Effectiveness of Drug Abuse Prevention Program Focusing on Social Influences among High School Students: 15-Month Follow-Up Study

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Abstract

Objective: To examine the effectiveness of a drug abuse prevention program focusing on social influences for drug education classes in high school.

Methods: The social influence program in the experimental group used role-playing led by a pharmacist, a police officer and a teacher. The intervention evaluation used a quasi-experimental design. The subjects were first-year students from 10 high schools assigned to the experimental group (6 schools, 828 students) and the control group (4 schools, 408 students). In the control group, a pharmacist used a conventional information program in a lecture format.

Results: Regarding knowledge about drug abuse, in both the experimental and control groups, and for both males and females, a long-term effect was observed immediately after the program and lasted up to 15 months. For three other measures, attitudes toward drug abuse problem, self-efficacy regarding drug abuse prevention, and perception of social support for preventing drug abuse, a short-term effect was generally observed in the experimental group beginning immediately after the program and lasting for 3 months. A long-term effect was evident in high-risk students with positive opinions regarding drugs. In the control group and for both males and females, although an effect was generally evident immediately after the program, neither a short- nor a long-term effect was observed in males, suggesting the difficulty in achieving lasting effects.

Conclusions: The social influence program in the experimental group showed remarkable effectiveness. Thus, the program may be useful for preventing drug abuse among high school students in Japan.

Key words: drug abuse, prevention, school-based, quasi-experimental design, social influence program

Introduction

To deal with the increasing severity of drug abuse problem in recent years in Japan, the Headquarters for the Promotion of Measures to Prevent Drug Abuse, headed by the Prime Minis-

ter, was established. In May 1998, the “Five-Year Drug Abuse Prevention Strategy” was adopted, followed by the “New Five-Year Drug Abuse Prevention Strategy” in July 2003 (1). Comprehensive guidelines for Japan’s measures to prevent drug abuse were given therein. Among these guidelines, the development of middle and high school drug education classes, with guidance from police officers, Narcotics Control Department agents, pharmacists, and other specialists, was stated as one measure to prevent drug abuse among young people, to enhance the drug abuse prevention guidance provided in schools.

In Japan’s schools, outside specialists have conventionally been invited to provide health-related guidance as lecturers in

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“health classes”. Themes including smoking prevention have been occasionally covered in these activities. However, there were few studies that showed the effects and limitations of these educational efforts (2, 3). In addition, because many of these classes consist of lectures given by a single specialist, the following advantages and disadvantages can be observed. For students, an outside lecturer can leave a fresh, lasting impression, and as a specialist, has a greater credibility on the subject matter. On the other hand, there is a tendency toward a unilateral transfer of information, and any perception of authoritarianism may lead to rebelliousness or misunderstanding on the part of the students. Additionally, in opposition to the mutual understanding that this can inspire between members of the school faculty and guardians, it is a concern that school personnel may have excessive expectations for these classes and end up relying on them exclusively (4).

In this study, we evaluated the effectiveness of a drug abuse prevention program in high school students that focused on the social influences for drug education classes at schools designed in the style described. The social influence program

involves learning social factors contributing to drug abuse by the role-playing approach.

Methods

1. Evaluation design

In this study, we used a quasi-experimental design, and the subjects were first-year students from 10 high schools assigned to the experimental group (4 general schools, 2 vocational schools) and the control group (2 general schools, 2 vocational schools), on the basis of the request of each school for the intervention program (information program or social influence program) and the type of school (general school or vocational school). The educational intervention for all 10 schools was held in the same month in the gymnasium of each school. At the same time, to avoid Type III error (5) in the program’s evaluation, we recorded the implementation of the program at each school on video tapes using two video cameras (one for instructors and the other for students), and confirmed that all programs were adequately implemented. In addition, to evaluate the pro-

Table 1 Summary of program (experimental group)

	Item	Instructor	Main Contents
Introduction	Understanding the Course Contents (8 minutes)	· Progress: Teacher	1. Students enter 2. Explain that drug abuse is not a remote problem for the students
	1. Understanding the harmful effects of drugs 1-1. Meaning of drug abuse 1-2. Drug abuse and dependency 1-3. Harmful effects on the brain (17 minutes)	· Progress: Teacher · Role-playing: Teacher and Students · Explanation: Pharmacist	1. Case I: “Dangerous Invitations from Older Students” 1-1. Recommendations of “Drugs for Fighting Tiredness” 1-2. Shouting, “Wait a minute!” the pharmacist, in white gown, goes to the front to explain the harmful effects of drugs. ▶ Taking drugs even only once is drug abuse. ▶ You become unable to quit of your own choice. ▶ The mind never returns to its original state. ▶ Tobacco and alcohol are gateway drugs Message: “Let’s protect our own health!”
Development	2. Understanding the social effects of drugs 2-1. Drug abuse and crime 2-2. Accidents and incidents related to drug abuse 2-3. Effects on social lifestyle (17 minutes)	· Role-playing: Teacher and Students · Explanation: Police officer	2. Case II: “I want to lose weight...” 2-1. Recommendations of “Slimming Drugs” by female friends 2-2. Blowing a whistle, the uniformed police officer goes to the front to explain the social effects of drug abuse. ▶ Drug abuse and possession are crimes. ▶ Connection between drug abuse and criminal groups. ▶ Words of invitations to drug abuse and use of common names. ▶ Examples of incidents caused by drug abuse. ▶ Drug abuse destroys family or social life. Message: “Adults are supporting your courage!”
	3. Developing skills to resist social pressures 3-1. Social influences that contribute to drug abuse 3-2. Skills of resisting (10 minutes)	· Role-playing: Teacher and Students · Explanation: Pharmacist, Police officer	3. Case III: “I fought with my parents...” 3-1. Recommendations of “Refreshing Drugs” by friends participating in nightlife. 3-2. Students model how to refuse when invited ▶ Having the courage to directly refuse ▶ Finding a way to refuse that suits you 3-3. Advice from the pharmacist and police officer ▶ Discuss with adults you can trust, such as parents, teachers and police.
Conclusion	Understanding the importance of responsible decision-making, choosing one’s behavior, and taking care of oneself. (8 minutes)	· Progress: Teacher · Reading aloud: Student	1. Female students read aloud “Terrible White Powder,” a letter from a young woman trying to recover from drug abuse. 2. Presenting the points of today’s drug abuse prevention class 2-1. Having accurate knowledge about drug abuse 2-2. Having the courage to say “No!” to temptation 2-3. Taking care of your irreplaceable self 3. Introduce leaders, students depart

gram, a self-administered anonymous survey was conducted, using a six-digit numerical code to identify each participant but insure anonymity. This survey was administered four times: pretest (prior to the program), posttest (immediately after the program), follow-up I test (3 months after the program), and follow-up II test (15 months after the program). This survey was implemented uniformly by teachers and others at each school, following the manual for the survey's administration. The ethical facets of the survey were given sufficient consideration in the manual: the respondents were separated by approximately 2 meters, the teachers and others were not allowed to walk around the room during the survey, the respondents were not compelled to provide answers, and the questionnaires were collected only after each respondent had personally sealed the questionnaire in a blank envelope.

2. Intervention program

The program used in the experimental group is the social influence program that focused on skills for resisting peer and other social pressures contributing to drug abuse. The approach to the students has the following two characteristics. First, a pharmacist (a specialist in drugs), a police officer (a specialist in crime prevention), and a teacher (a specialist in education) cooperate together, performing their roles according to their respective fields of specialty. Second, students moderated role-play simulations, in which representative students and teachers refuse drugs, based on the social learning theory (Table 1). The same police officer and pharmacist, and members of the project, led the program in each of the 6 schools in the experimental

group together with a teacher from the respective school. To ensure the successful implementation of the program, a preliminary meeting was held, a prior common understanding of the program was reached, and concrete preparations were completed. In the control group, a single pharmacist used a conventional information program in a lecture format. The pharmacist followed the directions from the manual, which was developed by researchers, in dealing with the same items of the program in the experimental group. She was an expert in drug education classes and has led this style of class continuously since 1984. The class duration in both groups was 60 minutes. A drug abuse prevention pamphlet (6) was distributed to all students for a booster intervention approximately two months after the class.

3. Analysis

Taking the program's contents and the framework of the PRECEDE-PROCEED model (7) into consideration, the four measures for evaluation are as follows: the predisposing factor for knowledge about drug abuse (9 items), the predisposing factor for attitudes toward drug abuse problem (5 items), the enabling factor for self-efficacy regarding drug abuse prevention (4 items), and the reinforcing factor for perception of social support for preventing drug abuse (4 items). The reliability of internal consistency was assessed using Cronbach's alpha (Table 2).

The subjects of analysis are 1,236 respondents (experimental group: 828, 87.6% valid responses; control group: 408, 92.9% valid responses) who participated in all of the following

Table 2 Questionnaire

1. Knowledge about drug abuse $\alpha=.746$
1-1. Using drugs or stimulants many times, or in large amounts, is drug abuse, but using them only once is not.
1-2. In the case of young people, sometimes there is a progression from tobacco and alcohol to drug abuse.
1-3. If drugs are used a few times, it is possible to quit at any point.
1-4. In many cases, slang terms for drugs are used to tempt people to try drugs.
1-5. When using drugs, the effects are only mental. Physical effects are nearly nonexistent.
1-6. Clever words are frequently used to tempt people to try drugs.
1-7. Drug abuse is often connected to other crimes.
1-8. When people are troubled or depressed, the risk of abusing drugs becomes higher.
1-9. Using or carrying drugs is punishable by law.
2. Attitudes toward drug abuse problem $\alpha=.853$
2-1. I want to better understand the drug abuse problem.
2-2. I want to try talking more with my friends about the drug abuse problem.
2-3. I want to try talking more with my family about the drug abuse problem.
2-4. I want to try talking more with my teachers at school about the drug abuse problem.
2-5. If I had friends troubled by drug abuse problems, I would want to help them.
3. Self-efficacy regarding drug abuse prevention $\alpha=.659$
3-1. When people around me have trouble or problems with drug abuse, I am able to discuss them with adults I trust, such as my family, police, or teachers.
3-2. Even if other people invite me to use drugs, I am able to refuse.
3-3. Even if other people invite me to smoke tobacco, I am able to refuse.
3-4. Even if other people invite me to drink alcohol (including beer, wine, cocktails and other alcoholic drinks), I am able to refuse.
4. Perception of social support for preventing drug abuse $\alpha=.784$
4-1. My friends would help me keep away from drug abuse.
4-2. My family would help me keep away from drug abuse.
4-3. My teachers at school would help me keep away from drug abuse.
4-4. Specialists in the community such as police and pharmacists would help me keep away from drug abuse.

events and tests: the pretest, the intervention program, the booster intervention, the posttest, and the follow-up I and II tests. Both the experimental and control groups were further divided into the high-risk subgroup and the low-risk subgroup according to their response to the question on drug abuse in the pretest questionnaire. That is, those respondents with affirmative opinions on drug abuse, namely, those who chose "It is acceptable to try once" or "It is the individual's freedom to choose whether or not to use" were placed in the high-risk subgroup. Respondents with negative opinions on drug abuse, namely, those who chose, "Regardless of the reason, drug abuse absolutely should not be tolerated" were placed in the low-risk subgroup. Then, under the items regarding knowledge about drug abuse, one point was given for each "correct answer," and zero points for each "false answer" or "I don't know." For items regarding attitudes toward drug abuse problem, self-efficacy regarding drug abuse prevention, and perception of social support for preventing drug abuse, each item was measured using the Likert-type scale from 1 (I strongly disagree) to 5 (I strongly agree), with higher scores indicating a more favorable response. Finally, the scores of each section were added together. Statistical analysis was performed using the Mann-Whitney U-test and Wilcoxon signed-rank test. A statistically significant difference was considered at $p < 0.05$.

Results

In the pretest, there was no significant difference between the experimental high-risk subgroup and the control high-risk

subgroup in any of the four measures for either males or females. Similarly, in the pretest, there was no significant difference between the experimental low-risk subgroup and the control low-risk subgroup in any of the four measures for either males or females.

1. Knowledge about drug abuse (Table 3)

In the experimental group for both males and females, and for both the high-risk and low-risk subgroups, a significant positive difference was evident when comparing the pretest results with any of the tests results conducted after the conclusion of the program.

In the control group, similarly to the experimental group, for both males and females, and for both the high-risk and low-risk subgroups, a significant positive difference was evident when comparing the pretest results with any of the tests results conducted after the conclusion of the program.

When comparing the experimental and control groups, the results of the experimental group were significantly better than those of the control group for the female low-risk subgroup in the posttest, the male high-risk subgroup in the follow-up I test, and the male low-risk subgroup in the follow-up II test. However, there was no subgroup of the control group whose results were significantly better than those of the experimental group for any of the tests conducted after the program.

2. Attitudes toward drug abuse problem (Table 4)

In the experimental group for both males and females and in the high-risk subgroups, a significant positive difference was

Table 3 Knowledge about drug abuse

Group	Sex	Subgroup	N	Pre	Post	1)	N	Pre	Follow-up I	2)	N	Pre	Follow-up II	3)
				Mean±SD	Mean±SD			Mean±SD	Mean±SD			Mean±SD	Mean±SD	
Experimental	M	high-risk	80	5.51±2.83	7.96±1.88	*	85	5.47±2.76	7.02±2.60	*	84	5.54±2.79	7.33±2.52	*
		low-risk	365	6.66±2.03	8.15±1.75	*	373	6.62±2.06	7.69±2.01	*	378	6.62±2.05	7.46±2.23	*
	F	high-risk	36	6.06±2.47	8.44±1.11	*	37	6.08±2.44	7.97±1.21	*	37	6.22±2.23	7.43±1.97	*
		low-risk	311	6.84±1.92	8.50±1.27	*	307	6.87±1.89	7.96±1.76	*	313	6.83±1.92	8.06±1.53	*
Control	M	high-risk	32	5.50±2.30	7.34±2.39	*	31	5.42±2.29	6.29±2.25	*	32	5.50±2.30	6.56±2.63	*
		low-risk	165	6.57±2.15	7.87±2.01	*	162	6.53±2.17	7.51±1.76	*	165	6.53±2.16	6.88±2.60	*
	F	high-risk	21	6.19±2.18	7.90±2.72	*	22	6.05±2.24	7.32±2.08	*	22	6.05±2.24	7.68±1.49	*
		low-risk	179	6.76±2.06	8.16±1.41	*	180	6.77±2.06	7.83±1.77	*	176	6.78±2.08	7.99±1.70	*

* $p < 0.05$.

1) Between the pretest and the posttest. 2) Between the pretest and the follow-up I test. 3) Between the pretest and the follow-up II test.

Table 4 Attitudes toward drug abuse problem

Group	Sex	Subgroup	N	Pre	Post	1)	N	Pre	Follow-up I	2)	N	Pre	Follow-up II	3)
				Mean±SD	Mean±SD			Mean±SD	Mean±SD			Mean±SD	Mean±SD	
Experimental	M	high-risk	88	11.14±3.75	14.51±5.13	*	88	11.14±3.75	13.24±4.70	*	88	11.14±3.75	13.43±3.92	*
		low-risk	379	14.06±4.07	16.27±4.54	*	378	14.08±4.07	14.67±4.34	*	380	14.06±4.06	14.46±4.41	n.s.
	F	high-risk	39	12.74±3.16	14.49±3.43	*	39	12.74±3.16	15.51±3.71	*	39	12.74±3.16	15.08±4.05	*
		low-risk	308	15.24±3.56	17.40±3.88	*	311	15.23±3.55	15.76±3.85	*	312	15.22±3.55	15.36±3.90	n.s.
Control	M	high-risk	32	10.59±4.03	12.59±5.98	*	32	10.59±4.03	10.81±4.01	*	n.s. 32	10.59±4.03	11.31±3.53	n.s.
		low-risk	172	14.20±4.42	16.03±4.81	*	173	14.16±4.44	14.62±3.88	*	n.s. 171	14.15±4.47	14.51±4.04	n.s.
	F	high-risk	23	11.91±3.27	15.13±4.59	*	23	11.91±3.27	13.00±4.44	n.s.	23	11.91±3.27	13.65±4.41	n.s.
		low-risk	180	14.57±3.62	15.80±4.13	*	179	14.58±3.63	14.83±4.04	n.s.	180	14.57±3.62	14.96±3.92	n.s.

* $p < 0.05$, n.s. not significant.

1) Between the pretest and the posttest. 2) Between the pretest and the follow-up I test. 3) Between the pretest and the follow-up II test.

evident when comparing the pretest results with any of the tests results conducted after the conclusion of the program. For both males and females of the low-risk subgroups, a significant positive difference was evident between the pretest results and the posttest and follow-up I test results.

In the control group for both males and females, and for both the high-risk and low-risk subgroups, a significant positive difference was evident when comparing the pretest results with the posttest results. However, there was no significant difference between the pretest results and the follow-up I and II test results.

When comparing the experimental and control groups, the results of the experimental group were significantly better than those of the control group for the female low-risk subgroup in the posttest, the male high-risk subgroup, female high-risk subgroup, and female low-risk subgroup in the follow-up I test, and the male high-risk subgroup in the follow-up II test. However, there was no subgroup for which the results of the control group were significantly better than those of the experimental group for any of the tests conducted after the program.

3. Self-efficacy regarding drug abuse prevention (Table 5)

For the male high-risk subgroup, the female high-risk subgroup, and the female low-risk subgroup of the experimental group, a significant positive difference was evident when comparing the pretest results with any of the tests results conducted after the conclusion of the program. In the male low-risk subgroup, although a significant positive difference was evident between the pretest results and the posttest and follow-up I test

results, no significant difference was evident between the pretest and the follow-up II test results.

In the female low-risk subgroup of the control group, a significant positive difference was evident when comparing the pretest results with any of the tests results conducted after the conclusion of the program. However, in the male high-risk and low-risk subgroups, although a significant positive difference was evident between the pretest and the posttest results, no significant difference was evident between the pretest results and the follow-up I and II test results. In the female high-risk subgroup, a significant positive difference was evident between the pretest results and the posttest and follow-up I test results. No significant difference was evident between the pretest and the follow-up II test results.

When comparing the experimental and control groups, the results of the experimental group were significantly better than those of the control group for the female low-risk subgroup in the posttest. However, there was no subgroup of the control group for which the results were significantly better than those of the experimental group for any of the tests conducted after the conclusion of the program.

4. Perception of social support for preventing drug abuse (Table 6)

In the experimental group, for both the male and female high-risk subgroups, a significant positive difference was evident when comparing the pretest results with any of the tests results conducted after the conclusion of the program. In the male low-risk subgroup, a significant positive difference was

Table 5 Self-efficacy regarding drug abuse prevention

Group	Sex	Subgroup	N	Pre	Post	1)	N	Pre	Follow-up I	2)	N	Pre	Follow-up II	3)
				Mean±SD	Mean±SD			Mean±SD	Mean±SD			Mean±SD	Mean±SD	
Experimental	M	high-risk	87	11.46±3.44	13.77±3.49	*	88	11.44±3.42	13.32±3.52	*	88	11.44±3.42	12.94±3.00	*
		low-risk	382	14.30±3.06	15.43±3.11	*	381	14.31±3.05	14.67±3.01	*	382	14.30±3.06	14.34±3.35	n.s.
	F	high-risk	39	11.79±3.37	13.46±3.78	*	39	11.79±3.37	14.44±3.05	*	39	11.79±3.37	13.38±3.62	*
		low-risk	312	14.56±2.72	16.16±2.80	*	315	14.52±2.74	15.21±2.96	*	315	14.52±2.74	15.17±2.83	*
Control	M	high-risk	31	11.65±3.75	13.19±3.85	*	30	11.77±3.75	12.53±3.66	n.s.	31	11.65±3.75	12.90±3.77	n.s.
		low-risk	169	14.41±2.94	15.33±3.49	*	170	14.41±2.93	14.65±2.98	n.s.	171	14.42±2.92	14.42±3.20	n.s.
	F	high-risk	23	11.61±2.84	14.09±3.54	*	23	11.61±2.84	13.35±3.64	*	23	11.61±2.84	13.30±3.20	n.s.
		low-risk	180	14.29±3.03	15.52±2.70	*	180	14.29±3.03	14.95±2.72	*	180	14.29±3.03	14.87±3.02	*

* p<0.05, n.s. not significant.

1) Between the pretest and the posttest. 2) Between the pretest and the follow-up I test. 3) Between the pretest and the follow-up II test.

Table 6 Perception of social support for preventing drug abuse

Group	Sex	Subgroup	N	Pre	Post	1)	N	Pre	Follow-up I	2)	N	Pre	Follow-up II	3)
				Mean±SD	Mean±SD			Mean±SD	Mean±SD			Mean±SD	Mean±SD	
Experimental	M	high-risk	88	11.27±3.80	13.19±3.96	*	88	11.27±3.80	12.74±3.96	*	88	11.27±3.80	12.78±3.34	*
		low-risk	382	13.51±3.39	14.54±3.62	*	378	13.50±3.40	13.93±3.48	*	382	13.51±3.39	13.68±3.51	n.s.
	F	high-risk	39	12.33±3.79	13.97±3.24	*	39	12.33±3.79	14.38±3.36	*	39	12.33±3.79	13.85±4.13	*
		low-risk	310	14.20±2.68	15.27±2.93	*	311	14.20±2.68	14.41±3.05	n.s.	313	14.19±2.68	14.40±3.13	n.s.
Control	M	high-risk	32	10.94±4.17	11.72±5.20	n.s.	32	10.94±4.17	11.25±4.83	n.s.	32	10.94±4.17	10.84±3.98	n.s.
		low-risk	171	13.56±3.56	14.46±3.61	*	171	13.56±3.56	13.90±3.36	n.s.	172	13.55±3.55	13.54±3.67	n.s.
	F	high-risk	23	11.74±4.03	14.13±4.08	*	23	11.74±4.03	12.96±4.28	*	23	11.74±4.03	14.13±3.63	*
		low-risk	180	13.86±3.35	14.51±3.29	*	179	13.85±3.36	14.38±3.26	*	180	13.86±3.35	14.43±3.38	*

* p<0.05, n.s. not significant.

1) Between the pretest and the posttest. 2) Between the pretest and the follow-up I test. 3) Between the pretest and the follow-up II test.

evident between the pretest results and the posttest and follow-up I test results. No significant difference was evident between the pretest and the follow-up II test results. For the female low-risk subgroup, although a significant positive difference was evident between the pretest and the posttest results, no significant difference was evident between the pretest results and the follow-up I and II test results.

In the control group, for the female high-risk and low-risk subgroups, a significant positive difference was evident when comparing the pretest results with any of the tests results conducted after the conclusion of the program. For the male low-risk subgroup, a significant positive difference was evident when comparing the pretest results with the posttest results. However, there was no significant difference between the pretest results and the follow-up I and II test results. In addition, for the male high-risk subgroup, no significant positive difference was evident when comparing the pretest results with any of the tests results conducted after the conclusion of the program.

When comparing the experimental and control groups, the results of the experimental group were significantly better than those of the control group for the female low-risk subgroup in the posttest and also for the male high-risk subgroup in the follow-up II test. However, there was no subgroup for which the results of the control group were significantly better than those of the experimental group for any of the tests conducted after the conclusion of the program.

Discussion

To examine the effectiveness of drug abuse prevention programs, it is essential to evaluate the effect on the incidence of drug abuse. In intervention studies evaluating drug abuse prevention programs in the United States, the most important measure is to examine whether the appearance of new drug users following the program decreased (8). However, the incidence of drug abuse among students in Japan is much lower than that in the United States, and it is difficult to use this measure for evaluation. In addition, when follow-up tests are carried out to understand the effect on student drug abuse, it is difficult to obtain both cooperation from schools and social understanding. Therefore, this study used the PRECEDE-PROCEED model, including a model of behavioral change, and evaluated the program using the following four measures: the predisposing factor for knowledge about drug abuse, the predisposing factor for attitudes toward drug abuse problem, the enabling factor for self-efficacy regarding drug abuse prevention, and the reinforcing factor for perception of social support for preventing drug abuse.

In both the experimental and control groups, and for both males and females, a long-term effect on knowledge about drug abuse was evident beginning immediately after the program and continuing up to 15 months later. For the other three measures, a short-term effect was generally evident in the experimental group beginning immediately after the program until 3 months later. In addition, it was noteworthy that a long-term effect was evident in the high-risk subgroup that gave affirmative response to the question on drug abuse, beginning immediately after the

program and continuing up to 15 months later. On the other hand, in the control group, although an effect was generally evident immediately after the program, neither a short nor a long-term effect of any kind was evident in males. These results suggest the difficulty in achieving a lasting, continuous effect on males.

The following points can be raised concerning the reasons for the remarkable results observed in the experimental group, when we consider the characteristics of the program implemented in the experimental group.

First, the program focuses on the social influences that foster drug abuse. Knowledge and understanding of the tragedy and seriousness of the mental, physical and social effects of drug abuse are essential for students to be able to avoid drug abuse. However that alone is insufficient, and it is also necessary to learn skills including drug refusal skills and recognizing peer pressure. In Western countries, social influence programs have been developed, and their effectiveness has been demonstrated with clear evidence. For example, Hansen (9) reviewed that positive results were 30% in information programs and 42% in affective programs that primarily appealed to emotions in the studies assessing the intervention effect of drug prevention programs based in schools. However, positive results were achieved in 63% of programs dealing with social influences and the comparatively high percentage of 72% was achieved in multiple-component programs that focused on information and social influences. Additionally, in studies in which a uniform comparison of the degree of effect sizes (10) is possible, Tobler (11) reported that social influence programs and multiple-component programs including social influences achieve greater effects than either information or affective programs. However, Skara and Sussman (12) pointed out that the long-term effects of more than two years have not yet been sufficiently demonstrated for programs focusing on social influences.

Second, the program effectively integrates role-playing activities. Beginning in the 1970's role-playing was used in the development of programs dealing with social influences designed for smoking prevention education. After that, it became widely used in programs dealing with themes such as drinking, drug abuse and sexual behavior (13). In the program, realistic simulations that seem likely to invite drug abuse are employed. Teachers from the school play the inviting role, while students in the same class play the role as targets. The student observers are questioned about the existence of peer pressure and refusal skills. It is believed that the appearance of known teachers at the school and classmates on the stage draws the attention of the student observers. Additionally, it is conjectured that the presentation of the drug abuse problem as a real issue close to the students is effective in raising the interest of the students, making them consider objectively and improving self-efficacy.

Third, the program uses the cooperation of pharmacists, police officers and teachers. In the program, these three groups of people divide the work, presenting the contents that make use of their respective specialties. Additionally, the appearance of cooperation developed by the specialists and teachers at the school is likely to leave a deeper impression on the students and provoke a positive reaction.

However, sufficient knowledge about drug abuse was observed in the control group. This suggests the effects and limitations of information programs based on a lecture format. It seems that similar drug education classes are widely used in Japanese schools. To improve educational effectiveness, it is necessary to follow advice focusing on social influences after such classes. Furthermore, this study showed comparatively greater effects on females than on males. The reason for this is not clear in this study. The fact that the pharmacist was female might influence the results.

Finally, some limitations of the study must be considered. The follow-up tests might have acted as an auxiliary intervention, reinforcing the educational effects of the program, and this study may overestimate the effects of the program. Moreover, for the intervention effect in the control group, the personal ability of the pharmacist may have also contributed to the effects of the program. In the experimental group, as the pharmacist and police officer that implemented the program were themselves members of the project, the maximum inter-

vention effect may have been achieved. In the future, to generalize the effectiveness of the program, it is necessary to ascertain the results achieved by people who did not participate in the project.

In conclusion, the social influence program for drug education class showed remarkable effectiveness. Thus, the program may be useful for preventing drug abuse among high school students in Japan.

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References

- (1) Headquarters for the Promotion of Measures to Prevent Drug Abuse. New Five-Year Drug Abuse Prevention Strategy, the Cabinet Office, Government of Japan; 2003.
- (2) Nozu Y, Tsunoda H. A review of studies on school-based smoking prevention programs. *Jpn J Public Health*. 1992; 39:307–318. (Article in Japanese)
- (3) Shima M, Ogimoto I, Shibata A, Fukuda K. Critical evaluation of school-based anti-smoking education in Japan. *Jpn J Public Health*. 2003;50:83–91. (Article in Japanese)
- (4) Nozu Y. Drug abuse prevention education. *Today's Therapy in Pediatrics* 13th ed. Tokyo: Igaku-Shoin; 2004. P. 535–536. (Article in Japanese)
- (5) Basch CE, Sliepcevich EM, Gold RS, Duncan DF, Kolbe LJ. Avoiding type III errors in health education program evaluations: a case study. *Health Educ Q*. 1985;12:315–331.
- (6) Japanese Society of School Health. An anti-drug pamphlet "Never done"; 2000. (Article in Japanese)
- (7) Green LW, Kreuter MW. *Health Promotion Planning: An Educational and Ecological Approach* 3rd ed. Mayfield Publishing Company; 1999.
- (8) Hansen WB, O'Malley PM. Drug use. In: Diclemente RJ, Hansen WB, Ponton LE editors. *Handbook of Adolescent Health Risk Behavior*. New York: Plenum Press; 1996. P. 161–192.
- (9) Hansen WB. School-based substance abuse prevention: A review of the state of the art in curriculum, 1980–1990. *Health Educ Res*. 1992;7:403–430.
- (10) Glass G, McGraw B, Smith M. *Meta-analysis in Social Research*. Beverly Hills, CA: Sage Publications; 1981.
- (11) Tobler NS. Meta-analysis of adolescent drug prevention programs: Results of the 1993 meta-analysis. *NIDA Res Monogr*. 1997;170:5–68.
- (12) Skara S, Sussman S. A review of 25 long-term adolescent tobacco and other drug use prevention program evaluations. *Prev Med*. 2003;37:451–474.
- (13) Iwata H, Nozu Y, Watanabe M. The trend of teaching practices using role-play in school health education at Western countries. *Jpn J School Health*. 2003; 45(Suppl.): 110–111. (Article in Japanese)