

When testing any experimental hypothesis, why is it important that the test you use to measure the outcome be both reliable and valid?

The Oxford Reference (2018) defines the experimental hypothesis as the hypothesis that in an experiment, the results of the experimental group will differ significantly from those of a control group, and that the difference will be caused by the independent variable (or variables) under investigation.

It is important that the test you use to measure the outcome of experimental hypothesis be both reliable and valid because using the incorrect testing instrument can lead to an erroneous assumption. Once the hypothesis has been formulated, the variables have been operationally defined, and the levels of measurement and statistical analyses have been determined, researchers must address the issues of reliability and validity. If reliability is more on consistency, validity is more on how strong the outcomes of the hypothesis are.

Siddarth, K. (2009) suggests that in order to remove the element of chance and increase the reliability of our hypothesis, we use statistical hypothesis testing. In this, you will first assume a hypothesis that smoking and lung cancer are unrelated. This is called the 'null hypothesis', which is central to any statistical hypothesis testing. You should therefore first choose a distribution for the experimental group. Normal distribution is one of the most common distributions encountered in nature, but it can be different in different special cases. There should then be limits set on the critical value, beyond which you can assume that the experiment proves that the null hypothesis is false and therefore using statistical hypothesis testing, the experiment shows there is enough evidence to reject the null hypothesis. This is generally set at 5% or 1% chance probability. This means that if the experiment suggests that the probability of a chance event in the experiment is less than this critical value, then the null hypothesis can be rejected. If the null hypothesis is rejected, then we need to look for an alternative hypothesis that is in line with the experimental observations.

If I read this information correctly and to answer the question of why when testing any experimental hypothesis it is important that the test you use to measure the outcome be both reliable and valid, the reliability and the validity of the test used to measure the outcome is important because in a chance event if we get a null result, then there remains a question of whether the hypothesis is faulty.

As a final word from Salkind (2017, p. 127) “on top of everything else, that comes with testing a hypothesis, there is also the work of making sure the instrument works as it should.

References

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