

An ad for ADT Security Systems says,

“When you go on vacation, burglars go to work [...] According to FBI statistics, over 25% of home burglaries occur between Memorial Day to Labor Day.”

Do the data in the ad support the claim that burglars are more likely to go to work during the time between Memorial Day to Labor Day? Please explain your answer. **(6 Points)**

Note: You can assume that “over 25%” means only slightly over. Had it been much over, say closer to 30%, then the marketers would have said so.

Note: Memorial Day is observed on the last Monday of May and Labor Day is observed on the first Monday of September.

The data in the ad do not support the claim. There are about 3 months and one week from Memorial Day to Labor Day, which span just over 25% of the year. So, assuming burglaries occur randomly throughout the year, it would make sense that about 25% of them occur in this time period. This means the data does not support the claim that burglaries are more likely to occur between Memorial Day and Labor Day.

Question 1. The data were gathered by the following procedure, reported in the study. “Between January and June 1998, parents of children aged 2-16 years [...] that were seen as outpatients in a university pediatric ophthalmology clinic completed a questionnaire on the child’s light exposure both at present and before the age of 2 years.” Was this study observational, or was it a controlled experiment? Explain. **(5 Points)**

This study is was observational, not a controlled experiment. In controlled experiments, the researchers manipulate the independent variable while holding other factors constant to see its effect on the dependent variable. Here, the study relies on the parents’ recollection of their childrens’ light exposure, rather than an experimental setup.

Question 2. The study found that of the children who slept with a room light on before the age of 2, 55% were myopic. Of the children who slept with a night light on before the age of 2, 34% were myopic. Of the children who slept in the dark before the age of 2, 10% were myopic. The study concluded the following: “The prevalence of myopia [...] during childhood was strongly associated with ambient light exposure during sleep at night in the first two years after birth.”

Do the data support this statement? Why or why not? You may interpret “strongly” in any reasonable qualitative way. **(5 Points)**

The data show a clear correlation between increased night light exposure before age 2 and a higher prevalence of myopia. However, correlation doesn't imply causation, so we can't deduce that the nighttime light is what causes myopia. For example, if myopic parents were more likely to use night lights, then the association might be due to genetics and not night lights.

Question 3. On May 13, 1999, CNN reported the results of this study under the headline, “Night light may lead to nearsightedness.” Does the conclusion of the study claim that night light causes nearsightedness? (5 Points)

No, the conclusion of the study doesn't explicitly say that night light causes nearsightedness. It states that myopia prevalence is “strongly associated” with light exposure at night. This suggests correlation and not causation.

Question 4. The final paragraph of the CNN report said that “several eye specialists” had pointed out that the study should have accounted for heredity.

Myopia is passed down from parents to children. Myopic parents are more likely to have myopic children, and may also be more likely to leave lights on habitually (since the parents have poor vision). In what way does the knowledge of this possible genetic link affect how we interpret the data from the study? Explain. **(5 Points)**

The knowledge of a genetic link between myopia and parental habits significantly impacts how we interpret the study's findings. It introduces a confounding variable, since it could cause parents to leave lights on as well as myopia that children inherit. This could be the cause of the correlation between myopia prevalence and light exposure at night.

