

Comparing Two Proportions

Math 121 - Workshop

In 2002 the Supreme Court ruled that schools could require random drug tests of students participating in competitive after-school activities such as athletics. Does drug testing reduce use of illegal drugs? A study compared two similar high schools in Oregon. Wahtonka High School tested athletes at random and Warrenton High School did not. In a confidential survey, 7 of 135 athletes at Wahtonka and 27 of 141 athletes at Warrenton said they were using drugs.

1. What are the explanatory and response variables in this situation? Make a two-way table to display the information given above. In the table, put the explanatory variable at the top.
2. State the appropriate null and alternative hypotheses for testing whether there is statistically significant difference between the proportions of athletes who use drugs at the two schools. Use the symbol p_T for the proportion of athletes who do drugs at schools with random drug testing and p_N for the proportion at schools with no drug testing.
3. To use the two-sample hypothesis test formula, you need to find the pooled proportion \hat{p} . To get it, combine the two separate samples into one large sample. Out of all the high school athletes surveyed, what proportion admitted using illegal drugs?

4. Use the two-sample hypothesis test for proportions formula:

$$z = \frac{\hat{p}_A - \hat{p}_B}{\sqrt{\hat{p}(1 - \hat{p}) \left(\frac{1}{n_A} + \frac{1}{n_B} \right)}}$$

to find the test statistic, then use the Normal Distribution app to find the p -value, and then explain what the numbers mean.

5. Was this an observational study or a randomized experiment?

6. Is it safe to conclude that the explanatory variable causes the difference in the response variable? Why or why not?