

A beginner's guide to the p-value

A p-value is a number that determines whether a result in a study is meaningful or due by chance. In many journal articles, you'll often see something like:

Table 3. Differences in reasons for going to university based on personal circumstance.

Reasons for going to university item	Circumstance	<i>M</i>	<i>M</i> _{rank}	Mdn	<i>U</i>	<i>z</i>	<i>p</i>
Personal development	Carers	4.74	153.70	5.00	3045.00	-2.75	.006
	Non-carers	4.49	123.03	5.00			
To make friends	Carers	3.42	102.96	4.00	4811.50	2.21	.027
	Non-carers	3.87	129.98	4.00			
	Under-21s	3.90	134.56	4.00	4405.50	-3.49	<.001
	Mature	3.48	100.25	4.00			
	EFL	3.87	128.26	4.00	3684.00	-2.10	.036
To change direction in my life	ESL	3.55	104.87	4.00			
	Under-21s	3.99	116.37	4.00	6992.50	2.63	.009
	Mature	4.35	141.76	5.00			
For the enjoyment of learning	Carers	4.53	149.76	5.00	3191.00	-2.13	.033
	Non-carers	4.08	123.71	4.00			
To improve my potential future earnings	Carers	4.42	149.39	5.00	3167.50	-2.31	.021
	Non-carers	4.39	123.16	5.00			
	EFL	4.45	130.47	5.00	3474.00	-2.92	.004
	ESL	4.21	100.20	4.00			
	Home	4.43	128.62	5.00	4346.50	1.96	.05
	International	4.21	105.66	4.00			

1. How does it work?

When conducting a study, researchers set up a null hypothesis (H_0) (see next section).

The p-value tells us whether or not the results from a study can be obtained if the null hypothesis were true.

A **small** p-value (usually ≤ 0.05) suggests the findings are meaningful (i.e. strong evidence **against** H_0).

A **large** p-value (usually > 0.05) suggests the findings could be due to random chance (i.e. weak evidence against the H_0).

2. What is the null hypothesis?

The null hypothesis (H_0) is the assumption that there is no difference or real effect. Normally, it serves as a starting point when doing research.

For example, a researcher tests if a new method of therapy reduces anxiety. The null hypothesis (H_0) of this research would be that the therapy has **no effect** (i.e. anxiety levels will remain unchanged). If the p-value of the research is 0.03 (a **small** value < 0.05), this suggests strong evidence **against** H_0 which indicates that the therapy does work.

Another researcher is investigating whether a new wound care treatment can speed up recovery. The H_0 in this case would be that the new treatment has no effect compared to standard care. If the p-value of the research is 0.10, there is weak evidence, suggesting that they may need more data.



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3. Common misconceptions

A p-value is **NOT** the probability that the hypothesis is true. Think of the p-value more as an indicator of whether the results are meaningful or not.

A p-value of 0.05 does **NOT** mean there is a 95% chance the result is real. Instead, it means that there is a 5% chance (so, very low possibility) that the result the research observed could happen under the null hypothesis.

Further support

The screenshot shows the Federation University Moodle dashboard. The top navigation bar includes 'Federation University', 'moodle', and links to 'Dashboard', 'Study Support', 'Student Services', 'Library', 'Login to', and 'Help'. The 'Study Support' menu is expanded, showing a list of resources: Academic Integrity Module – (AIM), ASK a FedUni student for help, Accessibility/Disability, FedReady – Get ready for study at FedUni, FedCite – Referencing, Learning Skills Advisor (LSA) bookings, Online Study Hub – tech guides & study help, PASS – Peer Assisted Study Sessions, Studiosity – same-day feedback, Study Skills website, TAFE Ready – Get ready for study at TAFE, Turnitin – plagiarism prevention, Uni Skills Workshops, and Writing Space – Drop-in support. The 'Learning Skills Advisor (LSA) bookings' and 'Studiosity – same-day feedback' items are highlighted with blue boxes. The dashboard itself features a 'Dashboard' heading and two main sections: 'We'll make jobhunting' (with a sub-heading 'Our Careers and Employability' and text 'writing winning application') and 'Light up your future w' (with a sub-heading 'With over 100 scholarships' and text 'support your studies. Appli'). A 'Course overview' link is visible at the bottom left.

Book with a Learning Skills Advisor (STEM) – get individualised feedback & support, online or in-person, with a maths specialist to help with assessment specific questions.



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