HOWEVER, the formulae we use for a sample and a population are different!

Most researchers almost never work with population data.

We use samples to infer the population's variance.

	Population	Estimate Based on a Sample
Variance	$\sigma^2 = \frac{\Sigma (X - \mu)^2}{N}$	$s^2 = \frac{\sum (X - \overline{X})^2}{n - 1}$
	where Σ = to sum X = a score in the distribution μ = the population mean N = the number of cases in the population	where Σ = to sum X = a score in the distribution \overline{X} = the sample mean n = the number of cases in the sample
Standard Deviation	$\sigma = \sqrt{\frac{\Sigma(X - \mu)^2}{N}}$	$s = \sqrt{\frac{\Sigma (X - \overline{X})^2}{n - 1}}$
	where Σ = to sum X = a score in the distribution μ = the population mean N = the number of cases in the Population	where Σ = to sum X = a score in the distribution \overline{X} = the sample mean n = the number of cases in the sample

HOWEVER, the formulae we use for a sample and a population are different!

Sample **variance** tends to be lower (i.e., undervalues the penalty).

Thus, we divide by n-1 (n is the data in sample) instead of n.

A smaller number in the denominator yields a higher variance.

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Thus, we divide by n-1 (n is the data in sample) instead of **n**.

A smaller number in the denominator yields a higher variance.

X = a score in the distribution

X = the population mean

W = the number of cases in the

population

= the number of cases in the sample

Standard Deviation

$$\sigma = \sqrt{\frac{\Sigma(X - \mu)^2}{N}}$$

 $s = \sqrt{\frac{-(s-as)}{n-1}}$

where Σ = to sum X = a score in the distribution μ = the population mean N = the number of cases in the Population

where $\Sigma = \text{to sum}$ X = a score in the distribution $\overline{X} = \text{the sample mean}$

n = the number of cases in the sample