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Identifying Patterns

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Problem Set 1

1. A. The conclusion that the investigator makes is premature and is not a fair comparison. The populations of Michigan and Minnesota vary greatly. The estimated population of Michigan in 1991 was approximately 10,000,000, while the population of Minnesota was approximately 5 million for 2001. (Courtesy of the US Census Bureau, Population Division) In order to conduct a fair comparison of which town is more law abiding you need would be to take the average of crimes committed by each person from each state. When done the average crime rate per person in Michigan is .00041 while Minnesota’s average crime rate per person is .00072 which is higher than that of Michigan. In conclusion that investigators claim was incorrect, Michigan actually more law abiding citizens.

B. The data suggests that the US has become more law abiding from 1991 to 2001 because the amount of crimes decreased while the population rose meaning that the crime per person rate fell. However when looking at 2001 it becomes apparent that the drastic drop in crime can be explained by September 11th which sparked a remarkable trend of patriotism and compassion from people, which resulted in fewer crimes.

4. A. The Public Health Service chose to study men and women and the different age groups separately to prevent confounding variables. The confounding variables that exist between various age groups and the different sexes could drastically skew the data. By limiting the confounding variables The Public Health Service was able to conduct a more accurate test.

B. The lesson that the data suggests, that once you start smoking you shouldn’t stop isn’t true. Although the results show that the current smokers are healthier than the smokers who quit the results could be due to confounders. One confounder in the test is the lack of control of the amount of time people have been smoking. If you look at current smokers who have only been smoking for a month and compare them to someone who quit but smoked for 40 years the ex-smoker will be less healthy because of the damage smoking has done, while the current smoker hasn’t smoked long enough for the detrimental health effects that result from smoking to take place. Another confounder that could result in the skewed data is the effects of withdrawal. If the ex-smoker had just quit his body could be suffering from extreme withdrawal symptoms that would make the current smoker seem healthier than the ex-smoker.

5. No, Zinc Sulfate should not be given to treat the disease based solely off of one positive test. This shouldn’t be given because of the conflicting results from the two different tests. In addition the positive test wasn’t a double blind study. The lack of blindness could result in the researches forging data or subconsciously altering the data by framing questions differently when they asked the participants about the effectiveness of Zinc Sulfate. In order for it to be a viable treatment the experiment should be done double blind and conducted exactly as before. The result of the third test should solidify the viability of Zinc Sulfate as a possible treatment for idiopathic hypoguesia.

6. The improvement can be explained by the body’s natural ability to improve. The fact that all groups improved reflects the ineffectiveness of Zinc and that slowly over time the disease will be less prevalent. The only other possibility is that the all of the groups had confounders that improved their condition.

7. A. The oral contraceptive study would be considered an observational study.

B. The study was adjusted to account for age, education, and marital status to eliminate possible confounders. In order to conduct a more acceptable study the investigators need to try to control and also eliminate as many confounders within their test. Rather than eliminating the confounders during the actual trails of the study, the investigators chose to eliminate the confounder like age, education and marital status in the results part of the experiment.

C. The factor that differs the between non users and users is that the users of the pill are more likely on it to avoid getting pregnant which means that they are more sexually active than the women not on the pill. The increase in sexual activity leads to an increased risk of cervical cancer.

D. No, the conclusion of this studied can’t be justified by the data because the study lacked randomization, controls and double blindness. In order to obtain data that could justify such conclusions the Kaiser Permanente needs to conduct a controlled experiment.

8. The statistics do not prove that the majority of home burglaries occur between Memorial Day and Labor Day. The time period of between those two holidays is approximately 3.5 months. If you were to calculate the average crime for every 3.5 months you would find that the amount of crimes committed between those to holidays to be approximately 30%. To do this you would divide twelve by 3.5 which comes out to 3.42. You then divide 1 by 3.42 to obtain the average crime expectancy percentage for any 3.5 month period. The data however states that 25% of home burglaries occur between that 3.5 month period which is below the average calculated above.

9. A. False, the results of the controlled experiments proved the opposite of the observational study. The observational study had results that supported the claim that large amounts of vegetables and fruits prevented lung and colon cancer while the controlled tests found that vegetables and fruits had no effect or even created a higher chance of people contracting colon and lung cancer.

B. True, the observational study could have reached incorrect conclusions due to confounders. The researchers seemed to have mistaken the relationship between fruits/vegetables and colon/lung cancer as causation rather than correlation. The observational study appears to prove that there is a correlation between people who eat lots of vegetables and fruits and the decreased risk of colon and lung cancer. The results however state that just because they eat vegetables that they are less likely to have colon and lung cancer. The confounder that plays the biggest role in the incorrect data is that people who eat large amounts of vegetables and fruits are expected to live healthier lives in general meaning their risk of lung and colon cancer would already be diminished, as a result of a healthier life style not because of their diet alone.

C. False, the experiments could not easily reach conclusions that were incorrect. Although it is possible for a confounder to influence the results the investigators did everything necessary to conduct an acceptable experiment. The results drawn from the controlled experiment are the results that should be deemed acceptable. By having two separate controlled experiments the investigators were able to limit the amount of possible confounders.

10. A. The study conducted by the San Francisco Chronicle was an observational study.

B. Yes, the study did find a relationship between mother’s behavior and her child’s level of body fat. This relationship however is either a coincidence or a simply a correlation.

C. Yes, if controlling behavior by the mother can cause children to eat more than it is plausible to explain an association between controlling behavior and body fat of children.

D. If there is a gene that causes obesity then yes that could explain the association and prove that the results gathered by the chronicle was simply a coincidence.

E. The association can be explained that although controlling the parent’s may not always make the right decision for their children. The mother could be very controlling and make their children eat unhealthy food and not let them go outside and exercise. The mother could also be so controlling that when the child is on their own at school they lack the independence necessary to choose a healthy lunch and make smart and healthy decisions.

F. The data doesn’t support the Chronicle’s advice, it appears that the data that the Chronicle obtained is simply a coincidence and in order for the data to be proven correct, a randomized controlled experiment would need to be completed. That experiment however would be impossible to conduct today due to the ethical guidelines that have been adopted.

11. A. The treatment group in the prison’s program is the volunteers who participate in the army-like boot camp that the prison runs. The control group for the experiment is the prisoners who are released without the training.

B. The prison’s spokesman has based their comparison off an observational study.

C. False, the data didn’t prove that the boot camp worked. The results can be explained by the fact that the boot camp was voluntary. This means that the prisoners who wanted to change and adopt better lifestyles and become more law abiding signed up for the camp while the ones who didn’t want to adopt a different lifestyle didn’t sign up. Their decision to join the program can explain why they didn’t return to prison like the non-boot campers. Their attempt to reform is foreshadowing that when they are released they are going to try to be more law abiding.

12. False, just because each ward has a higher percentage of Democrat registered voters who vote doesn’t mean that the city has a whole has a higher percentage of Democrat registered voters who vote. For example if the wards were chosen by a process called gerrymandering one ward could have only 4 registered democrats while the other has a higher number. If all four voted in that one ward and say only 75 of 80 registered republicans voted then the democrats would have a higher percentage. In the other ward however the numbers could be closer with 50 registered democrats and only 25 republicans voted while 30 democrats voted. The democrats would once again have a higher percentage but when combined the republicans would have a higher percentage overall.

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| Party | Ward 1 | Ward 2 | Combined |
| Democrats | 4/4 = 100% | 30/50 = 60% | 34/54 = **63%** |
| Republican | 75/80 = 94% | 25/50 = 50% | 100/130 = **75%** |