**Activity 7.5.3 Survey of 12th-Grade Students**

As was noted in Activity 7.5.1, *Monitoring the Future: A Continuing Study of American Youth* surveys 12th-grade students on a wide range of topics related to behaviors, attitudes, and values. In this activity, you will analyze student responses to questions on intelligence, dating, driving, and getting tickets for motor vehicle violations. You will investigate the associations between responses to questions 1 – 6 below, examining two questions at a time.

1. What is your gender?

2. How intelligent do you think that you are compared to others your age?

3. On the average, how often do you go out with a date (or your spouse, if you are married)?

4. During an average week, how much do you usually drive a car, truck, or motorcycle?

5. Within the LAST 12 months, how many times, if any, have you received a ticket (OR been stopped and warned) for moving violations, such as speeding, running a stop light, or improper passing?

6. How many of these tickets or warnings occurred after you were drinking alcoholic beverages?

1. Table 1 organizes responses from questions 1 and 2 into a two-way table. The row variable is gender and the column variable is intelligence rating.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Frequency | Above Average | Average | Below Average | Total |
| Female | 3957 | 2135 | 495 | 6587 |
| Male | 4586 | 1580 | 395 | 6561 |
| Total | 8543 | 3715 | 890 | 13,148 |

Table 1. Responses to questions 1 and 2.

In this activity, round all percentages to one decimal place.

a. How many students answered both questions 1 and 2?

b. How many students responded male to question 1 and average to question 2? What percentage of the respondents identified themselves as male and average intelligence? Show your calculations.

c. How many male students responded average to question 2? What percentage of males responded that they were of average intelligence? Show your calculations.

d. How many students who responded average to question 2 were male? What percentage of students who rated their intelligence as average were male? Show your calculations.

e. Now it’s time to compare female students’ responses to the question on intelligence rating to male students’ responses. Were males or females more likely to rate their intelligence as above average? Support your answer with appropriate percentages.

Table 2 organizes responses from questions 1 and 3. The row variable is gender and the column variable is dating frequency. Notice fewer people answered both questions 1 and 3 than answered both questions 1 and 2. (Why do you think that might be the case?)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Frequency | Never | 1 – 3X/Mo | 1 – 3X/Wk | 3+/Wk | Total |
| Female | 2394 | 2108 | 1574 | 353 | 6429 |
| Male  | 2189 | 2156 | 1669 | 373 | 6387 |
| Total | 4583 | 4264 | 3243 | 726 | 12,816 |

Table 2. Responses to questions 1 and 3.

2. Complete Table 3 by calculating the marginal percentages for dating frequency. Which frequency had the highest percentage, Never, 1 – 3X/Mo, 1 – 3X/Wk, or 3+/Wk? Is this what you expected?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Never | 1 – 3X/Mo | 1 – 3X/Wk | 3+/Wk |
| Percent |  |  |  |  |

Table 3. Marginal percentages for dating frequency.

3.

a. Make a table of conditional percentages of dating frequency for males and for females.

(Should this be row percentages or column percentages?) Explain how you calculated the values in your table.

b. Draw a bar chart that represents the percentages in your table from (a). Write the corresponding percentages above each bar.

c. Write a few sentences comparing the frequency with which males date compared to females. Can you draw any conclusions from these data?

4. In the Monitoring the Future survey, the sample size is large. In addition, the sample is selected so that it is representative of all 12th-grade students in the U.S. In situations where the sample size is large and the sample is representative of the population from which it was selected, relative frequencies ($\frac{Percentage}{100}$) can be used as estimates of probabilities. Select a 12th-grade student at random from all U.S. 12th graders. Let *A* be the event the student dates, on average, at least once per week and *B* be the event that the student is male. Calculate the following probabilities.

a. *P*(*A*) (Show your calculations.)

b. *P*(*A*|*B*) Show your calculations.

c. Recall that if *A* and *B* are independent events, then *P*(*A*) = *P*(*A*|*B*). Based on your answers to (a) and (b) are *A* and *B* independent events?

5. Table 4 organizes responses from questions 4 and 5. The row characteristic is tickets and the column characteristic is driving distance. Notice that 13,107 students answered both of these questions.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | None | 1 – 10 mi | 11 – 50 mi | 51 – 100 mi | 100+ mi | Total |
| None | 2850 | 1194 | 2813 | 2008 | 1655 | 10,520 |
| Once | 65 | 94 | 452 | 494 | 572 | 1677 |
| Twice | 26 | 23 | 122 | 174 | 218 | 563 |
| Three or more | 13 | 10 | 52 | 85 | 187 | 347 |
| Total | 2954 | 1321 | 3439 | 2761 | 2632 | 13,107 |

Table 4. Responses to questions 4 and 5 organized into a two-way table.

a. Begin the analysis by computing the marginal percentages for driving distances. Organize these percentages in Table 5.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | None | 1 – 10 mi | 11 – 50 mi | 51 – 100 mi | 100+ mi | Total |
| Percent |  |  |  |  |  |  |

Table 5. Marginal percentages for driving distances.

b. Draw a bar graph that represents your percentages from (a).

c. Using information from (a) and (b), describe the average weekly driving distances of 12th -grade students. Is it about what you expected? Explain.

6. Next, you will investigate whether there is a connection between the weekly driving distance and the number of tickets.

a. Calculate the conditional percentages for tickets for each category of driving distance. (Should you be calculating row percentages or column percentages?) Organize your percentages in Table 6.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | None | 1 – 10 Miles | 11 – 50 Miles | 51 – 100 Miles | 100+ Miles |
| None |  |  |  |  |  |
| Once |  |  |  |  |  |
| Twice |  |  |  |  |  |
| Three or more |  |  |  |  |  |

Table 6. Conditional percentages for tickets for each level of driving distance.

b. Explain how you calculated your percentages in Table 6.

c. Represent the percentages in your table from (a) with a bar chart.

d. Based on your answers to (a) and (c), describe the connection between Driving Distance and Tickets.

7. The Monitoring the Future survey includes questions on drug use and alcohol consumption. Table 7 organizes responses from questions 5 and 6. The row variable is Tickets and the column variable is Tickets After Alcohol Consumption. Only students who had received tickets answered question 6.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Tickets/Alcohol | None | One | Two | Three or more |  |
| Once | 1624 | 41 | 0 | 0 | 1665 |
| Twice | 519 | 30 | 9 | 0 | 558 |
| Three or more | 275 | 23 | 17 | 14 | 329 |
| Total | 2418 | 94 | 26 | 14 | 2552 |

Table 7. Responses to questions 5 and 6.

a. Calculate the row percentages for Table 7. This gives the conditional percentages of tickets received after consuming alcohol for each number of tickets issued.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tickets/Alcohol | None | One | Two | Three or more |
| Once |  |  |  |  |
| Twice |  |  |  |  |
| Three or more |  |  |  |  |

Table 7. Row percentages.

b. Explain why 0s appear in your table.

c. What percentage of students who received one ticket had consumed alcohol prior to receiving that ticket?

d. What percentage of students who received two tickets had consumed alcohol prior to receiving at least one of their tickets?

e. What percentage of students who received three tickets had consumed alcohol prior to receiving at least one of their tickets?