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CMPSC 480

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## **Content Project**

### **Substance use among the Youth**

A comprehensive analysis of a real-world data set

#### **Introduction**

As a Social Media Marketer with an academic focus in media studies as well as an emphasis on visual storytelling with media technologies. Furthermore, I have a particular passion for data. I love to exercise my ability to take a dataset and generate a story that can impact my community and the world at large. During the polishing of this analysis, I decided to revisit the project with fresh eyes and new perspectives. The large data set I worked with was extracted from 8th graders, 10th graders, and 12th graders and usage of various substances: cigarettes, e-cigarettes, marijuana, alcohol, and binge-drinking. This data is broken down into years: 1980, 1990, 2000, 2005, 2010, 2012, 2013, 2014, 2015, 2016. Having this data divided into years is extremely helpful for us because this allows for better analysis. For example, I could find trends between substance use and progression of time. I narrowed down my dataset to 8th graders, 10th graders, and 12th graders usage of cigarettes. The reason why I wanted to focus on a specific substance is because I wanted to stick to our primary goal of keeping this project simple enough for us to understand every single step that I am doing. I figured that if I focused on more than one substance, not only will our project be extremely complex, but our analysis would also lack in detail as there are many variables to consider. By keeping it short and simple, I can research this topic to a great extent so that I can generate some concrete and interesting conclusions. This project has the potential to truly impact the youth for the better.

When repolishing the project, I was in search of newer correlations between substance use and the progression of time. Previous and initial work here indicated that the progression of time only indicates that there has been an increase in the usage of substance. On the contrary, my

results showcase that as the years went on, substance use among youth decreased. Here lies my motivation to dig deeper and find concrete evidence for why this is shown to be true. My Project outline entails the selection of an exploratory questions of my interest, an appropriate data set, an in-depth analysis of this data set, examination of the dataset. My question for this analysis is: Throughout the years, how has different policies and implementation of these policies helped to decrease national trends of cigarette use among youth in the United States? My focus after formulating the question was to do some focused, in-depth research. In this project, I will provide storytelling from a real data set to enable a communication effort for a change in the tobacco policies. I am arguing against the continuance of harmful tobacco policy. These pieces of analysis will create a movement to influence the tobacco policy. It showcases data reporting at another level.

Retouching base with my research I found that in fact the national, state, and local program activities have been shown to reduce and prevent youth tobacco use when implemented together. Since my initial dataset was too large as it included data for many different substances, not just cigarettes, I condensed it to focus and highlight my object of focus cigarettes. I wanted to narrow it down even more because it ultimately was a general analysis of cigarette use among all youth. This automatically cancelled out worrying about the trends and variables such as race and sex. And finally to keep everything consistent, I cut out the first two data points for all grade levels because oddly enough data for 1980 and 1990 were missing. After all that cutting down, the dataset was small, manageable, and significant. In my visuals and code sections there is a constant trend for all 3 grade levels, the decline in substance use. Further beyond this project, I would like to expand my project by focusing my resources on Electronic cigarettes: (Youth and Tobacco Use). As I read an article which stated that there has been an increase in electronic cigarettes among the youth.

## DATASET

**Dataset Years:** 1980, 1990, 2000, 2005, 2010, 2012, 2013, 2014, 2015, 2016

Substance, grade in school, sex, and race	1980	1990	2000	2005	2010	2012	2013	2014	2015	2016
Cigarettes	Percent using substance in the past 30 days									
All 12th graders	30.5	29.4	31.4	23.2	19.2	17.1	16.3	13.6	11.4	10.5
Male	26.8	29.1	32.8	24.8	21.9	19.3	18.4	15.2	13.0	12.7
Female	33.4	29.2	29.7	20.7	15.7	14.5	13.2	11.6	9.1	8.1
White	31.0	32.5	36.6	27.0	22.2	20.1	18.5	16.5	13.4	13.0
Black or African American	25.2	12.0	13.6	10.0	10.7	8.4	10.8	7.5	6.4	5.5
All 10th graders	---	---	23.9	14.9	13.6	10.8	9.1	7.2	6.3	4.9
Male	---	---	23.8	14.5	15.0	12.0	10.5	7.7	6.1	5.0
Female	---	---	23.6	15.1	12.1	9.6	7.5	6.6	6.3	4.4
White	---	---	27.3	17.0	14.8	12.2	10.4	8.5	7.3	6.3
Black or African American	---	---	11.3	7.7	7.0	6.2	4.2	4.2	3.5	1.8
All 8th graders	---	---	14.6	9.3	7.1	4.9	4.5	4.0	3.6	2.6
Male	---	---	14.3	8.7	7.4	4.6	4.0	3.5	3.3	2.5
Female	---	---	14.7	9.7	6.8	4.9	4.7	4.2	3.7	2.6
White	---	---	16.4	9.5	7.9	5.0	4.3	4.6	3.8	3.0
Black or African American	---	---	8.4	6.7	4.0	3.8	3.3	2.0	2.4	1.8

### Policies in the Years 1980-2016

In **1992** the Synar Amendment (Public Law 102–321), was passed to curb the illegal sale of tobacco products to minors. Synar Amendment to the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) Reorganization Act of 1992 requires all states to adopt and enforce restrictions on tobacco sales and distribution to minors. (Minors' Access to Tobacco)

Pro-Children Act of **1994** requires all federally funded children's services to become smoke-free. Expands upon 1993 law that banned smoking in Women, Infants, and Children (WIC) clinics. (Legislation)

An amended Synar Regulation, was issued by the Substance Abuse and Mental Health Services Administration in **January 1996**, and requires each state receiving federal grant money to conduct annual random, unannounced inspections of retail tobacco outlets to assess the extent of sales to minors. (Minors' Access to Tobacco)

In **1999**, seven states and the District of Columbia failed to attain their Synar Amendment targets. Failure to comply with the law puts states at risk of forfeiting federal block grant funds for substance abuse prevention and treatment services. (Minors' Access to Tobacco)

On **March 21, 2000**, the United States Supreme Court ruled that the FDA lacked jurisdiction to regulate tobacco products and to enforce rules to reduce the access and appeal of tobacco products for children and adolescents. The loss of the FDA's education and enforcement program eliminates vital federal support for state tobacco control programs. (Minors' Access to Tobacco)

In the year of **2006**, the U.S. Surgeon General concluded that "workplace smoking restrictions lead to less smoking among covered workers."

Federal laws and regulations included the Family Smoking Prevention and Tobacco Control Act of **2009**, and the Patient Protection & Affordable Care Act of **2010**.

In **2012**, The Centers for Disease Control and Prevention launches the first ever federal government paid media advertising campaign encouraging people to quit smoking, Tips from Former Smokers, which features real people living with diseases caused by smoking.

FDA launches its public education campaign, aimed at preventing priority populations including youth from starting to use tobacco products in **2014**.

The Institute of Medicine released a new report entitled, "Health Implications of Raising the Minimum Age for purchasing Tobacco Products." The **2015** report found that raising the minimum age for legal purchase of tobacco products to at least 21 years old will significantly reduce youth smoking initiation and rates. Subsequently, Hawaii became the first state to raise the minimum sales age for tobacco products to 21.

The U.S. Department of Housing and Urban Development issued a **2016** final rule to require all public housing agencies to implement smoke-free policies for all residential units and common areas. The rule will protect 2 million Americans, including 760,000 children, from exposure to secondhand smoke in their homes.

### Analysis

- Answering a designed questions
  - a. Throughout the years, how has different policies and implementation of these policies helped to decrease national trends of cigarette use among youth in the United States? Is there an increase or decrease in the usage of cigarettes among the youth? Here I wanted to formulate a question that was manageable articulation that I am able to address using an analysis of data (Not too broad or too narrow).
- Create a new questions to ask
  - a. Why is there a decline?
  - b. What are the implications of this decline in cigarette use?
  - c. How do we go about showcasing the results in this project to the world at large?
- Relevant background and find at least five (5) academic references

### Research

1. “Highlights: Minors’ Access to Tobacco”

[https://www.cdc.gov/tobacco/data\\_statistics/sgr/2000/highlights/minor/index.htm](https://www.cdc.gov/tobacco/data_statistics/sgr/2000/highlights/minor/index.htm)

2. “Legislation”

[https://www.cdc.gov/tobacco/data\\_statistics/by\\_topic/policy/legislation/index.htm](https://www.cdc.gov/tobacco/data_statistics/by_topic/policy/legislation/index.htm)

3. “Youth and Tobacco Use”

[https://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/youth\\_data/tobacco\\_use/index.htm](https://www.cdc.gov/tobacco/data_statistics/fact_sheets/youth_data/tobacco_use/index.htm)

4. “Centers of Disease Control and Prevention”

[https://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/secondhand\\_smoke/protection/reduce\\_smoking/index.htm](https://www.cdc.gov/tobacco/data_statistics/fact_sheets/secondhand_smoke/protection/reduce_smoking/index.htm)

5. “Tobacco Control Policies and Their Impacts”

<https://www.atsjournals.org/doi/pdf/10.1513/AnnalsATS.201307-244PS>

6. “Tobacco Control Milestone”

<https://www.lung.org/our-initiatives/tobacco/reports-resources/sotc/tobacco-timeline.html>

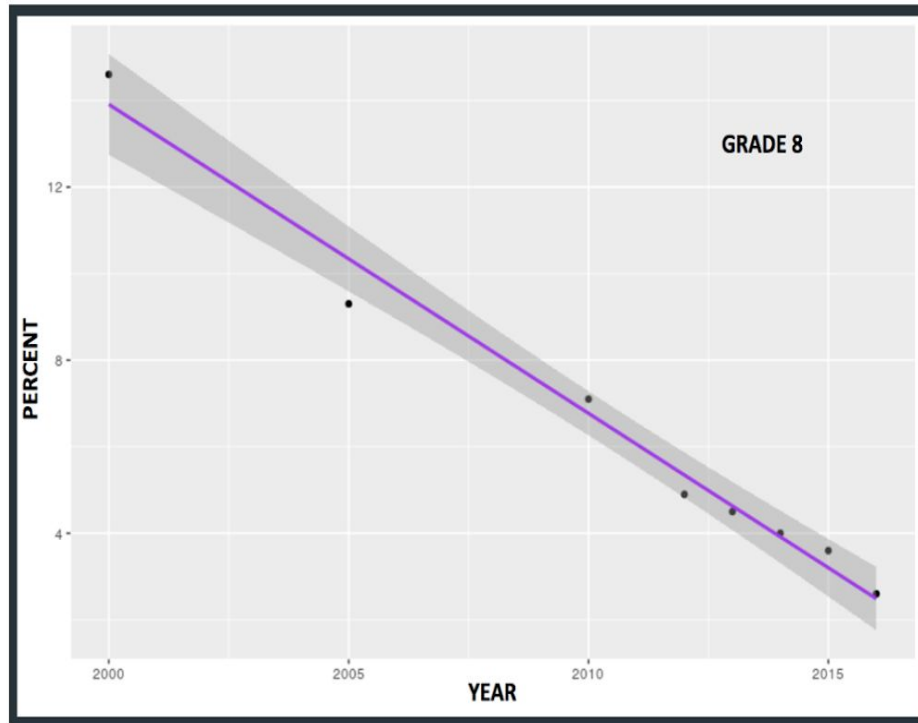
### **My Analysis Procedures**

1. Data collection
2. Cleaning
3. Transformation
4. Modeling
5. Visualization

### **Analysis Includes**

- Exploration of the relationships between variables of data
- Discover new features in the data or try to confirm/deny a hypothesis
- Summarize and interpret results
  - a. Include visualizations to show the results
- Address any data or inherent flaws and faults of the data which cannot be easily corrected (i.e., missing data entries)

## Visuals ggplots &amp; Code - R Studio



**Figure 1:** Relationship between Cigarette Use and Year for Grade 8.

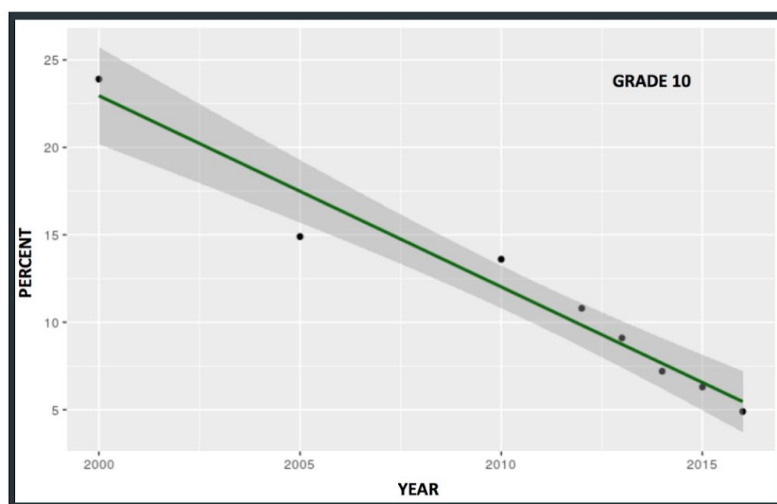
```

YouthData %>% ggplot(aes(x = year, y = grade8)) + geom_point(alpha = 1) + geom_smooth(method = "lm", color = "purple")

```

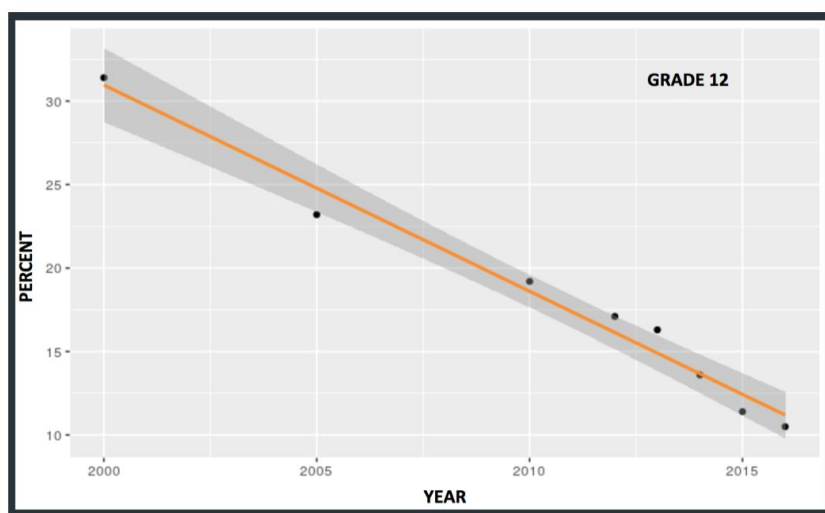
Code and Visuals were created in RStudio using R code to conduct my analysis.





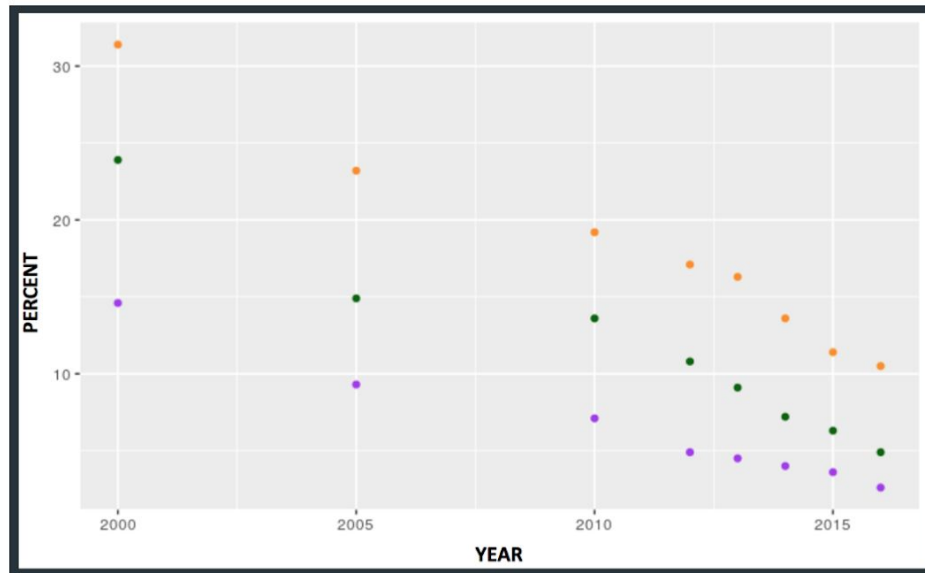
**Figure 2:** Relationship between Cigarette Use and Year for Grade 10.

```
YouthData %>% ggplot(aes(x = year, y = grade10)) + geom_point(alpha = I(1)) + geom_smooth(method = lm, color = "green")
```



**Figure 3:** Relationship between Cigarette Use and Year for Grade 12.

```
YouthData %>% ggplot(aes(x = year, y = grade12)) + geom_point(alpha = I(1)) + geom_smooth(method = lm, color = "orange")
```



**Figure 4:** Relationship between Cigarette Use and Year for Grades 8 (Purple), 10 (Green), and 12 (Orange).

```
ggplot(data = YouthData) + geom_point(mapping = aes(x = year, y = grade8), color = "purple") + geom_point(mapping = aes(x = year, y = grade10), color = "green") + geom_point(mapping = aes(x = year, y = grade12), color = "orange")
```

This ggplot was constructed from data all three grade levels to show our data as a whole in one graph. According to the graphs, we observed a clear decline in youth cigarette use for all grade levels throughout the years.

## Results

After retouching upon the foundational research for this project, I rediscovered the vitalness of understanding the correlations between youth and substance use. In even more detail, this data is broken down into years: 1980, 1990, 2000, 2005, 2010, 2012, 2013, 2014, 2015, 2016. The main conclusion gathered through careful observation of the data set along with its respective graphs is that there is that there has been a constant decline in youth cigarette use throughout the years. Moreover, it is important to indicate that this trend remains consistent for all youth groups regardless of grade-level. When attempting to research about possible explanations for this prominent and incontrovertible progression, it is important to approach the topic from a policy standpoint. As noted before, policy implementation is a powerful technique that has been used for many years to not only reverse norms in society, but to also influence and shift methods of thinking. This approach is fundamental to reform as it is one of the few ways to successfully maneuver around differing opinions by establishing uniform guidelines. Because of this, the process of initiating and enacting policy is not an easy one. Proof of significance as well as support from multiple members of society is vital as these factors serve as a driving force for policymakers. Furthermore, when it comes to youth cigarette use reform, both of these factors were and continues to be prevalent in the United States. As a result, there have been multiple laws and regulations have been passed through legislation which in return remains to be one of the most substantiated reasons as to why we see this decline in youth cigarette use. For example, Tobacco 21 is one of the strongest driving forces behind youth cigarette use reform. The main focus of this national campaign is to raise the minimum legal age for tobacco and nicotine sales in the United States from 18 to 21. Furthermore, Tobacco 21 runs its entire campaign on the evidence-based notion that raising minimum legal age will result in significant changes with regards to individual youth success.

My exploratory data analysis procedure began with a set of clear measurement steps: what will be measured and how exactly the measurement be executed. The implementation of a simple ggplot is an important technique required to help measure and depict correlations and trends. I established which variables the plot will showcase, and then linked that information

to the tidy data. Next, I computed the aesthetics of the plot which involved titles and colors. By doing this, my end result was three separate ggplots that were separated by grade level.

As stated previously, it is important to keep in mind what initiates these actions: data. Without data, there would be no indication of problems within our society. This could quickly lead to catastrophic events as there would be no incentive to halt these negatives. In contrast, data allows us to put things into perspective, analyze problems, and find solutions to these problems. It helps us progress as a society and build a better future. Because of data, we can see trends and patterns that need to either be encouraged or eliminated. Most importantly, we can help those around us. We can utilize data sets to push forth policy, encourage public opinion, and reverse detriments. Almost every problem has a solution and every solution starts with careful data analysis.