



The impacts of a school-wide no smoking strategy and classroom-based smoking prevention curriculum on the smoking behavior of junior high school students

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Abstract

Background: This study aimed at exploring the impacts of a school-wide no smoking strategy and a classroom-based smoking prevention curriculum on smoking-related knowledge, attitude, behavior, and skill of junior high school students.

Methods: Using a pre–post quasi-experimental design, 469 seventh-to ninth-grade students at four junior high schools in Taiwan, were selected and separated into three groups according to class unit. Experimental group A experienced a school-wide no smoking strategy and a six-session smoking prevention curriculum. Experimental group B experienced only the school-wide no smoking strategy. The control group experienced no intervention. The students were tested 1 week before intervention began and 1 week after it ended.

Results: Experimental group A exhibited a better understanding than either experimental group B or the control group of the dangers of smoking and of techniques for refusing cigarettes; and in fact, group A indicated low smoking intention than experimental group B. Experimental group A also had a better attitudes towards resisting smoking than the control group. However, the intervention had no demonstrable effect on the smoking behavior and on the smoking substitution methods of students.

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Conclusions: To reduce the smoking rates among junior high school students, diversified school-wide no smoking strategies and standardized, diversified instruments should be adopted so that outcomes of smoking prevention work may be assessed more objectively and effectively.

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Keywords: School-wide no smoking strategies; Classroom-based smoking prevention curriculum; Smoking behavior; Junior high school

1. Introduction

It is estimated that in the United States everyday about 4400 youth aged 12–17 years try to smoke at the first time in their lives (Substance Abuse and Mental Health Services Administration, 2002). One-third of these youth smokers are likely to die from smoking-related disease (Centers for Disease Control and Prevention, 1996). According to 2002 US National Youth Tobacco Survey, the rate of smoking among senior high school students had declined by 18% during 2000–2002. But there was no statistically significant reduction of smoking rate among junior high school students (Allen, Vallone, Haviland, & Heaton, 2003). In a survey of smoking in Japan in 2000, 5.9% of boys and 4.2% of girls in the seventh grade were found to be monthly smokers. In the twelfth grade, however, the figures were 36.9% and 15.8% respectively (Osak et al., 2006). Among young people in the People's Republic of China, 31% of males and 3.7% of females have smoked a cigarette (Liu, 2003). Smoking rates among young people in Taiwan rose from 13.8% in 1988 to 25.9% in 1996 (Chen, Percy, & Horner, 2001); the rates rise from 0.6% among 12 year olds to 17.3% among 15 to 16 year olds, and 22.6% at graduation from senior high school (Wen, Levy, Cheng, Hsu, & Tsai, 2001). Among 13 to 15 year olds in Yilan County, Taiwan, the rate for males is 8.8%, while that for females is 3.2% (Chen, Chen, Fagot-Campagna, & Narayan, 2001). These figures clearly indicate a need for improved health promotion and smoking-prevention programs targeting these populations.

Wakefield et al. (2000) researched the relationship between prevention efforts aimed at keeping young people from smoking at home, at school, and in public places, and their smoking rates and quantities. The results showed that when a school strictly enforces a non-smoking policy, the level of student adherence to the policy is relatively high. Similarly, *Guidelines for School Health Programs to Prevent Tobacco Use and Addiction*, issued by the US Centers for Disease Control and Prevention, called for the development and promotion of school strategies to prevent harm caused by smoking (Centers for Disease Control and Prevention, 1994). As a result, Canada and a number of US states have introduced comprehensive, in-school smoking bans, the primary premise behind them being that a non-smoking school environment not only reduces smoking rates, but also reduces students' exposure to harm caused by their environment. A number of follow-up studies also discovered correlations between school policies restricting smoking and reduced smoking rates and quantities (Wakefield et al., 2000; Pentz et al., 1989; Moore, Roberts, & Tudor-Smith, 2001; Hahn et al., 2005). For this reason, more and more countries are introducing comprehensive school-wide no smoking strategies in a bid to reduce youth smoking rates (Peck, Acott, Richard, Hill, & Schuster, 1993; Goldstein et al., 2003). The School Health Policies and Programs Study indicated that, in the year 2000, 44.6% of US schools had adopted "tobacco-free environment" policies (Centers for Disease Control and Prevention, 2006).

The Centers for Disease Control and Prevention (1994) hold that effective strategies for preventing young people from smoking include school smoking prevention education, mass media publicity,

increases in smoking taxes, and plans to enhance community opposition to smoking. Related research has also indicated that effective smoking prevention programs can reduce future healthcare costs (National Institute on Drug Abuse, 2006; Stephens, Kaiserman, McCall, & Sutherland-Brown, 2000) and many countries are therefore interested in making schools a primary focus of smoking-prevention efforts.

In 1997, Taiwan passed the Tobacco Hazards Act, and in 2002 drafted the School Health Act, designating all schools from high school down as no smoking facilities. In 2003 the Taiwanese Department of Health set in motion a nationwide no smoking school counseling program in order to set up work to prevent harm from smoking, and bringing considerable power to bear. The results of this program, however, merit further research. This is why the current study aims to investigate the outcomes of a school-wide no smoking strategy and classroom-based smoking prevention curriculum on the smoking behavior of junior high school students in Taiwan.

2. Methods

2.1. Research design

This study adopted a pre–post quasi-experimental design, and divided the subjects into three groups. Experimental group A was subject to a school-wide no smoking strategy and classroom-based smoking prevention curriculum, while experimental group B experienced only the school-wide no smoking strategy and the control group received no intervention. One week before the intervention began, and, separately, 1 week after it ended, the experimental groups and the control group were tested, so that effects of the intervention could be ascertained.

2.2. Subjects

Random sampling was used to select the subjects from four junior high schools in Yilan County, Taiwan. Three schools served as experimental schools and the remaining as a control school. One class of students was selected from each grade in three experimental schools, to serve as experimental group A. An additional class in each grade from each of the experimental schools was then selected as experimental group B. In the control school, two classes of students in each grade were selected as the control group. The number of students in the experimental groups and the control group totaled 469, of whom 155 were in experimental group A, 207 were in experimental group B, and 107 were in the control group. The ratio of males and females was almost equal (49.9% to 50.1%), as was the ratio of seventh and eighth grade students (42.6% to 42.4%), while there were relatively few ninth grade students, who accounted for only 14.9% of the total. Approval for the study was obtained from the review board of the Bureau of Health Promotion, Department of Health in Taiwan. The subjects and primary guardian were informed.

2.3. Conducting the experiment

The conduct of the experiment for this study included the development of a school-wide no smoking strategy and classroom-based smoking prevention curriculum. The school-wide no smoking strategy involved planning and setting up a no smoking enforcement task force to formulate the strategy, organize anti-smoking activities, and create an anti-smoking atmosphere. Junior high school health educators developed a

classroom-based smoking prevention curriculum consisting of six 45-minute sessions. The course covered topics including the chemical substances in cigarettes, the history of smoking, physiological harm caused by smoking, harm prevention laws, youth smoking and family factors, peer pressure and media influence, cigarette refusal techniques, smoking substitution methods, and active planning to resist smoking. Once the course design had been completed, it was piloted at a junior high school in Taipei County. At the same time, the experimental schools were asked to choose teachers who would teach the course at their schools and to train these teachers about youth smoking.

2.4. Instruments

A pre-test and post-test assessment tool was constructed on the basis of the smoking prevention course, and with reference to related questionnaire (Lee, Chang, Lai, Lee & Chen, 2002), and following the processes of experts examining face validity, piloting, and revision. The researchers thus finally arrived upon a complete, structured questionnaire concerning tobacco control-related knowledge, attitudes, practice, and skills (KAPS).

The content of KAPS included individual background data, knowledge of the harm caused by tobacco, anti-smoking attitude, smoking intentions, cigarette refusal skills, substitution methods, and smoking behavior. There were 23 “Yes or No” questions about the harm caused by tobacco, each worth one point for a correct answer and no points for an incorrect answer or “don’t know”. The r_{KR21} coefficient for the reliability of the scale used in this research was .74.

There were 32 questions on anti-smoking attitude, using a five-point Likert scale. The Cronbach alpha coefficient for the scale used in this study was .91.

Smoking intentions related to the previous week and month, to the period while attending junior high school and senior high or senior vocational high school, and to intentions after the age of 18.

Seven techniques for refusing cigarettes were identified by the subjects. A four-point Likert scale was used, the higher the score, the higher the possibility of a refusal technique being used.

A total of 16 smoking-substitution methods, adopted at times when students were unhappy, under a lot of pressure, or facing the possibility of being engaged in some smoking-prevention-related activity, were identified by the subjects, and graded on a four-point Likert scale. In mean terms, the higher the score, and the higher the possibility of a smoking-substitution method being adopted.

Smoking behavior was categorized into five types (Mayhew, Flay, & Mott, 2000). The first was smoking daily or almost every day. The second was having smoked continually for over a month, but not every day. The third was having smoked for less than a month and fewer than 100 cigarettes in a lifetime. The fourth was having tried only a puff, or one or two cigarettes. The fifth was never having tried smoking.

2.5. Data collection procedures

The experiment for this study was carried out between April 2003 and June 2004. Schools showing an interest in conducting a no smoking strategy were selected as experimental schools and consultations were held with the relevant staff. In October 2003, “seed” teachers assisted with pilot investigations, and a self-reported questionnaire was adopted for data collection. Between November 2003 and May 2004, the experimental schools implemented the school-wide no smoking strategy and the classroom-based smoking-prevention curriculum. Finally, post-testing was conducted in June 2004.

2.6. Statistical analysis

Since class units constituted the study units in this research, the subjects could not be chosen by a random distribution approach; so further adjustment was required in the gathering of statistics in order to control the original levels of variance. When the results of the experimental intervention were analyzed, using each group's pre-test results as covariates and the group itself as an independent variable, analysis of covariance (ANCOVA) was performed to eliminate the effect of the subjects' pre-test results.

3. Results

3.1. Impact on knowledge about the harm caused by tobacco

Following ANCOVA, knowledge within the three groups about the harm caused by tobacco showed significant difference ($F=10.84$, $p<.001$). It was found that experimental group A's knowledge of such harm ($M=17.11$) was significantly superior to those of both experimental group B ($M=15.41$) and the control group ($M=15.46$) (Table 1).

3.2. Impact on anti-smoking attitude

The three groups' attitudes to resisting smoking showed significant difference ($F=3.91$, $p<.05$). Furthermore, it was found that experimental group A's attitude to resisting smoking ($M=4.28$) was significantly superior to that of the control group ($M=4.12$) (Table 1).

3.3. Impact on smoking intention

The three groups' smoking intention showed significant difference ($F=4.89$, $p<.01$). Comparison of the results of the post-test showed experimental group A ($M=4.50$) to be significantly superior to experimental group B ($M=4.20$) (Table 1).

Table 1
Analysis of covariance, adjusted mean and post-hoc comparisons

Variables	Source of variation	ANCOVA			F	Adjusted mean			Post-hoc comparisons
		SS'	df	MS'		Exp. A	Exp. B	Cont.	
Knowledge	Group	269.83	2	134.92	10.84***	17.11	15.41	15.46	A>B, A>Cont.
	Residual	5376.38	432	12.45					
Attitude	Group	1.34	2	0.67	3.91*	4.28	4.19	4.12	A>Cont.
	Residual	70.00	408	0.17					
No smoking intention	Group	8.95	2	4.47	4.89**	4.50	4.20	4.42	A>B
	Residual	418.29	457	0.92					
Refusal techniques	Group	2.88	2	1.44	4.91**	3.34	3.18	3.16	A>B, A>Cont.
	Residual	133.09	453	0.29					
Substitution methods	Group	0.17	2	0.08	0.37				
	Residual	94.12	423	0.22					

Exp. A: experimental group A.; Exp. B: experimental group B.; Cont.: control group.

* $p<.05$; ** $p<.01$; *** $p<.001$.

Table 2
Smoking behavior changes between pre-test and post-test

Variables	Exp. A	Exp. B	Cont.	χ^2
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Receded	10 (6.5)	12 (6.1)	13 (12.7)	5.04 ($p > .05$)
Unchanged	128 (83.7)	170 (85.9)	81 (79.4)	
Improved	15 (9.8)	16 (8.1)	8 (7.8)	

Exp. A: experimental group A.

Exp. B: experimental group B.

Cont.: control group.

3.4. Impact on cigarette refusal techniques

The three groups' cigarette refusal techniques showed significant difference ($F=4.91, p < .01$). It was found that the smoking resistance techniques of experimental group A ($M=3.34$) were significantly superior to those of experimental group B ($M=3.18$) and of the control group ($M=3.16$) (Table 1).

3.5. Impact on smoking substitution methods

The three groups' smoking substitution methods showed no statistically significant difference ($F=0.37, p > .05$) (Table 1).

3.6. Impact on smoking behavior

In analysis of the changes in the subjects' smoking behavior between pre-test and post-test, each category of the post-test that demonstrated a decrease in smoking from pre-test levels was classified as "Improved". Each category that remained the same as the pre-test was classified as "Unchanged". Each category that showed an increase in smoking was classified as "Receded". The result was that the experimental intervention showed no statistically significant impact on smoking behavior of the three groups ($\chi^2 = 5.04, p > .05$) (Table 2).

4. Discussion

The outcomes of a two-pronged school smoking prevention strategy (comprising the school-wide no smoking strategy and the classroom-based smoking prevention curriculum) are better than those of a single-pronged school smoking prevention strategy (the school-wide no smoking strategy) in terms of students' smoking-related knowledge, intention, and refusal techniques. Moreover, a two-pronged strategy proved superior to no intervention at all in terms of smoking-related knowledge, anti-smoking attitudes, and cigarette refusal techniques. We can infer from this that a diversified smoking prevention strategy is better than a non-diversified one and also better than none at all. This result bears some resemblance to work done in Australia (Bastian, 2002) aimed at getting schools to promote non-smoking by means of the institution itself, the school organization, ethos and environment, curriculum, teaching and learning, partnership, and services, as well as to the outcomes of the research of utilizing diversified means to reduce smoking rates (Hamilton, Cross, Lower, Resnicow, & Williams, 2003; Peck et al., 1993). It shows that if smoking prevention strategies focused on schools are to be effective; they should be diversified, multi-component forms of intervention.

Since the school-wide no smoking strategy adopted in the current study lasted only 1 year, and evaluation was performed after only a short period of intervention, the number of subjects whose smoking behavior changed was very small, showing no statistical significance. This result is similar to that of an investigation in relation to Australian secondary schools, which showed that the impact of smoking prevention policies on students' smoking behavior was small (Clarke, White, Hill, & Borland, 1994). Although the school-wide no smoking strategy exerted no statistically significant change on students' smoking behavior, Table 2 shows that experimental groups A and B had lower smoking recession rates than the control group, which appears to show that deterioration of smoking behavior in these two groups was alleviated somewhat under the influence of the school-wide no smoking strategy, perhaps suggesting that even short-term intervention can achieve results. This finding thus echoes various studies that have indicated that when schools limit smoking strategies to the reduction of student smoking rates and quantities (Wakefield et al., 2000; Pentz et al., 1989; Moore et al., 2001) they should still continue to promote a school-wide no smoking strategy. While a comprehensive smoking ban is in place in Taiwanese schools from senior high down, it will not be possible to keep in check the smoking behavior of young people, or, indeed, to bring any influence to bear on them at all, in absence of a task force to promote the policy and to create a school-wide non-smoking environment and smoking resistant living space.

Changes in smoking behavior are usually one of the important indicators of smoking prevention program. The changes in smoking behavior brought about by the classroom-based smoking prevention curriculum were not statistically significant. Kreuter & Green (1978) argued that it is often inaccurate to use only changes in smoking behavior as the standard for judging whether or not smoking education has succeeded, especially in relation to the educational programs of the youngest subjects, and that such appraisals should also include knowledge about smoking and attitudes toward smoking. Criteria for appraising school smoking hazard prevention activities used in this study included: knowledge about smoking, attitude toward smoking, smoking intentions, refusal techniques, and smoking substitution methods — a diversified approach to appraising the outcomes of smoking education programs, making for a relatively objective appraisal.

In order to develop smoking prevention programs, the needs of people at different “smoking stages” should be particularly stressed (Ma, Tan, Toubbeh, & Su, 2003). In the current study, the appraisal of changes in smoking behavior involved comparison with pre-test data. It is recommended that future research might adopt the Prochaska and Diclemente (1983) stage of change model (whereby one can only achieve change if one believes in one's need to change and undergoes a series of procedures) in order to appraise the outcomes of the smoking prevention program all the more objectively. In addition, the literature has consistently identified that peer group smoking behavior/attitudes are important factors influencing adolescents' smoking (Madarasova Geckova et al., 2005; Turner, West, Gordon, Young, & Sweeting, 2006). This study included peer pressure and refusal skills in the classroom-based smoking prevention curriculum and peer group effect may be attenuated. It is recommended that future study may assess the effect of peer smoking behavior/attitudes.

Changes in smoking substitution methods brought about by the experimental intervention used in the current study were not statistically significant, a result which may have to do with the fact that the classroom-based smoking prevention curriculum was not taught for long. Most of the smoking substitution methods adopted in the study were normal, daily leisure activities; but even so, to give the students opportunities to apply them to their lives in a skilled manner would perhaps require a slightly longer period of appraisal. We would recommend that in future smoking prevention course design work, methods be included to enhance the sense of achievement, such as role play and situation variation, in order to increase the methods of smoking substitution available to junior high school students; and that long-term tracking be conducted, so that this particular outcome will be evaluated all the more objectively.

5. Conclusion

In the preservation of student health, smoking prevention and reduction of student smoking, schools play a prominent role. As regards students' knowledge of the dangers of tobacco, smoking intention, and smoking refusal techniques, the outcomes of using a two-pronged intervention proved superior to those of using a single-pronged intervention. As regards students' knowledge of the dangers of smoking, attitude towards resistance to smoking, and cigarette refusal skills, moreover, the outcomes of two-pronged intervention were superior to those of no intervention. Owing to the brevity of the intervention period, the experiment showed no significant impact on students' smoking behavior or smoking substitution methods. We still recommend that diversified school-wide smoking hazard prevention strategies be adopted, and that diversified but standardized evaluation instruments be developed in order to permit more objective and effective evaluation of school smoking hazard prevention programs.

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