difference; middle school students showed the highest average score of 3.72; a decreasing average trend was noticeable as the age group progressed toward adulthood (Table 5). According to a social survey conducted in South Korea in 2022 on the reasons for suicidal impulses among individuals aged ≥13 years, excluding physical and mental illnesses, depression and disabilities, academic performance, and educational prospects were iden-

**Table 5.** Demographic data and awareness between middle school student group and high school student group

Variables	Middle school student (n=246)	High school student (n=284)	$\chi^2$ or t	p
Sex			0.34	0.558
Male	115 (46.7)	140 (49.3)		
Female	131 (53.3)	144 (50.7)		
Importance of suicide prevention			5.57	0.140
Agree	201 (81.7)	210 (73.9)		
Unsure	22 (8.9)	43 (15.1)		
Indifferent	11 (4.5)	15 (5.3)		
Disagree	12 (4.9)	16 (5.6)		
Possibility of suicide prevention			4.47	0.348
Absolutely impossible	9 (3.7)	8 (2.8)		
Impossible	17 (6.9)	24 (8.5)		
Unsure	63 (25.6)	91 (32.0)		
Possible	102 (41.5)	112 (39.4)		
Absolutely possible	55 (22.4)	49 (17.3)		
Strengths sum	6.87±1.97	6.80±2.20	0.37	0.711
Difficulties sum	11.18±6.24	13.86±7.07	-4.62	<0.001
Emotional problems sum	3.11±2.60	4.29±2.73	-5.11	<0.001
Conduct problems sum	2.43±1.69	2.85±1.90	-2.63	0.009
Hyperactivity sum	3.41±2.36	3.78±2.27	-1.82	0.069
Peer problems sum	2.23±1.62	2.94±2.01	-4.51	<0.001

Data are presented as mean±standard deviation or n (%).

tified as the primary reasons among those aged 13–19 years (30.8%) [34]. For the 20–29 age group, job-related issues constituted 22.9%, whereas economic difficulties were reported in 14.4% of the responses [34]. This may be attributed to competitive sociocultural environments and high levels of academic stress. According to previous studies, academic stress has a positive relationship with depression and is highly correlated with suicidal thoughts and attempts. Additionally, as most of the school curriculum focuses on college entrance exams, and education or support related to mental health is insufficient, depression is associated with the perception of suicide. Moreover, psychological and financial independence, economic recession, and employment uncertainty have an effect.

Social media and SNS is also associated with this phenomenon; suicide can potentially be promoted through the media. Individuals who frequently engage with the media may be influenced by their perceptions of suicide. Furthermore, recent self-harm challenges through SNS have had an impact. According to a survey on SNS usage behavior conducted in 2021, 89.7% of individuals in their 20s were the most frequent users of social media (89.7%). Therefore, there is a possibility of concomitant changes in awareness regarding suicide because of media influence [35]. However, it is also suggested that these social media platforms are good spaces for seek-

ing help and receiving support from others [28]. To create a safer environment, institutional and technological development should promote a safer space.

Therefore, more campaigns and educational systems are needed to promote suicide prevention among adolescents and young adults who exhibit low strength and high difficulty based on their SDQ scores. According to another study, those who participated in campaigns were more knowledgeable about suicide prevention and were open to seeking professional help. This tendency was particularly observed in patients aged <25 years [36]. Additionally, in the long term, these campaigns can help reduce social stigma associated with suicide attempts and mental health conditions, thus contributing to a decrease in suicide rates.

### Limitation

This study has several limitations. First, standardized tools were not used to investigate perceptions of suicide prevention. Second, this study was conducted on the population of Ansan City, restricting its generalizability. Third, individuals interested in suicide prevention may have participated in the survey because it included those who participated in suicide prevention campaigns and education conducted by the Ansan City Suicide Prevention Center or voluntarily participated through SNS advertisements. In addition, this study

did not conduct a survey by dividing the participants into online and offline groups using the same Google Form. This may have led to reporting and participant biases. Finally, variables that may affect suicide perception, such as family or acquaintance history of suicide and mental health history, were not investigated in this survey. Future studies should explore adolescents' perceptions of suicide prevention in a larger and more diverse sample of youths using standardized tools. Additionally, factors that may affect suicidal perception should be investigated.

## CONCLUSION

While several studies have been conducted on the perception of suicide prevention among adults, research on adolescents is insufficient. Therefore, this study examined the perception of suicide prevention within the local community as well as the understanding of suicide prevention among adolescents experiencing emotional and behavioral difficulties. The persistently high suicide rate is recognized as an important issue not only for individuals but also for the society. Therefore, to improve the awareness of suicide and mental health issues, there is a need for active societal engagement in suicide prevention campaigns and educational programs. Recently, efforts have been made in South Korea to expand suicide prevention hotlines, enhance counseling services through social media platforms familiar to adolescents, mandate education on respect for life, and establish a fundamental plan for suicide prevention. This plan aims to identify individuals at high risk of suicide in advance and cultivate "lifeguards" who connect them to specialized institutions such as suicide prevention centers. Continued attention and support for these initiatives are necessary.

### Availability of Data and Material

The datasets generated or analyzed during the study are available from the corresponding author on reasonable request.

### Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

### Author Contributions

Conceptualization: Jongha Lee, Rayoung Han, Ho-Kyoung Yoon. Data curation: Jongha Lee, Boram Chae, Rayoung Han, Nayoung Chae. Formal analysis: Jongha Lee, Jiyoung Kim, Boram Chae. Funding acquisition: Jongha Lee. Methodology: Jongha Lee, Young-Hoon Ko, Jiyoung Kim. Supervision: Jongha Lee, Young-Hoon Ko, Ho-Kyoung Yoon. Writing—original draft: Jongha Lee, Jiyoung Kim. Writing—review & editing: Jongha Lee, Young-Hoon Ko.

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