

## 5 Statistics You Should Know

### Being Smart Reading Statistics

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## So What are the Stats

Effect size  
Plots/Descriptive  
Correlations  
Tests of Difference  
Time ordered

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## How do I know which one to use?

What is the question

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## Types of Questions

Look for action verb  
Describe  
Compare  
Association among  
Count the number of groups  
What kind of dependent variable

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## Effect Size

Lets us know was the sample big enough

Mean1 - Mean2/ sd

Do try this at home

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## Rule of Thumb Effect Sizes

Small = .2  
Medium = .5  
Large = .8

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## Find These Effect Sizes

Sample 12 women

POMS Anger Scale

mean1=2.25 mean2=1.44 sd=2.84

Bodily Feeling Muscle Pain

mean1=17.17 mean2= 15.0 sd 1.46

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## Sample Need for 80% Power

Effect Size	.2	.3	.5	.6	.7	.8	1.0	1.40
Sample	393	175	64	45	33	26	19	10

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## Statistical Significance is not Clinical Significance

A non statistically significant effect may be clinically important

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## Plots

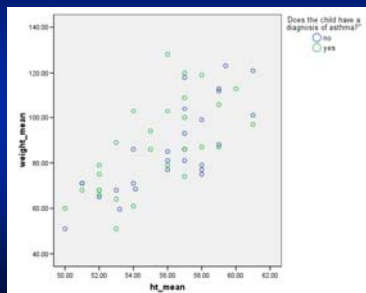
Plot your data

Look at plots in papers, do they really look like what author is claiming.

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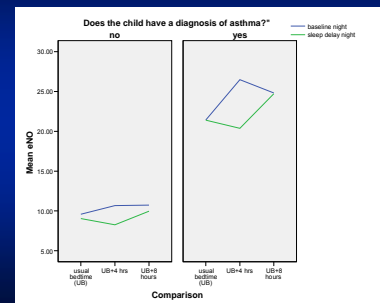
## Scatter Plot HT vs. WT



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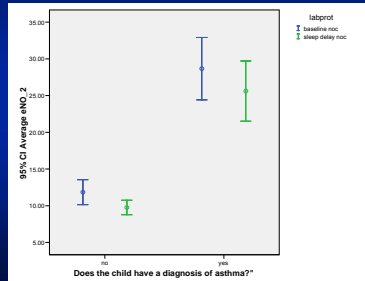
## Line Plot eNo



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## Error Bars eNO Clustered by Group



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## Descriptive

Mean  
Median  
SD

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## Look at sd Compared to Mean

Sample 12 women

POMS Anger Scale

mean1=2.25 mean2=1.44 sd=2.84

Bodily Feeling Muscle Pain

mean1=17.17 mean2= 15.0 sd 1.46

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## Correlation

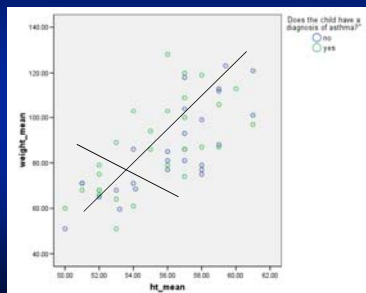
Bivariate- between two variables  
Regression- several variables to one outcome variable  
Need variability

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## Scatter Plot HT vs. WT

$r = .72$   $R^2 = .52$



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## Rule of Thumb

Little  $r < 0.4$  is not really meaningful  
Square  $r$  and look at % variance explained  
Regression look at change  $R^2$  apply above rule

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## Tests of Difference

How many independent groups  
Parametric test- estimate parameter  
e.g. a mean  
T-test two groups  
ANOVA multiple groups  
Non-Parametric  
Mann-Whitney U two groups  
Kruskal-Wallis multiple groups

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## Parametric or Non-Parametric

### Use Parametric when

Have appropriate distribution required  
to estimate a parameter such as  
mean

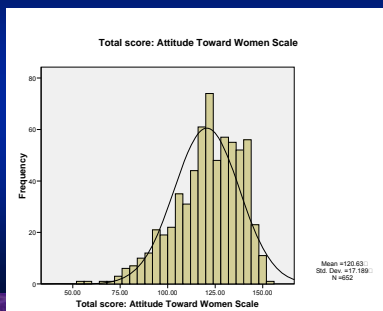
### Use Non-Parametric when

Have a funky distribution  
Need to do calculation by hand

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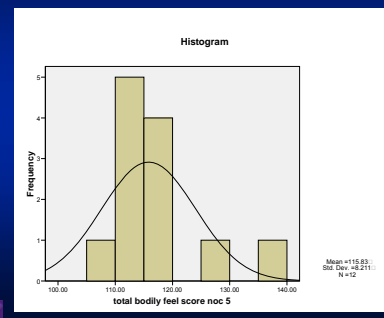
## Good Distribution Use Parametric



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## Not So Good Use Non-Parametric



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## Another Reason to Plot Your Data

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## Time Ordered Data

It is correlated  
It violates all assumption of  
independence of most stats  
It is very hard to get don't waste it

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## Time Ordered Data Types of Tests

T-Test 2 points in time  
ANOVA multiple points in time  
More than 4 need special time series tests

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## Time Ordered Data Abuse

It is flat out wrong to treat each time point as a separate subject and use in conventional statistical test

Look at sample N if few in number and df or n listed for test is a lot it is wrong

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## Have Fun Reading Statistics

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