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Impact of a Peer-Educator Led LifeSkills Training Tobacco Module on Tobacco-Related Attitudes, Knowledge, and Susceptibility in 5th and 6th Graders



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ABSTRACT

The purpose of this intervention was to assess student changes on measures of susceptibility, knowledge, and attitudes relating to smoking before and after administration of the peer-educator led Life Skills Training Program (LST) in the Shaker Heights Woodbury Upper Elementary School. Tobacco is the leading cause of preventable death in the United States, and it is estimated that 80 percent of tobacco users initiate use before the age of eighteen. Many public health intervention programs have been tailored to youth prevention efforts; the Life Skills Training Program (LST) is one such program. LST is a school-based intervention targeted at middle school aged children that can be taught by either teachers or peer-educators. A study population comprised of fifth and sixth graders from Woodbury School in Shaker Heights who would be receiving the tobacco module of the LST intervention was sampled. Students received a pre and post test survey. A total of 653 students participated. Age, gender and grade level were the only demographic data obtained. Results were stratified according to grade, gender, smoker in the household and previous tobacco use. Significant changes in attitudes and knowledge were seen between pre and post tests in all categories except girls' attitudes. Significant changes in susceptibility scores were only seen in half the categories. 5th graders showed lower pre test knowledge scores than 6th graders, but 5th graders also showed greater improvement in knowledge about tobacco between the pre and post tests compared to 6th graders. Girls and boys had comparable changes in knowledge. However, there was no significant change in girls' positive attitudes towards smoking. Students with prior smoking history showed less change in knowledge

and positive attitudes towards smoking. These groups also did not show a significant reduction in susceptibility between pre and post tests. Boys and students with a smoker in the house had greater susceptibility scores than other subgroups. The LST tobacco module appears to be effective in increasing knowledge and decreasing students' positive attitudes towards smoking. Susceptibility appears to be less affected by this intervention than attitudes and knowledge. However, based on our results, it may be beneficial for instructors or program designers to focus on certain subgroups who do not show significant changes in knowledge or susceptibility. Future research should be conducted to compare peer-led and teacher-led interventions, as well as to better understand whether differences exist in results based on gender of the peer instructors. It would also be beneficial to do a long term follow-up to further determine the impact of the intervention on later smoking behavior.

BACKGROUND

Tobacco is the leading cause of preventable death in the United States (CDC, 2002). Many public health initiatives and policies have focused on reducing overall tobacco use as well as prevention of smoking initiation. Approximately 80 percent of tobacco users initiate use by age eighteen, making adolescents the most vulnerable population (YTS 2000). In addition, a trend of increasingly early tobacco initiation has been observed, with 8.4% of middle school smokers trying smoking before they reach the age of 11 (YTS 2000). According to the Youth Tobacco Survey, 36.3% of middle school students have used tobacco at least once, while 15.1% currently smoke (YTS 2000). If the trend of early tobacco initiation continues, about five million

U.S. children who are currently under 18 years old will die prematurely as adults due to tobacco-related causes (CDC 1996).

Tobacco Reduction education programs that seek to change social norms, to educate regarding the negative effects of smoking, and teach skills to resist smoking initiation are therefore recommended for young adolescents. LST is one such school-based program designed to prevent alcohol, tobacco, and other substance use among youth. The program has a three-pronged approach, aiming to address 1) alcohol, tobacco, and other substance use (ATOD)-related knowledge, attitudes, and norms; 2) skills for resisting social influences, and 3) personal self management skills. The LST program is comprised of 15 class periods, lasting approximately 45 minutes each, and aimed at middle school or junior high school students. The program also contains later booster sessions to reinforce the material throughout the students' academic experience. In all there are at least 10 booster sessions following the first year of the program, and five the following year.

LST is currently the most comprehensively evaluated school-based prevention program available. More than two decades of research have demonstrated prevention effects with respect to alcohol (Botvin et al, 1984,1994), tobacco (Botvin et al.1980, 1983), and marijuana use, other substance use, multiple substance use (Oetting, 1987; Botvin, 1990; Hawkins, 1992), and hypothesized mediating variables (Botvin 1982). The magnitude of the reported effects has usually been large, with most studies reporting reductions of 50% or more relative to control groups.

Current literature suggests that anti-smoking programs may be more effective if they employ peer

educators instead of classroom teachers. A recent literature review by Gottfredson & Wilson (2003) studied 94 other research reports and looked at peer-led interventions, teacher-led interventions, and integrated teacher-peer interventions in school-based substance abuse programs. The authors conclude that peer-only delivery had the highest effect size, while programs using peers and teachers, and teachers-only were significantly less effective. Therefore, the peer-teaching element in the LST program may be key in effectively conveying the anti-smoking message to students.

This paper therefore focuses on evaluation of one tobacco module of a peer-lead program in upper elementary students. Existing research studies have evaluated the LST program as a whole but have not determined the effectiveness of individual components. Our evaluation supplements existing research by providing data on the efficacy of one specific session of the LST program. This research will evaluate the effect of the tobacco module of the LST program on students' attitudes, knowledge, and susceptibility regarding tobacco.

METHODS

Design: This study utilized a quasi-experimental, one group pre test/post test design.

Participants: The study population was comprised of all fifth and sixth grade students at Woodbury Upper Elementary School in Shaker Heights, Ohio who received one peer-educator led tobacco-related LST module. Woodbury was selected for the program evaluation due to high sample availability and the racial and socioeconomic diversity of the student body. A total of 653 students were included, representing all students

receiving this educational model from peer-educators.

Instruments: The students completed the pre test prior to the LST presentation and the post test after the presentation. The pre and post tests were matched according to pre assigned numbers, maintaining the anonymity of the subjects. Age, gender and grade level were the only demographic data obtained from the survey. The questionnaire used was a modified version of an existing LST evaluation instrument. Our version consisted of seventeen questions to assess knowledge, attitudes, susceptibility, and behavior. We also added a word bank to allow students a more open-ended way to express their attitudes regarding smoking.

Analysis: To compute knowledge scores, we used seven questions assessing the student's knowledge of a number of smoking related issues that were covered during the educational module, specifically: 1) whether or not they believed most adults smoke cigarettes, 2) if smoking causes your heart to beat slower, 3) if smoking makes it harder for kids to breathe, 4) if smoking makes one's teeth and fingers yellow, 5) if a stimulant is a chemical that calms down the body, 6) if smoking costs a lot of money, and 7) if they believed most kids their age have tried smoking. The data was recoded and dichotomized so that a student received a score of "1" for each correct answer and a score of "0" for each incorrect answer.

The responses were then summed to give each participant a knowledge score between 0 and 7 on both the pre and the post test. Paired sample t-tests were used to compare pre and post test results within each group, and independent sample t-tests were used to compare post test results between groups to determine magnitude of knowledge test score changes.

Questions that were included in attitude scores were: 1) do you think smoking cigarettes makes you look cool, 2) do you believe kids who smoke have more friends, and 3) do you believe that most kids your age have tried smoking? Like knowledge and susceptibility questions, these questions were combined to form an attitude score via recoding. A decrease in attitudes scores shows more negative attitudes regarding smoking. Although combining these three questions does not produce optimal internal consistency for either the pre test or the post test, the combined statistical power of these three questions combined was greater than evaluating each attitude question alone (Cronbach's alpha pre=.463, post=.573). Each of the items included in this score contributes to the Cronbach's alpha, with any deleted item lowering the Cronbach's alpha, indicating that each item contributes to internal consistency.

In order to obtain the susceptibility scores, questions: 1) do you think you will smoke cigarettes or cigars within the next year, 2) do you think you will smoke cigarettes or cigars in high school, and 3) if one of your friends offered you a cigarette would you smoke it, were combined and recoded on a one to five point scale. The sums of the scores were divided by the total number of questions that the students answered to give each participant a susceptibility score between 1 and 5, with increasing numbers indicating increased susceptibility to smoking. We were able to combine these three questions with high reliability for both the pre and post test results (Cronbach's alpha= 0.776, 0.843).

To analyze the data, SPSS v.12.0 for Windows was used. We excluded all LST cases who did not complete the pre test or post test, totaling 29 cases. Our final analysis included 624 cases from the LST program

(95.5% of total responses included in analysis). Results were stratified out by grade level, gender, current or past smoking behavior, and household smoker.

Hypotheses:

1. It was predicted that students would improve from pre test to post test in knowledge, attitude and susceptibility, with the greatest change occurring in knowledge, then attitude, then susceptibility.
2. It was predicted that personal exposure to tobacco use would make students less receptive to the teaching session, including 1) students with a smoker in the home, 2) students who reported current smoking versus those who did not and 3) students who reported smoking by at least one of their closest friends.
3. It was predicted that there would be differences in response based on gender and grade level.

RESULTS

Participant Demographics, shows the characteristics of the student population who participated in the LST program evaluation. The study population was ap-

	N	%	N	%
LST Total	624			
5th Grade/6th Grade	329	52.7	295	47.3
Boy/ Girl	326	52.2	272	43.6
Smoker/No smoker in home	166	26.6	453	72.6
Past/No past tobacco use	53	8.5	568	91.0

Table 1: Participant Demographics

	Pre test mean score	Post test mean score	t-test	p-value
Adults smoke cigarettes	0.56	0.81	-11.63	<.001
Smoking a cigarette causes your heart to beat slower	0.18	0.26	-3.74	<.001
Smoking makes it harder for kids to breathe	0.05	0.03	1.15	0.250
Smoking makes your teeth and fingers yellow	0.22	0.04	10.08	<.001
A stimulant is a chemical that calms down the body	0.52	0.56	-1.98	0.049
Smoking cigarettes makes you look cool	0.31	0.26	2.00	0.047
Kids who smoke have more friends	0.72	0.54	4.64	<.001
Smoking costs a lot of money	2.29	3.29	-15.06	<.001
Most kids my age have tried smoking	1.23	1.15	2.02	0.044
Do you think you will smoke cigarettes within the next year	3.83	3.87	-1.84	0.066
Do you think you will smoke cigarettes in high school	3.72	3.78	-2.44	0.015
If one of you friends offered you a cigarette would you smoke it	3.78	3.83	-2.70	0.007
Does anyone in your house smoke	0.26	0.25	1.00	0.318
Do any of your close friends smoke	0.07	0.08	-0.85	0.394
Have you ever tried smoking, even one or two puffs	0.05	0.04	0.45	0.655
Have you ever tried smoking cigars, cigarillos, or little cigars	0.03	0.05	-2.14	0.033

Table 2: Results of Individual Items from the Paired Sample T-test, LST Intervention Pre Test vs. Post Test

	n	Pre test mean score	Post test mean score	t-test	p-value
All Participants					
5 th Grade	327	3.86	5.08	-15.24	<.001
6 th Grade	293	4.13	4.87	-9.94	<.001
Boy	324	4.06	5.04	-12.50	<.001
Girl	272	3.94	4.96	-12.51	<.001
Smoker in home	165	3.64	4.83	-10.19	<.001
No smoker in home	450	4.12	5.06	-14.94	<.001
Past tobacco use	53	3.92	4.68	-3.43	0.001
No past tobacco use	564	4.00	5.02	-17.75	<.001

Table 3: Changes in Knowledge Based on Personal Characteristics

proximately evenly distributed between both genders, with 52.2% of the participants being boys and 43.6% of the participants as girls. Approximately half, 52.7%, of participants were in 5th grade and 47.3% were in 6th grade. Since only 26.6% of participants reported having a smoker in the home, a majority of children do not experience tobacco use on a daily basis in their homes. Only 8.5% of study participants reported previous tobacco use.

Paired sample T-test, LST Intervention pre test vs. post test, shows the changes between the mean responses to questions on the pre and post tests administered to the LST participants. Most of the predicted questions asked showed significant changes in response. For example, between pre and post test, there was a significant change in the number of students who thought that most adults have smoked cigarettes ($t=-11.63$, $p<.001$). When asked if smoking makes you look cool, question six, the mean decreased by 0.05 points between pre and post tests ($t=1.995$, $p=.047$) suggesting that fewer students felt that smoking makes you look cool after the LST intervention. Also, when students were asked if they believed if kids who smoke have more friends the mean decreased from 0.72 to 0.54 between pre and post test ($t= 2.02$, $p=.044$), indicating that between pre and post tests, less participants felt that their peers who smoke have more friends. Items that would not be expected to change between pre and post testing, such as household smokers, close friends smoking, and whether the student has tried smoking cigarettes, did in fact not generally change. Interestingly, there was a significant change in reports of cigar use from pre to post test, even though this was not a planned teaching goal.

As Described in Table 3, participants show sig-

nificant changes in knowledge between the pre and post tests. (Report all participant total first) Overall 5th graders' mean knowledge scores increased statistically between the pre and post test from 3.86 to 5.08, ($t=-15.24$, $p<.001$). 6th graders knowledge scores also significantly increased from pre test scores to post test scores from 4.13 to 4.87 ($t= -9.94$, $p< .001$). Although 6th graders had a significantly higher knowledge score in the pre test questionnaires ($t=-2.77$, $p=.006$), by the post test the 5th graders significantly surpassed them in increased smoking knowledge ($t=2.29$, $p=.023$).

Boys showed a statistically significant increase in knowledge scores from 3.99 on the pre test to 4.98 on the post test ($t(323)=-12.50$, $p<.05$). Girls also showed an increase in mean knowledge scores from 4.06 to 5.04 ($t(271) = -12.51$, $p< .05$). At the time of the pre test and the post test both boys' and girls' knowledge scores did not differ significantly from one another ($t=1.322$, $p=.187$), and ($t=.896$, $p=.370$) respectively.

Students who did not have a smoker in the home had a 4.12 pre test score and a 5.06 post test knowledge score showing a statistically significant increase in knowledge score ($t= -14.94$, $p<.001$). Participants who had a smoker in the home also showed a statistically significant increase, from 3.64 points to 4.83 knowledge score points in the post test ($t=-10.19$, $p<.001$). Those who did not have a smoker in the home had a significantly higher pre test score than those who do have a smoker in the home, ($t=4.31$, $p<.001$) and this carried over in to the post test as well, where students without smokers in the home still had a significantly higher post test score than those who did ($t=2.23$, $p=.026$).

Participants who reported no past tobacco use had a pre test score of 4.00 and a post test score of 5.02,

a statistically significant increase in mean knowledge scores ($p=.001$). Participants who did report past tobacco use also showed a significant knowledge point increase in mean knowledge scores from 3.92 to 4.68 from the pre test to post test ($p<.001$). Students who did not use tobacco previously had significantly higher post test scores than those who had smoked previously.

Table 4 summarizes the participants' susceptibility scores, or their overall susceptibility to smoking initiation. (Report all participants first). 5th graders showed a decrease in mean susceptibility scores, from 1.18 in the pre test and 1.14 in the post test, but this decrease was only approaching significance ($t=1.85$, $p=.065$). However, 6th graders showed a statistically significant decrease in post test susceptibility scores, from 1.28 points in the pre test and 1.22 points in the post test ($t=2.62$, $p=.009$). 5th graders had a significantly lower pre test susceptibility score of 1.19 than 6th graders who had a pre test score of 1.28 ($t(522.69)=-2.30$, $p<.05$). 5th graders also had significantly lower post test susceptibility scores (1.14) than 6th graders (1.22).

Boys showed a statistically significant decrease in susceptibility from 1.28 in the pre test to 1.22 in the

post test ($t=2.87$, $p=.004$). Also, girls showed a decrease from 1.16 in the pre test to 1.13 in the post test, indicating that girls' susceptibility was approaching statistical significance, ($t= 1.79$, $p=.075$). Girls had a significantly lower pre test mean of 1.28 susceptibility score than boys who had 1.17 ($t=2.83$, $p= .005$) and girls post test scores of 1.22 remained significantly lower than that of

boys who had a mean score of 1.13 ($t= 2.28$, $p=.023$). Students who reported having a smoker in the home showed a significant point decrease from 1.43 to 1.29 in susceptibility scores ($t=3.31$,

$p=.001$). Those who did not have a smoker in the home did not show a significant change in susceptibility due to the LST program. Students who had smokers in their houses entered with significantly higher susceptibility scores of 1.43 in comparison to those who did not have smokers in the home (1.16). Additionally, in post test susceptibility scores, students with no smoker in the home had significantly lower scores (1.14) when compared those with smokers in the home who had post test scores of 1.29.

Students who reported past tobacco use showed a decrease in mean susceptibility scores from 1.77 susceptibility points to 1.66 points, although this change

	n	Pre test mean score	Post test mean score	t-test	p-value
All participants					
5th Grade	324	1.18	1.14	1.85	0.065
6th Grade	293	1.28	1.22	2.62	0.009
Boy	324	1.28	1.22	2.87	0.004
Girl	269	1.65	1.13	1.79	0.075
Smoker in home	165	1.43	1.29	3.31	0.001
No smoker in home	450	1.15	1.14	1.17	0.244
Past tobacco use	52	1.77	1.65	1.50	0.140
No past tobacco use	564	1.18	1.14	2.82	0.005

Table 4: Changes in Tobacco Use Susceptibility Based on Personal Characteristics

was not statistically significant ($t= 1.5$, $p=.140$). Those who had not used tobacco previously showed a significant decrease in mean susceptibility scores from 1.18 points to 1.14 ($t= 2.82$, $p=.005$).

Table 5 shows changes in students' attitude scores. 5th graders showed a significant decrease in positive attitude towards smoking with a pre test mean of 1.69 and a post test mean of 1.60 on the attitude scale ($t= 2.84$, $p= .005$). Also, 6th graders showed a significant decrease in positive tobacco attitude from 1.82 to 1.70 ($t= 3.98$, $p<.001$). Although 5th and 6th graders' pre test scores were significantly different from one another, with 5th graders' scores being lower, ($t=-2.49$, $p=.013$), by the post test, 6th graders' attitudes were not significantly different from 5th graders ($t=-1.82$, $p=.069$).

Boys' positive tobacco attitude scores significantly decreased from pre test to post test, from 1.75 to 1.60 ($t=4.35$, $p<.001$). Girls' post test attitude scores also decreased from 1.75 to 1.69, but this finding was not significant ($t=1.78$, $p=.078$). Boys and girls started

with identical pre test attitudes scores.

Participants who reported a smoker in the home showed a significant decrease in mean attitude scores from 1.95 to 1.81 ($t=2.93$, $p=.004$). Those who did not have a smoker in the home showed a decrease in mean attitudes scores from 1.68 to 1.58 ($t=3.81$, $p=.004$). Those who did not have a smoker in the home had significantly lower pre test attitude scores ($t=-4.25$, $p<.001$) as well as post test scores ($t=-3.63$, $p<.001$).

Participants who reported past tobacco use showed a decrease in positive attitudes toward smoking, from 2.2 to 2.02 ($t=2.22$, $p=.031$). Students who reported no prior tobacco use also showed a significant decrease in negative attitudes from 1.70 to 1.60 ($t=4.25$, $p<.001$). Those who had never smoked had significantly lower pre tests attitude scores than those students who had smoked ($t=-4.39$, $p<.001$). This was true of post test scores as well; those who had never smoked had significantly lower scores than those who had ($t=-3.12$, $p<.001$).

	n	Pre test mean score	Post test mean score	t-test	p-value
All participants					
5th Grade	325	1.69	1.60	2.84	0.005
6th Grade	291	1.82	1.70	3.98	<.001
Boy	321	1.75	1.60	4.35	<.001
Girl	271	1.74	1.69	1.77	0.078
Smoker in home	165	1.95	1.81	2.90	0.004
No smoker in home	446	1.68	1.58	3.81	<.001
Past tobacco use	53	2.23	2.02	2.22	0.031
No past tobacco use	560	1.70	1.60	4.25	<.001

Table 5: Changes in Attitudes about Smoking Based on Personal Characteristics

Pre test			Post test		
Word	n	%	Word	n	%
1. unhealthy	477	76.4	1. unhealthy	447	71.7
2. dangerous	419	67.1	2. dangerous	401	64.3
3. stupid	417	66.8	3. stupid	377	60.4
4. addictive	213	34.1	4. expensive	203	32.5
5. smelly	134	21.5	5. addictive	198	31.7
6. expensive	76	12.2	6. smelly	141	22.6

Table 6: LST Word Bank

Table 6 examines the Tobacco Word Bank and demonstrates the top five responses on the pre and post tests. On both the pre and post tests, the most popular choices were “stupid” (pre=66.8%, post=60.4%), “dangerous” (pre=67.1%, post=64.3%) and “unhealthy” (pre= 76.4%, post= 71.7%). Interestingly, 20.3% more students chose “expensive” on the post test than the pre test. To compensate for this increase, the words stupid, unhealthy, dangerous, and addictive decreased slightly.

Finally, when comparing the Pearson’s correlation coefficients of pre test and post test scores, we noted that the mean susceptibility score is positively and significantly related to attitudes. $r(615)=.294, p<.05$). Post test susceptibility scores are negatively and significantly correlated to post test knowledge scores $r(617)= -.137, p<.05$), $r(616)=.279, p<.05$) and a .299 point increase in pre test knowledge scores, $r(617)=-.299, p<.05$). Post test attitude scores are significantly correlated to post test susceptibility scores and post test knowledge scores, $r(615)=.294, p<.05$) and $r(619)=-.37, p<.05$) respectively.

Finally, when examining Pearson’s correlation coefficients in Table 7, post test values for positive tobacco attitude and future tobacco use susceptibility are significantly correlated with each other, and negatively

correlated with knowledge. This implies that increased knowledge may have a role in determining attitudes and susceptibility in a manner that may decrease future tobacco use.

DISCUSSION

Prior research shows that knowledge and attitudes are often influenced by presentations such as LST, but susceptibility—the better predictor of future smoking behavior—is less easily influenced (Pierce et al. 1996). Therefore, we predicted that when questions were grouped according to knowledge, attitudes, and susceptibility, knowledge and attitudes would change most significantly. This was indeed true. When results were stratified according to grade, gender, smoker in household and prior tobacco use, significant changes in knowledge and attitudes were seen across all categories, but significant changes were only seen across half of the susceptibility categories. The only exception to this trend is girls’ attitudes, which did not change significantly.

A particular finding of interest is the difference in pre and post test knowledge scores among 5th and 6th graders. While 5th graders’ pre test knowledge scores were lower than 6th graders’ scores, the 5th graders actu-

ally had higher scores than the 6th graders on the post test. Although both groups had significant changes in knowledge, the 5th graders learned and retained approximately 40% more knowledge than 6th graders, surpassing their older peers' post test knowledge scores even with lower tobacco-related knowledge scores at baseline. Future research should focus, therefore, on the reasons for this disparity and on possible methods for increasing 6th graders' knowledge scores even further. Perhaps the knowledge segment of the program needs to be administered differently to the two grades. Additionally, research should be conducted to see what the change in knowledge and attitudes is between 6th graders who have received a tobacco program in both 5th and 6th grade and those that receive a tobacco program in only 6th grade.

Girls' knowledge change and boys' knowledge change was comparable. However, while there was no significant change in girls' positive attitudes toward smoking, boys' positive attitudes did change significantly. More research should be conducted to examine the reasons for these differences in attitude change. Perhaps an additional attitude-related component of LST should be geared specifically toward girls.

Students without prior tobacco use gained 25% more knowledge than those students with prior tobacco use. However, those students with prior tobacco use had decrease in positive attitudes towards smoking that was more than twice that of those of students without prior tobacco use. Additionally, our results on the susceptibility portion of the survey indicate that while most subgroups reported a significant reduction in susceptibility to smoking, current or past smokers did not. However, the insignificance of this groups' reduction may be attributable to the smaller size of the group (n=56), as

their numeric scores actually changed more than those of non-smokers. We therefore recommend that more attention be paid to this particularly susceptible subgroup to assess how much they are truly benefiting from LST. The LST curriculum currently does not include any section geared toward current or past smokers; perhaps a brief discussion focusing on the benefits of quitting if a student already smokes would be helpful. Additionally, LST presenters could mention a few resources for students who wish to quit smoking. An additional study with a much larger sample size of current or past smokers would help clarify the program's true impact on this population.

Other particularly susceptible subgroups included boys and students with a smoker in the household. While these groups did have a significant decrease in susceptibility, their post test susceptibility scores were still much higher than the pre test and post test scores of less susceptible groups. Thus, while the LST program was effective in significantly reducing the susceptibility scores of these groups, future research should focus on reducing these groups' susceptibility scores even further.

Lastly, while the 5th graders did not have a significant decrease in susceptibility scores, this lack of change was primarily due to their low pre test score (1.14). In contrast, the 6th graders showed a statistically significant decrease in post test susceptibility scores, from 1.28 points in the pre test to 1.22 points in the post test. However, it is notable that their post test scores were still higher than 5th graders' scores on the pre test. This highlights 6th graders as a more susceptible group; perhaps more research should focus on affecting this older cohort in particular.

Limitations: Our study had several limitations. Most importantly, there was no short or long term follow-up, so we cannot draw any conclusions about lasting effects of the LST program on students' tobacco knowledge, attitudes, and susceptibility. Additionally, we had no way to determine the extent to which classroom teachers participated in LST presentation. This limitation is of particular concern; many studies have shown significant differences in the effectiveness of teacher-led versus peer-led anti-smoking interventions. Our study also did not include any questions about socioeconomic status or race/ethnicity. This is problematic since these factors may affect smoking susceptibility. Lastly, while many of our questions were from previously tested surveys, the word bank was not from literature, and was not framed in a manner that facilitated pre test/post test analysis. The other questions from prior literature did not all come from the same source, and therefore had not been used in combination before.

Study strengths included a large study population and standardized questionnaire administration. Additionally, while we did not ask students to report race or ethnicity, all students came from one school with a very diverse student body.

Future Research: Future research should include long-term follow-up to determine if the LST intervention does in fact deter smoking behavior. It is also important to determine differences in results between classes that have only peer educators and those that have a teacher influence. Additionally, anecdotal evidence shows there to be a possible difference in effectiveness between male and female peer-presenters. Future research should examine this difference. Lastly, it is important to determine the extent to which peer administration of LST aided or hindered program effectiveness. Comparing a peer-led LST program with an adult-led program would help clarify this issue.

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