How can a pooled standard deviation be calculated, and can you provide an example?

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A pooled standard deviation is a measure of variability that takes into account multiple groups or populations. It is calculated by combining the standard deviations of each group and weighting them based on the sample size of each group. This results in a more accurate representation of the overall variability within the entire population.

For example, let's say a researcher wants to compare the test scores of students from two different schools. The first school has a standard deviation of 5 and a sample size of 50, while the second school has a standard deviation of 3 and a sample size of 80. To calculate the pooled standard deviation, the researcher would combine the two standard deviations using the formula:

Pooled Standard Deviation = √ / (50+80-2) = √ / 128 = √1792/128 = √14 = 3.74

This pooled standard deviation of 3.74 would give a more accurate representation of the variability of test scores among all students from both schools, rather than just looking at the individual standard deviations of each school.

Calculate a Pooled Standard Deviation (With Example)

A pooled standard deviation is simply a weighted average of standard deviations from two or more independent groups.

In statistics it appears most often in the **two sample t-test**, which is used to test whether or not the means of two populations are equal.

The formula to calculate a pooled standard deviation for two groups is as follows:

Pooled standard deviation = √ (n1-1)s12 + (n2-1)s22 / (n1+n2-2)

where:

n1, n2: Sample size for group 1 and group 2, respectively.s1, s2: Standard deviation for group 1 and group 2, respectively.

Note that the pooled standard deviation should only be used when the standard deviations between the two groups can be assumed to be roughly equal.

Also note that because the pooled standard deviation is a weighted average, it will give more "weight" to the group with the larger sample size.

Example: Calculating the Pooled Standard Deviation

Suppose we have two different groups with the following information:

Group 1:

Sample size (n1): 15Sample standard deviation (s1): 6.4

Group 2:

Sample size (n2): 19Sample standard deviation (s2): 8.2

We can calculated the pooled standard deviation for these two groups as:

Pooled standard deviation = √ (15-1)6.42 + (19-1)8.22 / (15+19-2) = 7.466

Notice how the value for the pooled standard deviation (7.466) is between the values for the standard deviation of group 1 (6.4) and group 2 (8.2).

Bonus: Pooled Standard Deviation Calculator

You can also use the Pooled Standard Deviation Calculator to quickly calculate the pooled standard deviation between two groups.

For example, we could plug in the values from the previous example to come up with the same pooled standard deviation that we calculated by hand:

s_1 (sample 1 standard deviation)

6.4

n_1 (sample 1 size)

15

s_2 (sample 1 standard deviation)

8.2

n_2 (sample 2 size)

19

CALCULATE

Pooled standard deviation = 7.466090

Note that you can also use the "Enter raw data" option on the calculator to enter the raw data values for the two groups and calculate the pooled standard deviation in that manner.