Notes on Effect Sizes

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Effect Size Based on Standardized Variable (ES_z)

A z score is the deviation of x from its mean in standard deviation units.

$$z = \frac{x_0 - \bar{x}}{sd_x}$$

Our effect sizes could plausibly be thought of as being stated in the z metric. Since we use a standardized dependent variable, our effect size (which I am going to call ES_z, for *effect size based upon a z statistic*,) is essentially:

$$ES_z = \frac{x_{treatment} - x_{comparison}}{sd_x}$$

Cohen's d

In contrast, Cohen's d is the difference between two groups divided by a *pooled* standard deviation, where the pooled standard deviation is a weighted composite of the two groups. Following equations given in the Stata Manual (`help esize`):

$$d = \frac{x_{treatment} - x_{comparison}}{sd_{pooled}}$$

and

$$sd_{pooled} = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$

Converting from ES_z to Cohen's d

Based upon the above formulas, converting between the two effect sizes should be simple:

$$ES_z \left(\frac{sd_x}{sd_{pooled}} \right) = d$$

sd_x is available from `summarize x`.

The standard deviation and number of observations for each group, where `group` is the grouping variable is available from `bysort group: summarize x`.

One can then calculate:

```
display pooledsd = (((n1-1)*(sd1^2)) + ((n2-1)*(sd2^2)))/(n1+n2-2))^.5
```

and then perform the above calculation.