
Question 1.1 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.

Time Period: Memorial Day occurs at the end of May, and Labor Day is at the beginning of September. This period spans roughly three months, or approximately one-quarter of the year.

Expected Proportion: If burglaries were equally distributed throughout the year, we would expect around 25% of burglaries to occur during this period (since it represents about 25% of the total days in a year).

The Claim: The ad claims that over 25% of burglaries happen between Memorial Day and Labor Day, which is only slightly above the expected proportion based on the duration of the period. Since the ad suggests "over 25%," we can infer that the actual number is close to 25%, but not significantly higher (perhaps around 26% or slightly more).

Question 5.1. 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 an observational study because the researchers did not intervene or control the conditions of the children's light exposure. They simply collected data from parents through questionnaires regarding the children's past and current light exposure. Since there was no manipulation or assignment of different conditions (as would occur in a controlled experiment), it qualifies as an observational study.

Question 5.2. 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)**

Yes, the data do support the statement that myopia prevalence during childhood is "strongly associated" with light exposure during sleep, based on the significant differences in myopia prevalence across different light exposure conditions. However, the data only indicate an association, and further investigation would be needed to establish causality.

Question 5.3. On May 13, 1999, CNN reported the results of this study under the headline, "Night light may lead to nearsightedness." Does the original study claim that night light causes nearsightedness? **(5 Points)**

No, the original study does not claim that night light causes nearsightedness. The study only reported an association between nighttime light exposure and the prevalence of nearsightedness. Specifically, it showed that higher light exposure (such as sleeping with a night light or room light on) was correlated with a higher rate of nearsightedness. However, this is an association, not a direct causal relationship.

Question 5.4. 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 possible genetic link means we must be cautious in interpreting the study's findings. Without controlling for hereditary factors, the association between nighttime light exposure and myopia cannot be confidently attributed to light exposure alone. To draw more accurate conclusions, future studies would need to account for the genetic predisposition of the children to myopia.