

The Mystery Behind the Addiction to Cigarettes

Supercomputing Challenge

Final Report

Capshaw Middle School

Team 28

Area of Science: health

Team Members:

Mercedes Downing

Emily Durham

Nathan Rees

Kaegan Schultz

Teacher:

Ms. Monese

Sponsor:

Ms. Monese

Table of Contents

Executive Summary	3
Introduction.....	4
Project Proposal.....	4
Project Description	5
Math Model.....	5
Research	6
Results/Conclusions	9
StarLogo.....	10
Works Cited.....	12

Executive Summary:

Teenage is the most vulnerable stage among the different stages of human growth and development. It is a time when people are unsure of themselves and look for role models to emulate. Teens want both to conform to different trends in their environment and to be recognized as individuals. This tug of war affects self esteem and increase vulnerability. Teens like to fit in or to become socially accepted. When people are teens, they try many things including smoking. In this project we wanted to find out why teens smoke even when they know the harms of cigarette smoking. In order to investigate this behavior, we read books and internet articles about smoking. We also interviewed our peers at school, about cigarette smoking and why they think teens smoke. Based on this information, we built a StarLogo program to model to test different variables that contribute to smoking. The results of our investigation showed that teens smoke because of the need to belong and for the immediate social gain smoking provides. These were major themes influencing teen smoking decisions. We also found out that exposure to cigarettes mattered, teens that were exposed to cigarettes, either by family members, media, or friends seemed to try smoking more than those who did not. Most go on to become addicted.

We ran trials manipulating the number of times a teen is exposed to cigarettes smokers and the probability that they would try smoking. This model imitates the real-teen environment. As a teen comes in contact with those who smoke, the probability of becoming smokers increases. The model was built to recognize that most individual can pick up smoking because of who they associate with.

This project has provided an example that can be manipulated to include many topics that are relevant in the middle school: bullying spread of disease, the susceptibility of individuals to alcohol, drug, and tobacco use, and sexual activities. This project also showed us that teens sometimes become who they hang out with.

Introduction:

The hypotheses of this project are:

The number to times a teen is exposed to cigarettes smokers would increase the probability of trying cigarettes.

The lower the number of people a potential smoker associates with, the less likely they will smoke.

Project Proposal:**Statement of the problem:**

The purpose of this project was to model how exposure to cigarettes smokers increases a teen's likelihood to smoke cigarettes. Research showed that being a teen is a vulnerable developmental stage. Teens want to imitate what they are exposed to. Those who are exposed to cigarette smoking, whether it's through family members, peers, friends, media, tend to smoke. Research we did supported our initial belief that smoking trends spread based on the probability one is exposed to smokers. We wanted to find out if there was a relationship between the numbers a teen is exposed to cigarettes to the probability of becoming a smoker.

Project Description:

We created a simple model to test different variables in the probabilities of exposure to smoking to see how it would impact teen's chances to smoke. We thought that teens that were bombarded by cigarettes in their world, through family members, peers, and media would pick up smoking 100% over 10 iterations of the model, but we found out that a small percentage of teens did not end up smoking. This was a bright moment in our research to show that some teens rise above the pressures in their lives. We want to pursue this line of research to find out why they never smoked. We researched a gene called The gene CYP2A6 has addicted millions of people to cigarettes. It was discovered on June 24, 1998 and we now know it as CYP2A6. More than a half a million people are infected with CYP2A6 in the United States that causes cigarette addiction.

Math:

We used the following equation to graph the expected number of times a teen is exposed to cigarettes in a given time:

Experiment 1: There are 4 equal factors that expose a teen to cigarette smoking. They are: family member, peers, media, and no exposure. The probability of landing on picking up smoking is 1:4

$$\begin{array}{rcl} \text{Probabilities: } p(\text{family members}) & \frac{\text{chances of smoking}}{\text{Total number of exposures}} & \frac{1}{4} \end{array}$$

$$\begin{array}{rcl} P(\text{peers}) & \frac{\text{chances of smoking}}{\text{Total number of exposures}} & \frac{1}{4} \end{array}$$

$$\begin{array}{rcl} P(\text{media}) & \frac{\text{chances of smoking}}{\text{Total number of exposures}} & \frac{1}{4} \end{array}$$

$$\begin{array}{rcl} P(\text{no exposure}) & \frac{\text{changes of smoking}}{\text{Total number of exposures}} & \frac{1}{4} \end{array}$$

The probability of smoking cigarettes is the measure of the chance that the a teen will become exposed to smoking.

The probability of having a smoking family member (event A) is the number of ways this can occur divided by the total number of possible outcomes. The probability of an event A, symbolized by $P(A)$, is a number between 0 and 1, inclusive that measures the likelihood of an event in the following way:

If $P(A) > P(B)$ then event A is more likely to occur than event B.

If $P(A) = P(B)$ then events A and B are equally likely to occur.

Research:

Why Teens Smoke

If you are a teenager, chances are that you have considered taking up smoking at some point. About 3,000 teenagers pick up the smoking habit each day in America, or roughly one million new teenage smokers per year. About 60% of all high school students try smoking by the time they are seniors. That means lots of new smokers, and it also means there's a good chance that you or one of your friends is smoking right now. Teens smoke for many reasons and often for the same reasons as adults do: to cope with stress, to control their weight, as a social habit and to combat boredom.

One of the biggest reasons teens start to smoke is peer influence - their friends do it. Studies show that this is especially true for girls. Studies show one of the most important tools parents have with teens is their relationship. Parents need to use their parental influence. Know who their kids hang out with. Have high expectations for them. Listen to them and treat them with respect. Your kids will hold themselves to higher standards too. This is especially important if you smoke yourself.

There's clear evidence that tobacco companies target children in their marketing. Some of the most effective are sports sponsorships - for example, boys are twice as likely to smoke if they follow car racing. Movies too - the more kids see their favorite movie stars smoking on the screen, the more likely they'll try it themselves. Some researchers think that tobacco advertising carries even more weight than peer influence.

Finally, the main reason that kids smoke is that adults do. Smoking is seen as adult behavior and kids are always looking for ways to be more grown up.

School Survey:

We surveyed about 50 of our peers because we wanted to find out why teens smoke even when they know the dangers of cigarette smoking. We did this research in the hope of helping teenagers to understand *why* so many teenagers start smoking. Hopefully, if they *understand* why teenagers start smoking, chances are that they won't smoke. It is sort of like a magic trick. The first time you see the trick it looks really cool and mysterious. But then if someone tells you how it's done it's not mysterious at all anymore and the trick loses a lot of its appeal. Smoking works the same way.

Dangers of smoking:

Did you know that lung cancer caused by smoking is now the top female cancer killer, claiming 27,000 more women's lives each year than breast cancer? That more teenage girls (about 30 percent) are smoking now than they did 10 years ago? That's a big increase. Many teens want to grow up and get married, raise a family, and live happily ever after. But who you marry will depend on whether or not you smoke because non-smokers tend to avoid smokers leaving smokers to the smokers. Smoking is a very important aspect to a relationship. If you pick up the personal ads in any newspaper you'll

see a lot of people specify a smoking preference. So if you decide to become a smoker, you'll more likely end up married to a smoker. And you'll have kids, and they will grow up being smokers.

Most of what you hear about smoking is that you'll be sick when you're old. But in fact you'll also be sick when you're young. One of the early effects of smoking is you'll be short of breath. You won't be able to run as far as you used to or walk uphill on hot humid days. You'll find yourself wheezing and coughing and you just won't have the physical stamina you used to. You'll be 25 years old and not be able to keep up with non-smokers who are 45 years old.

Being an adult is very important to teenagers. Teenagers crave to be adults, to take their place in society and to be a full adult member of the tribe. So is smoking adult? Not hardly. Smoking is stupid. So why do kids smoke to be more adult? The real reason kids smoke to be more adult is because rebelling is the sign of being an adult. Adults make their own choices. Children have to do what their parents tell them to do. Parents tell children not to smoke. Teenagers smoke to prove to their parents they have the authority to make their own choices. One mistake that parents make is that they don't teach their children how to make good choices. They just "tell them what to do" and expect them to learn the pattern. But they don't let the kids make their own choices and feel the consequences of their own mistakes. This invites rebellion, actually forcing teens to be rebellious as the only way to develop their own reasoning skills. And you can't rebel unless you defy your authority figures. So since the authority figures are usually right on the issues, to rebel is to be forced to make a lot of wrong choices.

TV commercials are another reason why smoking is not only cool, but it's bad. The message they want you to hear is that when you are rebelling against authority that you should choose smoking as the act of rebellion. That's why big tobacco pays movie producers to make sure the bad guys smoke. So if you identify with any character in a movie, and that character smokes, you will want to smoke. You as a teenager need to rise above your parental failures. Although smoking is an act of rebellion, there are plenty of other ways to rebel that don't involve becoming an addict. Ultimately, you are responsible for your own mistakes.

Why is cigarette smoking is bad for a smoker?

Everyone knows that smoking can cause cancer when you get older, but did you know that it also has bad effects on your body right now? A cigarette contains about 4000 chemicals, many of which are poisonous. Some of the worst ones are:

Nicotine: a deadly poison

Arsenic: used in rat poison

Methane: a component of rocket fuel

Ammonia: found in floor cleaner

Cadmium: used in batteries

Carbon Monoxide: part of car exhaust

Formaldehyde: used to preserve body tissue

Butane: lighter fluid

Hydrogen Cyanide: the poison used in gas chambers

What do all these chemicals do to your body?

As you might imagine, even small amounts of the poisonous chemicals in cigarettes can do bad things to your body. Here are some facts about what smoking cigarettes does:

Smoking makes you smell bad, gives you wrinkles, stains your teeth, and gives you bad breath.

Smokers get 3 times more cavities than non-smokers.

Smoking lowers your hormone levels.

When smokers catch a cold, they are more likely than non-smokers to have a cough that lasts a long time. They are also more likely than non-smokers to get bronchitis and pneumonia.

Teen smokers have smaller lungs and a weaker heart than teen non-smokers. They also get sick more often than teens who don't smoke.

What happens to my lungs when I smoke?

Every time you inhale smoke from a cigarette, you kill some of the air sacks in your lungs, called alveoli. These air sacks are where the oxygen that you breathe in is transferred into your blood. Alveoli don't grow back, so when you destroy them, you have permanently destroyed part of your lungs. This means that you won't do as well in activities where breathing is important, like sports, dancing, or singing.

Smoking paralyzes the cilia that line your lungs. Cilia are little hair like structures that move back and forth to sweep particles out of your lungs. When you smoke, the cilia can't move and can't do their job. So dust, pollen, and other things that you inhale sit in your lungs and build up. Also, there are a lot of particles in smoke that get into your lungs. Since your cilia are paralyzed because of the smoke and can't clean them out, the particles sit in your lungs and form tar.

I know smoking is bad for me, but I really like it.

Many teens like the feeling that smoking gives them. This good feeling is from the nicotine in the cigarettes. Some teens think smoking will help them lose weight or stay thin. Many teens also feel like smoking gives them a sense of freedom and independence, and some smoke to feel more comfortable in social situations. If this sounds like you, you should stop and think about whether the things you like about smoking are really worth the risks.

Nicotine can make you feel good, but is feeling good (a feeling you can also get from healthy activities like playing sports) really worth all the bad things cigarettes do to you? If you smoke, you'll get sick more often. You also have the chance of getting lung cancer

or emphysema, which will make you really sick for a long time before you die. If you are very sick, that good feeling from nicotine won't seem so important anymore.

Smoking doesn't really help people lose weight. If that were true, every smoker would be thin.

Smoking lowers your hormone levels.

Do you think that smoking is a sign that you can do what you want? That you are in control of your life?

Think about it this way: When you decide to start smoking, you are doing exactly what tobacco companies want you to do. They spend millions of dollars every year on advertising to try to get new people, especially teens, to smoke. Once they have you hooked, they are controlling you. You are forced to buy their products in order to support your addiction. Do you really want a big corporation controlling your life and telling you how to spend your money?

Why should I stop smoking if I'm not addicted?

Many people don't realize they are addicted to smoking. They think they can easily quit any time they want. But when they try, they forget it is extremely difficult. Unfortunately, it is very easy to get addicted. Cigarettes are just as addictive as cocaine or heroin. Even if you only smoke one or two cigarettes a day and even if you've never bought a pack of cigarettes yourself, you are at risk. Stressful situations or hanging out with friends who smoke might cause you to smoke more and become addicted. Try going a whole week without smoking at all. If you find this difficult, you are probably addicted to cigarettes.

Results:

After analyzing the data, the following hypotheses were found to be correct.

The StarLogo model graphed the probability of smoking that were based on different methods of exposure This graph supports the findings that exposure increased the chances of teen smoking.

Conclusion:

Our findings have significance for public health workers planning and implementing tobacco-use prevention programs aimed at teens whose smoking behaviors are not yet determined by nicotine addiction. How such programs have been traditionally framed and the ways in which peer influence and risk behaviors have been addressed may be largely irrelevant to the rationale of the adolescents themselves.

StarLogo Code:

Observer Procedures:

```
patches-own [ num-stamps-to-give ]
```

```
turtles-own [ num-stamps-left ]
```

```
breeds [ collectors ]
```

```
to setup
```

```
  ca
```

```
  ; setup the patches with the special patch at 0, 0
```

```
  ask-patches [
```

```
    ifelse (xcor = 0 and ycor = 0) [
```

```
      setpc white
```

```
      set num-stamps-to-give num-stamps ;uses the slider value
```

```
    ]
```

```
  [
```

```
    setpc black
```

```
    set num-stamps-to-give 0
```

```
  ]
```

```
]
```

```
; setup the turtles at random positions
```

```
create-and-do 30 [
```

```
  setxy random screen-width random screen-height
```

```
]
```

```
End
```

Turtle Procedures:

```
to go
```

```
wiggle
```

```
change
```

```
pick-up
```

```
drop  
end
```

```
to wiggle  
rt random 60  
lt random 60  
fd random 3  
end
```

```
to change  
if pc = red [setc red - 1]  
if pc = lime [setc lime - 1]  
if pc = yellow [setc yellow - 1]  
if pc = violet [setc violet - 1]  
if pc = blue [setc blue - 1]  
end
```

```
to pick-up  
set num-stamps-left (num-stamps-left + num-stamps-to-give)  
end
```

```
to drop  
if num-stamps-left > 0 [  
stamp color ; leaves a stamp the same color as the turtle.  
set num-stamps-left (num-stamps-left - 1)  
]  
End
```

Works Cited:

Author unknown, "Truth about Smoking",
<http://www.tobacco.aadac.com/prevention/why_teens_smoke> 2007

Brain, Marshall, "Teenager's Guide to the Real World", *BYG Publishing, Inc., Raleigh, NC 27629* - <http://www.bygpub.com>

Center for Young Women's Health Staff, "Information About Smoking: A Guide for Teens", Center for Young Women's Health Children's Hospital, Boston, Ms, 1999-2007

Glosser, "probability", http://www.mathgoodies.com/lessons/vol6/intro_probability.html
2/07

Resch, Linda D., "Let's Make a Deal Math: The Study of Probability", <
www.cyberbee.com/probability/mathprob.html>, 12/02