


# Multidisciplinary Approach to Smoking Cessation in Late Adolescence: A Pilot Study

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More than 80% of adult smokers begin using tobacco before reaching the age of 18 years, making youth smoking a serious public health epidemic.<sup>1</sup> Since early development of nicotine dependence and exposure to its harmful health effects can be detrimental later in life, cessation interventions targeting youth are necessary.<sup>2</sup> These cessation interventions are particularly necessary for youth aged 15 to 19 years because this age range is considered a significant period for the development of regular smoking. However, adolescents tend to underestimate the addictive nature of nicotine.<sup>3</sup> They rarely attempt to quit smoking, and often use unassisted cessation methods when they do.<sup>4</sup>

Providing comprehensive smoking cessation interventions for youth is not easy. Established tobacco control programs for adults cannot be applied to adolescents, as studies have indicated that these adult cessation interventions are not suitable for youth. This emphasizes the need for youth-oriented programs.<sup>5,6</sup> Moreover, the smoking habits and motivation of youth are influenced by a myriad of factors. Notable related factors for youth smoking are gender, age, stress, lower economic status, and tobacco use among peers, among others.<sup>7</sup> Therefore, youth interventions require multidisciplinary approaches. Finally, smoking relapse often occurs among youth quitters. One recent study on former youth smokers found that relapse occurred in about 55% of the participants within about 1 year after quitting, suggesting the need for long-term follow-up to help youth maintain their cessation period.<sup>6</sup>

In South Korea, aggressive tobacco control is needed because the smoking prevalence among males is among the highest in the world.<sup>8</sup> Although the youth smoking rate has been decreasing since 1997, age-targeted smoking cessation programs are not widely available.<sup>4</sup> Furthermore, school-based regulation of youth smoking is not truly effective, and current youth smokers have relatively easy access to cigarettes illegally.<sup>9,10</sup> Moreover, youth are frequently exposed to secondhand smoke in

the home and public places, and to tobacco advertisements and promotions.<sup>11,12</sup>

Therefore, in 2015, a general hospital in South Korea and a district office of education overseeing 103 schools initiated a project called Nasarang, which involved developing a nonpharmacological, multidisciplinary smoking cessation program for youth. This smoking cessation intervention is designed to encourage motivation to quit smoking, enhance self-esteem, and help youth learn how to consider others and, eventually, self-importance. The program is led by professionals in the medical field with help from diverse members of the community, such as school personnel, parents, administrative staff from the district office of education, and even college students. The 8-week program comprises smoking cessation clinic visits, intense group counseling meetings, and a no-smoking activity day camp. After 8 weeks of this cessation intervention, the participants undergo at least 6 months of follow-up to ensure adherence to cessation. A satisfaction survey is also conducted to help with further development of the program.

## Methods

### Participants

Among the 70 different middle schools and high schools in a specific district of Seoul, 7 schools—including 3

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middle schools and 4 high schools—were selected. From these schools, we chose a total of 31 participants (26 males and 9 females). Twenty-two of the participants were high school students and 9 were middle school students.

Unlike other countries, there is no law against adolescent smoking in Korea. The only exercising regulation, if any, is the policies set by each school to give negative reinforcement to the smoking students. For example, some schools keep count of how many times each student is caught smoking a cigarette. Once the number exceeds that is set by the school policy, the responsible student is subject to be expelled or forced to transfer. The students in (this) program participated as their school administration would subtract their smoking activity count on the condition of their completion of the program.

The data in this study were collected out through a program implemented 12 weeks from August 2015.

### Procedure

**Clinical Approach.** For the clinic visits, participants undergo acute treatment for smoking cessation over the 8-week intervention period, consisting of a total of 4 therapeutic sessions. Each session is led by a family medicine specialist, who assesses participants' overall health statuses and examines their degree of tobacco addiction through urine cotinine analysis and an expired carbon monoxide examination. Each student's height and body weight were also measured. Equipment capable of analyzing urine nicotine concentration is available in only a few designated places in South Korea, such as the National Cancer Center. Thus, the analysis was conducted at Boramae Hospital. Cotinine, a metabolite of nicotine, can be used to verify subject's success in quitting smoking. This test offers only a positive or a negative result, rather than calculating the exact cotinine concentration. Despite this limitation, this examination was selected as an index for success because a smoke-free period of at least a week is required for a negative result. Participants were then checked again after 1, 4, and 8 weeks. After the 8 weeks of the program, each student was assigned a college student mentor and his or her smoking cessation status was followed for 6 months.

### Psychosocial Approach

**Group counseling meeting.** The purpose of the group counseling meetings was to understand the motivation behind youth smoking and help participants to learn about healthy coping skills other than smoking to relieve stress. By communicating with youth smokers in the same age group, participants can share their fundamental causes and opinions about smoking more openly. Each counseling meeting consisted of 6 to 8 people

and was led by a psychologist and an assistant from the community. Each meeting lasted for about 60 minutes, and was held once a week, every other week during the intervention period, for a total of 5 times. Moreover, the students also had to participate in smoking cessation education during each meeting. Participants were specifically taught the Experience New Days (END) program. The END program was the first Korean smoking cessation education program created by the Ministry of Health and Welfare and Korea Health Promotion Institute. The program offers a teaching aid composed of 10 chapters, which is taught to students over 10 sessions. Each chapter has a different topic that sequentially aids students in ceasing smoking. However, since the counseling program meets only 5 times over the 8 weeks, the END course was modified such that only 5 sessions would be needed to complete the course. The modified END program is depicted in Figure 1, with the session topics printed in blue.

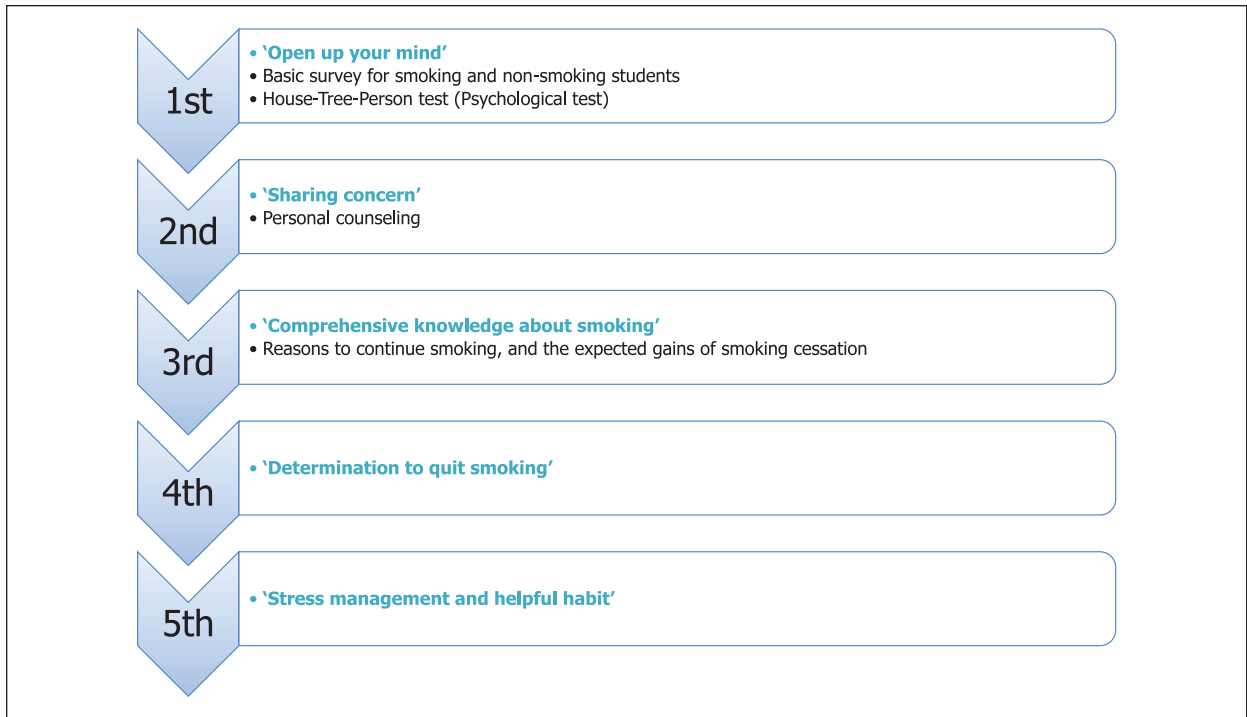
**Day camp.** The day camp provided a way for youth smokers to break away from typical/formal smoking education. The students participate in a variety of activities such as observing graphic warning labels on cigarette packs from different parts of the world and making their own. According to one study, graphic health warnings can lower self-reported craving for cigarettes more than can a text-only warning.<sup>12</sup> The day camp lasted for 6 hours, and smoke-free youth from the same class were also able to register for the camp. By interacting with nonsmoking students, participants could directly learn others' perceptions of smoking. Moreover, the activities might help reduce the curiosity about cigarettes among nonsmoking participants, and prevent them from using tobacco.

The multidisciplinary program for adolescents is summarized in Figure 2.

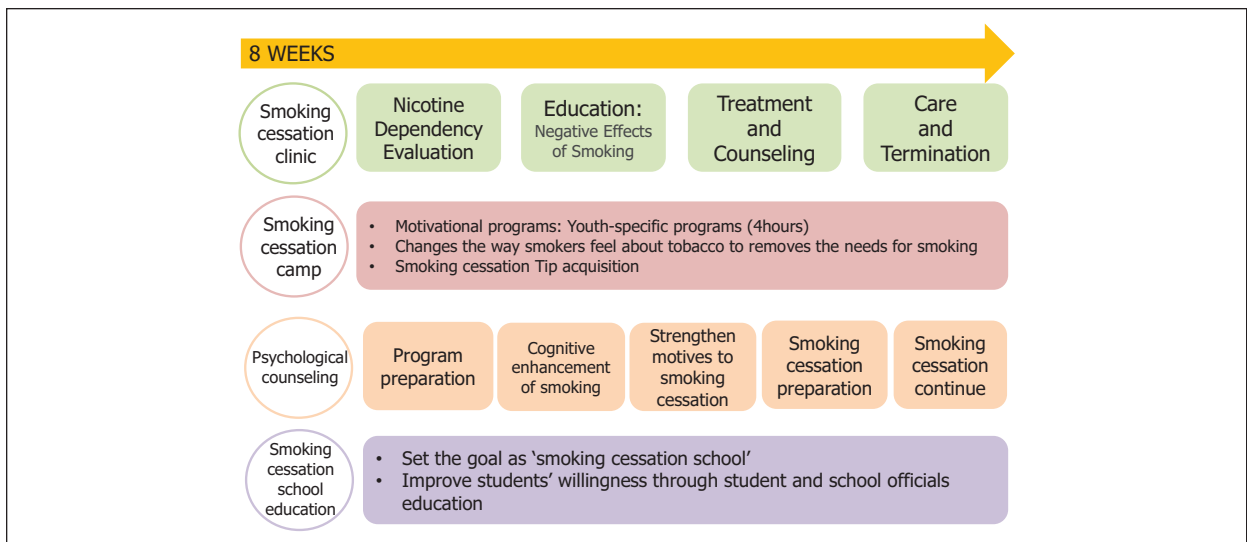
**Cessation program for adults.** Educational personnel and parents of students also participated in the same clinical visit program, as this might contribute positively to the students' motivation to quit smoking. However, this adult program differed in several aspects from the program for youth. Specifically, it was a total 12 weeks long, and adults engaged in self-help group meetings instead of meeting with college student mentors during the 6-month follow-up period.

### Ethical Approval and Informed Consent

This study was approved by the Institutional Review Board of the Seoul Metropolitan Government–Seoul National University Boramae Medical Center (Approval Number: 26-2016-131). Since these data are anonymous



**Figure 1.** Conceptual diagram of the modified Experience New Days program (5 sessions). Each session topic is printed in blue.



**Figure 2.** Conceptual diagram of multidisciplinary approach to smoking cessation of late adolescent (Nasarang project).

material, they cannot be approved by the individual. Therefore, the consent form was waived.

## Results

### Attendance

Thirty-one students from 7 different middle and high schools participated in the program. After the first

clinical visit, 5 students dropped out, bringing the total sample number to 26. The attendance rates for the clinic visits, day camp, and group counseling meetings were 92%, 40%, and 85%, respectively.

### Satisfaction (Survey)

Most (96%) students were satisfied with the multidisciplinary composition of the program and reported that the

program motivated them to quit smoking. Among the program's various subparts, the clinic visit had the highest satisfaction rate, at 96%. The majority of participants answered that the communication sessions during the group counseling meetings and clinic visits were the most helpful.

## Effectiveness

**Urine Cotinine Analysis.** Urine samples from participants were examined during the first medical examination, the fourth week of the intervention, and the eighth week of the intervention. In the fourth week, 17% of participants showed no cotinine in their urine sample. In the eighth week, 28% of participants showed no cotinine.

**Expired Carbon Monoxide Examination.** The expired carbon monoxide examination was performed during the first clinic visit as well as during the fourth and eighth weeks. In the first clinic visit, 38% of participants showed no carbon monoxide in their expiration. During the eighth week, 40% of participants were free from carbon monoxide expiration.

## Discussion

This program helped us not only learn about the culture of youth in South Korea, especially adolescents, but also gain insight into how involvement of the entire community is necessary for the program to be successful. The program's effectiveness was supported by the results of the urine cotinine analysis and the high satisfaction rate in the survey.

However, this study has some limitations that should be considered. First, the program had a small number of participants, at only 26 (due to drop out). Second, the participants were not followed 1, 3, and 6 months after the termination of the acute treatment. Specifically, their statuses were not updated over this follow-up period, due to a lack of college mentor volunteers. Third, in order to demonstrate the effects of this multifactorial approach, the proportion of students who attended all 3 aspects of the smoking cessation program (ie, clinic visits, psychosocial approach, and smoke cessation camp) is likely to be higher in the group that successfully quit smoking. However, in this study, rather than recording the individual attendance rate, we only recorded the attendance rate by school. As a result, it was not possible to compare participants by whether they attended the various aspects of the program or not. Fourth, the rate of expired carbon monoxide increased by 2% in the last week of the program, although this result can be omitted because it can fluctuate with acute smoking status. For example, if a participant who does not smoke for 3 hours

undergoes a carbon monoxide examination, they might show no carbon monoxide in their exhalation. Therefore, this examination should be removed from the clinical visit program. Finally, there is a need to develop an education program about youth smoking for school authorities and parents. Appropriate guidance and support from adults might influence the success of smoking cessation among youth.<sup>13</sup> Therefore, educational initiatives should be designed to help adults recognize that youth smoking is as an addictive disease rather than a behavior deserving punishment, and to teach them how to assist students appropriately.

There are some promising interventions similar to that described in this study, in that they assist youth smokers using a multidisciplinary and nonpharmacological approach. For example, the Not On Tobacco (N-O-T) is a successful model program selected by the Centers for Disease Control and Prevention and has been widely adopted in the United States.<sup>14</sup> More than 12 000 adolescents participated in the program, and teachers, counselors, health educators led approximately 90% of adolescents to either quit or reduce smoking. Because the validation study had a huge pool of participants, the effectiveness of the N-O-T can be said to be well demonstrated. The Quit 4 Life/Vie 100 Fumer (Q4L) developed by Health Canada is another promising intervention.<sup>15</sup> This program guides professionals and assistants with components such as interactive websites as well as handbooks to ensure that they provide more organized assistance to youth. Moreover, the Q4L followed its participants up to 18 months after, ensuring more definite cessation than the 6-month follow-up in our program. The Q4L and N-O-T program offer various ideas that might be applied to improve the Nasarang project.

Nevertheless, this study is the first intensive trial to establish a nonpharmacological, multidisciplinary smoking cessation intervention for youth in South Korea. Consequently, although several limitations obscured evaluation of this multifactorial approach, 28% of participants showed no cotinine in their urine analyses at the 8th week, providing some evidence of the study's effect. Since 2016, a general hospital in South Korea has already been conducting further research based on this project. Recruiting greater number of participants and supplementing the program with the strong points from other well-established programs such as the Q4L might lead to a more suitable smoking cessation intervention for Korean adolescents.

Although the students initially came to the program without their voluntary will to quit cigarette smoking, they were asked during the session to scrutinize why they had continued smoking, and what the potential gains were if they quit. In conclusion, this study confirmed that

the program promoted self motivation to quit smoking even in those who did not voluntarily participate.

## Practice Implications

This study is the first, intensive trial to establish a non-pharmacological, interdisciplinary smoking cessation intervention for youth in Korea. Since smoking habits of adolescents are influenced by a myriad of factors, we have approached students with not only health care professionals but also the members of the public community. By providing an age-specific program that assists students to quit smoking both clinically and psychosocially, the research provided the training model in improving communication between health care providers and young patients. It is proved by the high satisfaction rate of the survey. Considering the short duration (8 weeks) of the study, smoking quit rate on the last week was quite high (28%), proving the program's effectiveness.

We are already conducting a further study based on this project since 2016. Recruiting greater number of participants and supplementing shortcomings of the program can lead to a more successful outcome. We believe that, with continuous effort, this program will be helpful not only in Korea but also in other countries with high smoking rate.

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## Author Contributions

Jae Suk Park and Sang Hyung Lee conceptualised the study, responsible for literature search, supervised and participated in data collection, data analysis and prepared the manuscript under the guidance and supervision of BO. GHL, MRY and IP contributed to the development and study design of the study. BO reviewed the literature and manuscript. All authors contributed to critical revisions of the manuscript and approved the final submitted version.

## Declaration of Conflicting Interests

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## References

1. National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. *Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General*. Centers for Disease Control and Prevention; 2012.
2. Tucker JS, Ellickson PL, Klein DJ. Smoking cessation during the transition from adolescence to young adulthood. *Nicotine Tob Res*. 2002;4:321-332.
3. Al-Delaimy WK, White MM, Pierce JP. Adolescents' perceptions about quitting and nicotine replacement therapy: findings from the California Tobacco Survey. *J Adolesc Health*. 2006;38:465-468.
4. Park E. School-based smoking prevention programs for adolescents in South Korea: a systematic review. *Health Educ Res*. 2006;21:407-415.
5. Hamilton G, O'Connell M, Cross D. Adolescent smoking cessation: development of a school nurse intervention. *J Sch Nurs*. 2004;20:169-174.
6. Peterson AV Jr, Marek PM. Late smoking relapse among adolescent quitters. *Addict Behav*. 2017;65:171-173.
7. Gwon SH, Jeong S. Factors influencing adolescent lifetime smoking and current smoking in South Korea: using data from the 10th (2014) Korea Youth Risk Behavior Web-Based Survey [in Korean]. *J Korean Acad Nurs*. 2016;46:552-561.
8. Jee SH, Samet JM, Ohrr H, Kim JH, Kim IS. Smoking and cancer risk in Korean men and women. *Cancer Causes Control*. 2004;15:341-348.
9. Centers for Disease Control and Prevention. Use of cessation methods among smokers aged 16-24 years—United States, 2003. *MMWR Morb Mortal Wkly Rep*. 2006;55:1351-1354.
10. Schepis TS, Rao U. Smoking cessation for adolescents: a review of pharmacological and psychosocial treatments. *Curr Drug Abuse Rev*. 2008;1:142-155.
11. Choi S, Kim Y, Lee J, Kashiwabara M, Oh K. Tobacco use among students aged 13-15 years in South Korea: the 2013 Global Youth Tobacco Survey. *J Prev Med Public Health*. 2017;50:60-65.
12. Klein EG, Quisenberry AJ, Shoben AB, et al. Health warning labels for smokeless tobacco: the impact of graphic images on attention, recall, and craving. *Nicotine Tob Res*. 2017;19:1172-1177.
13. Peirson L, Ali MU, Kenny M, Raina P, Sherifali D. Interventions for prevention and treatment of tobacco smoking in school-aged children and adolescents: a systematic review and meta-analysis. *Prev Med*. 2016;85:20-31.
14. Dino G, Horn K, Abdulkadri A, et al. Cost-effectiveness analysis of the Not On Tobacco program for adolescent smoking cessation. *Prev Sci*. 2008;9:38-46.
15. Azagba S, Asbridge M. School connectedness and susceptibility to smoking among adolescents in Canada. *Nicotine Tob Res*. 2013;15:1458-1463.