

What is a Directional Hypothesis? (Definition & Examples)

Authored by
stats writer

April 29, 2024

RECOMMENDED CITATION

stats writer (2024). *What is a Directional Hypothesis? (Definition & Examples)*.
PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=140962>

A directional hypothesis is a type of hypothesis that predicts the direction of the relationship between two variables. It states that there will be a specific and expected change in one variable based on the change in the other variable. This type of hypothesis is often used in experiments and research studies to make a clear prediction and guide the direction of the study. For example, "Increasing the amount of exercise will lead to a decrease in cholesterol levels" is a directional hypothesis as it predicts a specific direction of change in cholesterol levels based on the change in exercise. In contrast, a non-directional hypothesis would simply state that there is a relationship between exercise and cholesterol levels without specifying the direction of the relationship. Overall, a directional hypothesis helps researchers to make informed and focused conclusions about the relationship between variables.

What is a Directional Hypothesis? (Definition & Examples)

A statistical hypothesis is an assumption about a . For example, we may assume that the mean height of a male in the U.S. is 70 inches.

The assumption about the height is the *statistical hypothesis* and the true mean height of a male in the U.S. is the *population parameter*.

To test whether a statistical hypothesis about a population parameter is true, we obtain a random sample from the population and perform a hypothesis test on the sample data.

Whenever we perform a hypothesis test, we always write down a null and alternative hypothesis:

Null Hypothesis (H₀): The sample data occurs purely from chance.
Alternative Hypothesis (H_A): The sample data is influenced by some non-random cause.

A hypothesis test can either contain a directional hypothesis or a non-directional hypothesis:

Directional hypothesis: The alternative hypothesis contains the less than (" $<$ ") or greater than (" $>$ ") sign. This indicates that we're testing whether or not there is a positive or negative effect.
Non-directional hypothesis: The alternative hypothesis contains the not equal (" \neq ") sign. This indicates that we're testing whether or not there is some effect, without specifying the direction of the effect.

Note that directional hypothesis tests are also called "one-tailed" tests and non-directional hypothesis tests are also called "two-tailed" tests.

Check out the following examples to gain a better understanding of directional vs. non-directional hypothesis tests.

Example 1: Baseball Programs

A baseball coach believes a certain 4-week program will increase the mean hitting percentage of his players, which is currently 0.285.

To test this, he measures the hitting percentage of each of his players before and after participating in the program.

He then performs a hypothesis test using the following hypotheses:

$H_0: \mu = .285$ (the program will have no effect on the mean hitting percentage)
 $H_A: \mu > .285$ (the program will cause mean hitting percentage to increase)

This is an example of a directional hypothesis because the alternative hypothesis contains the greater than ">" sign. The coach believes that the program will influence the mean hitting percentage of his players in a *positive* direction.

Example 2: Plant Growth

A biologist believes that a certain pesticide will cause plants to grow less during a one-month period than they normally do, which is currently 10 inches.

She then performs a hypothesis test using the following hypotheses:

$H_0: \mu = 10$ inches (the pesticide will have no effect on the mean plant growth)
 $H_A: \mu < 10$ inches (the pesticide will cause mean plant growth to decrease)

This is also an example of a directional hypothesis because the alternative hypothesis contains the less than "<" sign. The biologist believes that the pesticide will influence the mean plant growth in a *negative* direction.

Example 3: Studying Technique

A professor believes that a certain studying technique will influence the mean score that her students receive on a certain exam, but she's unsure if it will increase or decrease the mean score, which is currently 82.

To test this, she lets each student use the studying technique for one month leading up to the exam and then administers the same exam to each of the students.

She then performs a hypothesis test using the following

hypotheses:

H₀: $\mu = 82$ (the studying technique will have no effect on the mean exam score)
H_A: $\mu \neq 82$ (the studying technique will cause the mean exam score to be different than 82)

This is an example of a non-directional hypothesis because the alternative hypothesis contains the not equal " \neq " sign. The professor believes that the studying technique will influence the mean exam score, but doesn't specify whether it will cause the mean score to increase or decrease.