

Failure of at-risk adolescents to quit smoking according to their organization: Focusing in adolescents on probation

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Objectives: This study tried to find out the failure of adolescents in crisis to quit smoking according to the type of institution. **Method:** Data were collected for the period from January 2018 to December 2020. Among 1,437 teenagers in crisis in Seoul, the adolescents were selected from each of the following five groups 223 students from regular schools, 470 from school institutions pursuant to the lifelong education, 217 from alternative/vocational schools, 211 from single mother support organizations/child-care institutions/youth support institutions, and 316 from probation agencies. The data of adolescents from institutions under the Ministry of Law were analyzed adolescents in process of the probation order after excluding those who did not smoke. After providing written consent on the provision of information, the following details of participants were captured: age, gender, alcohol consumption, workout routines, carbon monoxide concentration in exhaled breath, average daily amount of smoking, total number of years smoking, and duration of trying to quit smoking. Failure rates of smoking cessation were compared by the period criteria of 4, 6, 12, and 24 weeks. **Results:** As a result of this study, there were significant differences in carbon monoxide concentration, average smoking, and total smoking period, and 4 weeks (OR=4.86, 95% CI=3.02-7.82), 6 weeks (OR=4.74, 95% CI=2.87-7.84) and 12 weeks (OR=6.28, 95% CI=3.12-12.65) failed. **Conclusion:** The effect of smoking intervention may vary depending on the type of institution. Therefore, adolescents subject to probation with a relatively high failure rate to quit smoking need to introduce school environment-based smoking cessation education and visiting smoking cessation support services.

Key words: probation, adolescents, smoking cessation, counseling

I. Introduction

Adolescence is the most important transition period in the lives of individuals, as during this period, social conditions have a biological, behavioral, and psychological impact on them (Sawyer et al., 2012). In addition, most people develop unhealthy habits during adolescence, which could affect their lifelong health (Jackson, Henderson, Frank, & Haw, 2012). The OECD defines at-risk adolescents as those who have run

away from home, dropped out of school, are suffering from bullying, have committed delinquencies or crimes, or are at risk of depression and suicide. Most of these at-risk adolescents are exposed to the risk of various crimes, as they were raised in challenging environments and experience accidental impulses (Song & Yang, 2021). Previous studies on adolescents who are subject to probation have reported that the smoking rate was as high as 75% for adolescents who did not show up for class, those who dropped out of

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• Received: June 9, 2023

• Revised: September 14, 2023

• Accepted: September 24, 2023

school, and others who were at-risk, whereas according to data from the Centers for Disease Control and Prevention (CDC) of the United States, at-risk adolescents have been reported to smoke more than students at regular high schools (McFarland et al., 2019; Peters et al., 2005). The issue of at-risk adolescents' smoking is largely influenced not only by their peer groups and their experiences of delinquency (Gonzalez et al., 2016; Lee, Lee, & Kim, 2019), but also works as a "gateway" through which they are exposed to a more serious problem: drug abuse (Peters et al., 2005). Moreover, those who start smoking at a younger age are more likely to become lifelong smokers, as it has an impact on their level of nicotine dependence. Smoking at an early age also drastically shortens life expectancy (DiFranza et al., 2000) and affects the growth and health of both male and female adolescents (Song & Yang, 2021). It has also been reported that compared to adults, adolescents show a lower rate of making attempts to quit smoking and succeeding (Abrantes et al., 2009; Zhu, Sun, Billings, Choi, & Malrcher, 1999).

Pursuant to the Act on Probation (hereinafter referred to as the "Probation Act"), probation is an advanced system for the prevention of recidivism, not by detaining adolescents who have committed delinquencies or crimes in detention facilities like prisons and juvenile detention centers, but by forcing them to observe requirements through the monitoring and instructions of probation officers, performing mandatory community service, and taking educational training sessions. Adolescents subject to probation should observe the general and special matters ordered by the court. Among them, special matters might be imposed by the court or Probation Review Commission, depending on the characteristics of the individual minor, who is subject to probation. Using these special matters could help provide smoking interventions and behavioral corrections for

adolescents subject to probation, particularly through counseling services for smoking cessation, among other national smoking cessation support programs.

Since the revision of the National Health Promotion Act in 1995, the Korean government has been leading diverse initiatives and policies to help people quit smoking (Kim, Yoo, & Kang, 2019). In line with such efforts, school-based smoking prevention and cessation programs have been carried out to lower the smoking rate among adolescents. According to the 2020 online survey on adolescents' health behaviors, this program contributed to a large extent in lowering the smoking rate of adolescents from 6.7% in 2019 to 4.4% in 2020, while daily smoking also decreased from 3.2% to 2.3% during the same period (Korea Centers for Disease Control and Prevention, 2020).

Previous studies that studied youth smoking according to school and community characteristics report that adolescents who attended schools focused on strong policies related to tobacco use were less likely to smoke than those who did not (Lovato et al., 2010). In addition, adolescents who transferred to alternative schools due to academic or behavioral problems had a relatively high risk of smoking (Sussman, Dent, Severson, Dee, & Flay, 1998). A prior study on the use of tobacco by teenagers entering youth protection facilities in Quebec reported that tobacco use among teenagers using the facility is routine and policies to encourage a smoking cessation environment are needed (Haley et al., 2016), and a prior study on single mothers in Korea introduced individual smoking cessation counseling as the most effective smoking cessation factor (Lee & Lee, 2021). Therefore, we conducted smoking cessation counseling for single mother facilities, child care facilities, and youth institutions corresponding to child and youth protection facilities.

Currently, most youth smoking-related studies are only data on teenagers in school, and there are few

studies based on the type of institution in crisis compared to this. Therefore, through various prior studies, data were collected and analyzed by dividing institutions by type, and the failure of adolescents to quit smoking was investigated according to the type of institution.

II. Methods

1. Study participants and data collection

For this study, data were extracted from the entries of the Integrated Non-Smoking Service Information System (nosmk.khealth.or.kr) of the Ministry of Health and Welfare, collected for the period from January 2018 to December 2020.

The data used in the study are teenagers aged 9 to 24 who currently belong to youth institutions as of the time of service registration.

The total number of participants was 1,437, and they were classified into five according to the type of institution and analyzed. 223 regular schools, 470 lifelong education institutions, 217 alternative schools/vocational schools, 211 unmarried mothers/nursing institutions/teenage support institutions, Among the juvenile protection trials, 316 subjects in the process of probation disposition No. 4 (short-term 1 year) and No. 5 (long-term 2 years) were extracted and selected as the final analysis subjects. Those who agreed to the six-month program participated, but those who quit smoking, refused to quit smoking, lost contact, moved to other regions, died, pending trial, and others were excluded. In the case of those who were eliminated, the opinion of retrying was asked and re-registered or closed according to the progress. This study investigated the survey items (name, date of birth, gender, address, medical security, final education, marriage, smoking cessation supporters, disease and drinking experience

and exercise) and the evaluation items of smokers (name, date of birth, gender, address, medical security, final education, marital status, smoking cessation supporters, history of illness and drinking experience and exercise status). This study was conducted as a retrospective cohort study for 6 months.

This study was approved by the Institutional Review Board of The Catholic University of Korea. (MC20ZESI0142).

2. Study variable

1) Demographic characteristics of study subjects

To identify the participants' demographic characteristics, their gender, age, alcohol drinking status, and workout status factors were analyzed. Based on their age, they were categorized into four groups: under 13 years, that is, below middle school; 14 to 16 years, that is, middle school; 17 to 19 years, that is, high school, and 19 years or older adults. Drinking status was measured by the number of "glasses" consumed weekly. Workout status was measured by the number of "minutes" spent on regular physical activities each week.

2) Smoking-related characteristics of study subjects

Carbon monoxide concentration in the exhaled breath (ppm), average daily smoking amount, total number of years smoking, total number of years attempting to quit smoking, and failure/success status of smoking cessation (4, 6, 12, and 24 weeks) were identified as the participants' smoking-related characteristics. Carbon monoxide is a harmful chemical ingredient in cigarettes that disturbs the transfer and supply of oxygen through the blood, and causes a lack of oxygen in the body's tissue cells, while inhibiting the tissues from using oxygen. Therefore, to measure the carbon monoxide left in the participants' mouths, its amount (ppm) was measured

using SENKO's BMC-2000 tester, that measures the amount of carbon monoxide in one's exhaled breath during the participant's first visit. To determine whether the participants would quit smoking, their carbon monoxide concentration was measured; and when its concentration was 6 ppm or higher at the 4, 6, and 12-week periods, they were declared to have failed to quit smoking. At the period of 24 weeks, it was declared as a failure when the urine cotinine concentration measurements indicated a positive test result.

3. Counseling procedure for promoting quit-smoking

Individual counseling was provided through juvenile probation officers of the Seoul Compliance Support Center under the Ministry of Justice of Korea to identify the adolescents who were willing to quit smoking. Adolescents were also identified when they visited the Salesio Youth Center, which is a youth protection and treatment center and designated probation monitoring institution. Pursuant to the Personal Information Protection Act, the participants were informed about their consent relating to the provision of personal information to a third party and the processing of personal information. After the participants registered for Non-Smoking Service, each of them was given ten individual sessions of a non-smoking counseling program for six months from the date on which they had decided to stop smoking.

The "We quit smoking" program was included in this program, that was planned and operated by the Seoul Tobacco Control Center and customized for at-risk youth.

The program dealt with empathy building, setting future goals, identifying smoking behavior and nicotine dependence, writing a smoking diary, refusing smoking temptation, coping with withdrawal symptoms, managing stress, and preventing relapse in

each counseling session.

For the individual counseling visits, non-smoking buses provided by the Ministry of Health and Welfare were utilized. Carbon monoxide concentration in the exhaled breath (ppm) was measured during the individual counseling sessions, and various items were provided to help the participants quit smoking. Souvenirs were also offered for those who succeeded in quitting smoking for six months. Among the participants who participated in three or more individual counseling sessions for six months, those whose carbon monoxide concentration in exhaled breath (ppm) when tested were 6 ppm or lower and cotinine test results were also negative, were given a souvenir for their six-month success in quitting smoking.

4. Data analysis

This study used the SPSS 28.0 program for data analysis. T-test and chi-square test were conducted to compare the difference between participants' smoking cessation failure and success rates, depending on their type of institution (regular school, school institution pursuant to the lifelong education Act, alternative/vocational school, single mother support agency/child-care support institution, youth support institution, or probation agency), as well as general and smoking-related characteristics. The independent variable was type of institution and dependent variable were general and smoking related characteristics and failure rate. For comparison and analysis of the failure rate, binary logistic regression was performed after correcting for the factors of gender, smoking status, and workout status.

III. Results

1. Participants' general characteristics

Among the 1,437 participants, 63.1% were males. As for the smoking age, 1,100 high school students made up the largest portion (76.5%). The adolescents who drank (56.1%) were more than those who did not. Those who worked out (61.0%), comprised a larger portion compared to those who did not (Table 1).

2. Smoking-related characteristics by institutions

As for the smoking-related characteristics by institutions, significant differences were observed for carbon monoxide concentration, average smoking amount, and total number of years smoking. Among the participants, adolescents on probation showed the highest carbon monoxide concentration at 9.07 ppm, and reported the largest average smoking amount at

13.95 cigarettes (Table 2).

3. Comparison of failure rate by institutions

In the comparison of failure rates by institutions, adolescents on probation showed the highest failure rate for the period of 4 (90.5%), 6 (91.8%), 12 (96.5%), and 24 (100.0%) weeks (Table 3).

4. Comparison and analysis of failure rates by the category of institutions (for the period of 4, 6, and 12 weeks)

When compared and analyzed against the adolescents studying at alternative or vocational schools, it was reported that the failure rate of adolescents on probation was higher for 4 (OR=4.86, 95% CI=3.02-7.82), 6 (OR=4.74, 95% CI=2.87-7.84), and 12 weeks (OR=6.28, 95% CI=3.12-12.65) (Table 4).

(Table 1) General characteristics according to various institutions

Variable	a (N=223)	b (N=470)	c (N=217)	d (N=211)	e (N=316)	All (N=1,437)	p-value
Unit: N(%)							
Gender							
Female	85(38.1)	172(36.6)	85(39.2)	95(45.0)	93(29.4)	530(36.9)	.007
Male	138(61.9)	298(63.4)	132(60.8)	116(55.0)	223(70.6)	907(63.1)	
Age							
≤ 13	3(1.3)	0(0.0)	1(0.5)	1(0.5)	1(0.3)	6(0.4)	<.001
14-16	45(20.2)	36(7.7)	12(5.5)	46(21.8)	98(31.0)	237(16.5)	
17-19	162(72.6)	426(90.6)	185(85.3)	150(71.1)	177(56.0)	1,100(76.5)	
≤ 20	13(5.8)	8(1.7)	19(8.8)	14(6.6)	40(12.7)	94(6.5)	
Drinking status							
Yes	88(39.5)	265(56.4)	139(64.1)	114(54.0)	200(63.3)	806(56.1)	<.001
No	135(60.5)	205(43.6)	78(35.9)	97(46.0)	116(36.7)	631(43.9)	
Exercise status							
Yes	89(39.9)	184(39.1)	72(33.2)	102(48.3)	113(35.8)	560(39.0)	.015
No	134(60.1)	286(60.9)	145(66.8)	109(51.7)	203(64.2)	877(61.0)	

Notes. ^a General school; ^b School institutions pursuant to the lifelong education; ^c Alternative school, vocational training school; ^d Single-mother institutions, childcare institutions, youth institutions; ^e Probation institutions

〈Table 2〉 Smoking-related characteristics according to various institutions

Unit: %

Variable	a (N=223)	b (N=470)	c (N=217)	d (N=211)	e (N=316)	All (N=1,437)	p-value
CO (ppm)							
Mean	5.38	5.57	7.37	4.77	9.07	6.49	<.001
SD	5.15	4.36	4.82	4.81	6.29	5.38	
Average amount of smoking (cigarettes/day)							
Mean	8.35	10.52	12.36	9.62	13.95	11.08	<.001
SD	7.27	7.68	8.04	8.20	8.07	8.06	
Total smoking period (years)							
Mean	2.66	3.29	3.84	3.15	3.49	3.30	<.001
SD	1.90	1.94	2.56	2.04	2.09	2.11	
Period for non-smoking attempts (days)							
Mean	35.87	47.79	38.32	48.08	35.88	41.93	0.374
SD	78.69	124.19	85.52	93.03	108.94	104.86	

Notes. ^a General school; ^b School institutions pursuant to the lifelong education; ^c Alternative school, vocational training school; ^d Single-mother institutions, childcare institutions, youth institutions; ^e Probation institutions

〈Table 3〉 Smoking cessation failure rate according to various institutions

Unit: N(%)

Variable	a (N=223)	b (N=470)	c (N=217)	d (N=211)	e (N=316)	All (N=1,437)
4 weeks						
Fail	181(81.2)	356(75.7)	146(67.3)	159(75.4)	286(90.5)	1,128(78.5)
Success	42(18.8)	114(24.3)	71(32.7)	52(24.6)	30(9.5)	309(21.5)
6 weeks						
Fail	189(84.8)	372(79.1)	155(71.4)	174(82.5)	290(91.8)	1,180(82.1)
Success	34(15.2)	98(20.9)	62(28.6)	37(17.5)	26(8.2)	257(17.9)
12 weeks						
Fail	205(91.9)	415(88.3)	179(82.5)	190(90.0)	305(96.5)	1,294(90.0)
Success	18(8.1)	55(11.7)	38(17.5)	21(10.0)	11(3.5)	143(10.0)
24 weeks						
Fail	214(96.0)	436(92.8)	206(94.9)	196(92.9)	316(100.0)	1,368(95.2)
Success	9(4.0)	34(7.2)	11(5.1)	15(7.1)	0(0.0)	69(4.8)

Notes. ^a General school; ^b School institutions pursuant to the lifelong education; ^c Alternative school, vocational training school; ^d Single-mother institutions, childcare institutions, youth institutions; ^e Probation institutions

〈Table 4〉 Failure rate of smoking cessation by various institutions

Variable	Alternative school, vocational training school	General school	School institutions pursuant to lifelong education	Single-mother institutions, childcare institutions, youth institutions	Probation institutions
4weeks					
OR	1	2.54	1.74	1.77	5.67
95% CI		1.6-4.01	1.21-2.49	1.14-2.74	3.49-9.24
6weeks					
OR	1	2.75	1.74	2.28	5.35
95% CI		1.69-4.49	1.19-2.54	1.42-3.68	3.20-8.94
12weeks					
OR	1	2.60	1.71	2.08	6.40
95% CI		1.41-4.80	1.08-2.70	1.16-3.72	3.16-12.97

Notes. ^a Adjusted for age, gender, exercise status and drinking status

IV. Discussion

In this study, the difference in the failure rate of smoking cessation among adolescents in crisis according to the type of institution was found.

Its results showed that compared to adolescents who were not on probation, those on probation reported the highest figures for carbon monoxide concentration in their exhaled breath, daily average smoking amounts, and smoking cessation failure rate. Juveniles subject to probation refer to subjects in the process of probation disposition No. 4 (short-term one-year) and No. 5 (long-term two-year) during juvenile protection trials, which are made based on the size of each case and the presence or absence of reflection of the perpetrator. Therefore, these results are expected to require close communication and support from probation officers that directly affect the smooth return of adolescents to society along with institutional

intervention of smoking cessation programs using special compliance with juvenile probation.

As the "Smoking Prevention at School Program" is operated across the nation only at middle and high schools, it becomes difficult for at-risk adolescents, including those who do not go to school or who have run away from home to participate and benefit from the program. Among them, adolescents on probation are much more likely to smoke. As reported by previous studies (Hershberger, Zapolski, & Aalsma, 2016) a positive relationship could work as a buffer in the relationship between crimes and smoking among teenage criminals because when depending on social support, a high level of correlation exists among social support, illegal acts by adolescents, and smoking (Wojciechowski, 2019). Probation monitoring centers are offering diverse programs for adolescents, including social value-based juvenile delinquency treatment and prevention programs (May, Osmond, & Billick, 2014), and team-based approach programs for

the improvement of parent-child relationships (Brank, Lane, Turner, Fain, & Sehgal, 2008). However, as the number of adolescents assigned to one probation officer is very large, probation officers are highly likely to be exhausted owing to excessive workloads and responsibilities (White, Aalsma, Holloway, Adams, & Salyers, 2015). For this reason, it is difficult to provide customized guidance to individual adolescents or adopt in-depth approaches for them. Additionally, systematic non-smoking counseling services for adolescents on probation have never existed. Therefore, in this situation, it is almost impossible for adolescents who are subject to probation to use non-smoking training and counseling services provided by the government, unlike those who are not subject to probation.

Taking cognizance of the situation, this study adopted a non-smoking counseling service in which experienced counselors visited probation-related institutions and consistently provided 10 or more customized individual counseling sessions and programs on non-smoking, under the guidance of the juvenile probation officer. A comparison of failure rates between adolescents on probation and those from alternative/vocational schools showed that those from alternative/vocational schools had lower failure rates than adolescents on probation. This result is in line with the context of a previous study on Canadian youth that found that improving the school environment can reduce youth smoking rates (Azagba, & Asbridge, 2013), and a study on youth smoking reduction through school environments targeting alternative high schools across Denmark. As with the results of previous studies, it indicates that it is much more effective to prevent and reduce tobacco use in alternative vocational schools through an intensive anti-smoking policy based on the school environment (Jakobsen et al., 2021). Therefore, it is expected that skilled smoking cessation counselors or experts will be

effective in conducting smoking cessation education in advance to create a smoking cessation environment atmosphere and encourage voluntary participation in smoking cessation counseling at school environment-based institutions.

According to previous studies on out of school adolescents' smoking, these adolescents' smoking-related morbidity and mortality rates were higher than those of adolescents who were affiliated to schools, as factors that could protect adolescents on probation based on the school environment were non-existent (Desai, Ruitter, Schepers, Reddy, & Mercken, 2019). In this regard, smaller class sizes, lower teacher-to-student ratios, adolescent-tailored curricula, flexible and safe environments, and other factors of alternative/vocational schools that adolescents are affiliated to, all play an important role in building an environment to help adolescents stop smoking (Edgar-Smith & Palmer, 2015). Nevertheless, according to a previous study that compared adolescents at school and those out of school, only 23.4% of the out of school adolescents were given non-smoking education compared to the at-school adolescents (61.9%) (McFarland et al., 2019). As adolescents on probation are also not affiliated with any institution, they are probably exposed to many types of misconduct and delinquencies because they are not appropriately monitored or educated.

The crime analysis data of the Korea Youth Counseling and Welfare Institute and Korean Prosecution Service reported that 90% of juvenile "repeat offenders" who recommitted a crime after probation was imposed on them, committed the second crime within one year (Korea Youth Councelling & Welfare Institute, 2019). In addition, according to previous studies that explored the factors of delinquent behavior among Pakistani and Thai adolescents, it was found that smoking factors were included in the highest order of delinquent behavior

difference in both countries (Panezai, Panezai, Wassan, & Saqib, 2019). Therefore, smoking cessation is the most basic gateway to leading a healthy life for not only adolescents subject to probation but also adolescents in crisis, and is a major issue that should be of continued interest. To address this, during the last decade, the Korean government has been implementing numerous initiatives and non-smoking policies, as well as creating diverse endeavors to change public awareness of smoking, including providing aggressive smoking prevention education at schools (Lee & Kim, 2017), creating and managing an environment where adolescents are prohibited from purchasing cigarettes by raising cigarette prices (Min, Seo, & Park, 2018) and expanding non-smoking zones. In addition to such efforts, building a customized support system for adolescents on probation is also required, as they are in the blind spot of the benefits from such programs and policies of the government. This can be done by hiring experienced experts, who can consider the unique characteristics of adolescents on probation. As in the context of previous studies on school participation of adolescents under probation, lack of school participation is related to negative results such as school dropout and delinquency behavior, and school participation and delinquency are highly correlated. Therefore, as in the study (Crumé, Nurius, Kim, & Logan-Greene, 2021), it is urgent to introduce customized smoking cessation support services and individual smoking cessation counseling so that teenagers can function as healthy members of society.

Unlike previous studies conducted only on youth smokers attending school (Vallata, O'Loughlin, Cengelli, & Alla, 2021), this study is meaningful in that it provides data analysis on smoking-related characteristics and factors affecting smoking failure for adolescents in crisis according to institutional type. As a limitation of this study, the results of this study

cannot be applied to the entire youth in crisis in Korea as it may lack representation because the study subjects were recruited and conducted as a convenience sample. Therefore, it is necessary to expand the scope and look beyond regional limitations.

V. Conclusion

This study sought to identify the current status of smoking cessation failures of crisis adolescents according to the type of institution and to show that the effect of smoking intervention through surrounding supporters and school environment may vary depending on the type of institution in crisis youth. As a result, adolescents belonging to the Ministry of Justice had the highest carbon monoxide level and average smoking amount compared to other adolescents, which explains the school-based environment and the need to introduce visiting smoking cessation support services.

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