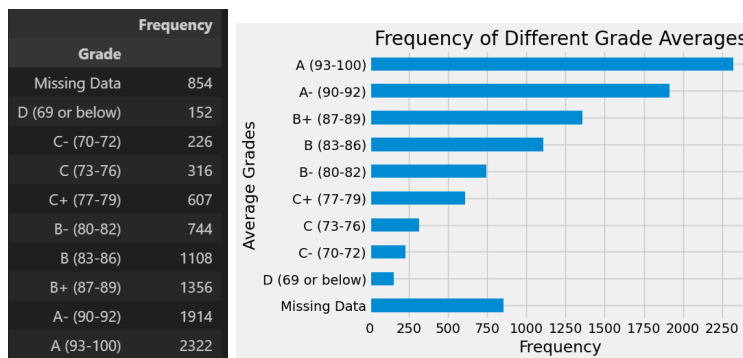## Section A

The following dataset is from 2022 entitled "Monitoring the Future: A Continuing Study of American Youth (12th-Grade Survey)." The intent of the prospective observational study is to explore and observe important values, behaviors, lifestyles, and characteristics of the American youth, an ongoing study, in order to come to a better understanding of the characteristics of the American youth in the present. This specific dataset focuses on 12th graders primarily. In this dataset, 12th graders are asked to complete one of six different surveys randomly with a variety of questions, with a set number of core questions that each student should answer. A few examples of questions that are asked to 12th graders in these surveys concern demographics, drug use, educational hopes and aspirations, and overall satisfaction with their lives, with a total of 1,400 variables asked throughout all the questionnaires. In total, approximately 9,599 students took part in the core survey (9,599 observations) and completed one of the six questionnaires. The sampling process consisted of grouping geographic locations, or primary sampling units (PSUs), together. For the study, 72 PSUs were created in total, and out of these, 8 were selected with certainty, 10 were selected with a probability of .50, and the remainder were selected using a probability based on their 2010 Census household count. Within the selected PSUs, the schools that fall within that geographic range are sampled. With schools that have more than 350 seniors, a sample of seniors or classes participated, while in schools with less than 350 seniors, all seniors were asked to participate. This method of sampling is an example of cluster sampling, where random selections of clusters of areas by geographic region are asked to participate in the questionnaire. This method of sampling proves highly effective, as the samples of clusters are purely randomly chosen and not biased in any way.
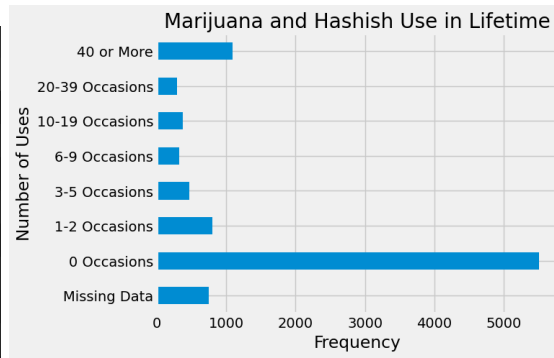
Grade	Frequency
Missing Data	854
D (69 or below)	152
C- (70-72)	226
C (73-76)	316
C+ (77-79)	607
B- (80-82)	744
B (83-86)	1108
B+ (87-89)	1356
A- (90-92)	1914
A (93-100)	2322

Figures 1, 2: Grade Averages for a sample of 12th grade students.

| Satisfaction	Satisfaction with Self	Satisfaction with Parents	Satisfaction with Friends
Missing Data	75	45	50
Completely dissatisfied	50	40	15
Quite dissatisfied	91	57	22
Somewhat dissatisfied	126	89	40
Neutral	214	187	122
Somewhat satisfied	325	209	169
Quite satisfied	384	453	514
Completely satisfied	271	456	604

Figures 3, 4: Satisfaction with different relationships for a sample of 12th grade students.

Marijuana or Hashish Use	Frequency
Missing Data	753
0 Occasions	5511
1-2 Occasions	796
3-5 Occasions	470
6-9 Occasions	318
10-19 Occasions	370
20-39 Occasions	294
40 or More	1087

Figures 5, 6: Marijuana and Hashish Use in lifetime among a sample of 12th grade students.

| Happiness	Frequency
Missing Data	10
Not too happy	352
Pretty happy	1009
Very happy	222
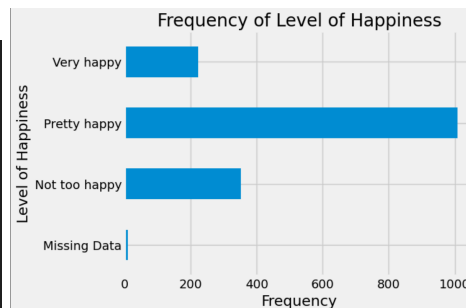
Figures 7, 8: Happiness among a sample of 12th grade students.

Section B

We can inquire into the given dataset and initially learn about the population of 12th graders by examining several key variables. Firstly, in the above Figures 1-2, the characteristics of self-reported grades were observed, with the most common grade of 12th grade students having an A grade average. The frequency of each grade average decreases until the lowest grade average, a D or below. Secondly, in Figures 3-4, the satisfaction of an individual with their various relationships—including their relationship with themselves, their parents, and their friends—was observed. It can be seen that the most common satisfaction for a student with their parents and with their friends is "completely satisfied", while the most common satisfaction for a student with themself is "quite satisfied". It is evident that most 12th grade students in the sample, in general, are more satisfied with their relationships with others and themselves than dissatisfied. Thirdly, from Figures 5-6, the total use of certain drugs in a student's lifetime, in this case marijuana and hashish, were recorded. The majority of 12th grade students (62.3%) respond that they have never used either marijuana or hashish in their lifetime. Of the categories for those who have used either drug, it can be determined that it is most common for a student to use marijuana or hashish more than 40 times, demonstrating an addiction where students are likely to consume additional marijuana or hashish over time if they begin to consume either drug. Finally, in Figures 7-8, it can be seen that when asked of their current level of happiness, the majority of students (63.7%) responded that they are "Pretty happy", with the second most common response being "Not happy". However, it stands true that the majority of students are generally happy rather than not happy.

	A or A- Grades	Total Grades	Percentage of A/A- Grades
Friendship Satisfaction			
Completely dissatisfied	4	15	26.666667
Quite dissatisfied	7	22	31.818182
Somewhat dissatisfied	16	40	40.000000
Neutral	30	122	24.590164
Somewhat satisfied	81	169	47.928994
Quite satisfied	227	514	44.163424
Completely satisfied	278	604	46.026490
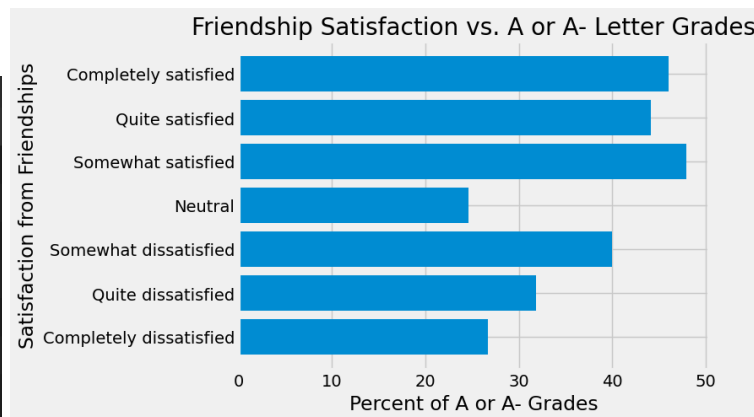
Figures 9, 10: Satisfaction from Friendships compared to Frequency of A or A- Grades

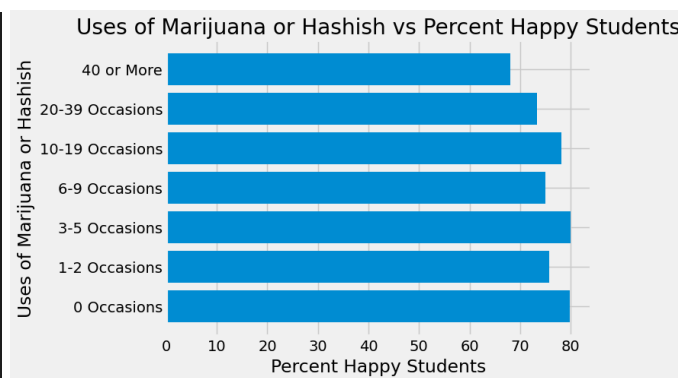|	Happy Students	All Students	Percent Happy
Marijuana or Hashish Use			
0 Occasions	730	914	79.868709
1-2 Occasions	109	144	75.694444
3-5 Occasions	68	85	80.000000
6-9 Occasions	39	52	75.000000
10-19 Occasions	43	55	78.181818
20-39 Occasions	33	45	73.333333
40 or More	121	178	67.977528

Figure 11, 12: Marijuana or Hashish use compared to Happiness

Section C

Using Figures 1-8, we can combine several of the variables together to piece together a more concrete understanding of the relationships in the above dataset in Figures 8-12. For example, in Figure 9, when looking in the Friendship Satisfaction column and grouping by each level of satisfaction, there is a trend with the percentage A or A- grades achieved by the students in that category compared to other categories. When looking at the plotted graph (Figure 10), the visualization of the data shows a generally decreasing trend for the percentage of A or A- grades achieved with the decrease in satisfaction from a student's friendships. In addition, in the data table shown by Figure 11, it can be seen that there is a trend between happiness and marijuana or hashish use. According to Figure 12, there are visible differences in the percent of happy students depending on how much marijuana or hashish is consumed. The difference is especially significant between the percentage of students who did not use either drug in any capacity, and those who used either drug more than 40 times, with the difference in happiness being around 11.9% lower for those with more than 40 consumptions.

Section D

Using the above charts and graphs, we can determine the relationships among certain variables and inquire about the origin of these trends. For example, the relationship between lowered satisfaction with students' friendships and declining A grades can be explained by the fact that "becoming friendless produces a meaningful decline in mental health". When students are dissatisfied with their friendships, these relationships become more associated with the element of "friendless," as a student would not consider such friendships as strong as they should be. A student's current mental health plays a large role

in what they will get out of their education, as students with stronger mental health will be more excited and more ready to learn. The relationship between satisfaction from friendships and A grades achieved may not entirely be casual, as there is a confounding variable of studying that directly impacts a student's grades as well as their satisfaction from friendships; an increase in studying will positively impact grades while negatively affecting a student's relationship with a friend, since less time is spent together. However, the effects of this confounding variable are minimized since many students have to collectively study and spend less time together to achieve higher grades. On the other hand, an example of a colliding variable could be a student's mental health itself, since higher grades provide a sense of satisfaction and additional motivation to continue the good work, and lower grades have the opposite effect, while an increase in friendship satisfaction also positively impacts one's mental health. In addition, the relationship between happiness and marijuana or hashish use can be explained by the fact that marijuana use, for example, can lead to "a loss of desire to work or compete and less interest in setting and attaining goals". Although drugs such as marijuana and hashish are frequently used to alleviate the stresses and worries that students have, this happiness will only be temporary, requiring students to consume additional drugs to maintain their desired level of happiness. As a greater amount of happiness provokes students to be more motivated and further increase their desire to attain their goals, motivation and attaining goals are associated with happiness. Students who consume such drugs will have decreased motivation, and they will only desire additional happiness or dopamine with an increased tolerance due to the drugs. A more relevant question that could be answered using additional data could be "How does a student's satisfaction with their relationships impact a student's satisfaction with their grades?" This question is better framed than simply looking at A grades since some students might just be content with their grades, even if they are not totally perfect. This can also take into account external factors such as the overall difficulty of the course, the teacher's style of teaching, and other factors as well, where students may be satisfied with lower grade averages.

Section E

The most important lesson I took away from exploring the dataset is specific trends among 12th grade students in the country. I learned the characteristics of a sample of 12th grade students, allowing me to better understand the mind of high school students, specifically seniors. I learned some of the priorities that we should emphasize in our education systems such that students will be better prepared to succeed in their endeavors. For example, as we learned that establishing good relationships with others leads to a better academic performance, school authorities could promote these relationships to provide students with a sense of belonging and an increased excitement to learn at school. Finally, I learned the importance of abstaining from or limiting the use of drugs such as marijuana and hashish on one's positive outlook, which will ultimately play a huge role in their future success and overall well being.

Works Cited

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