


HOW TO USE SPSS TO ANSWER BASIC QUANTITATIVE RESEARCH QUESTIONS

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print your name and
email address so that
I can email you these
notes! 😊**

TODAY WE WILL:

- Discuss how to get SPSS – rent it! 
- Go over some popular analyses based on following examples of research questions:
 1. Was there significant improvement in reading scores between pretest and posttest?
 2. Were there significant differences between groups in reading scores?
 3. Were there significant differences between groups in Posttest reading scores while controlling for initial Pretested ability?
 4. Did group, pretested ability, and estimate IQ all uniquely predict Posttest reading scores?
- Discuss YOUR OWN research questions.

GET IBM SPSS

- You can rent SPSS.
- Different options depending on the analysis you want to do and how long you plan to use IBM SPSS
- <http://www.onthehub.com/spss/>

RESEARCH QUESTION #1:

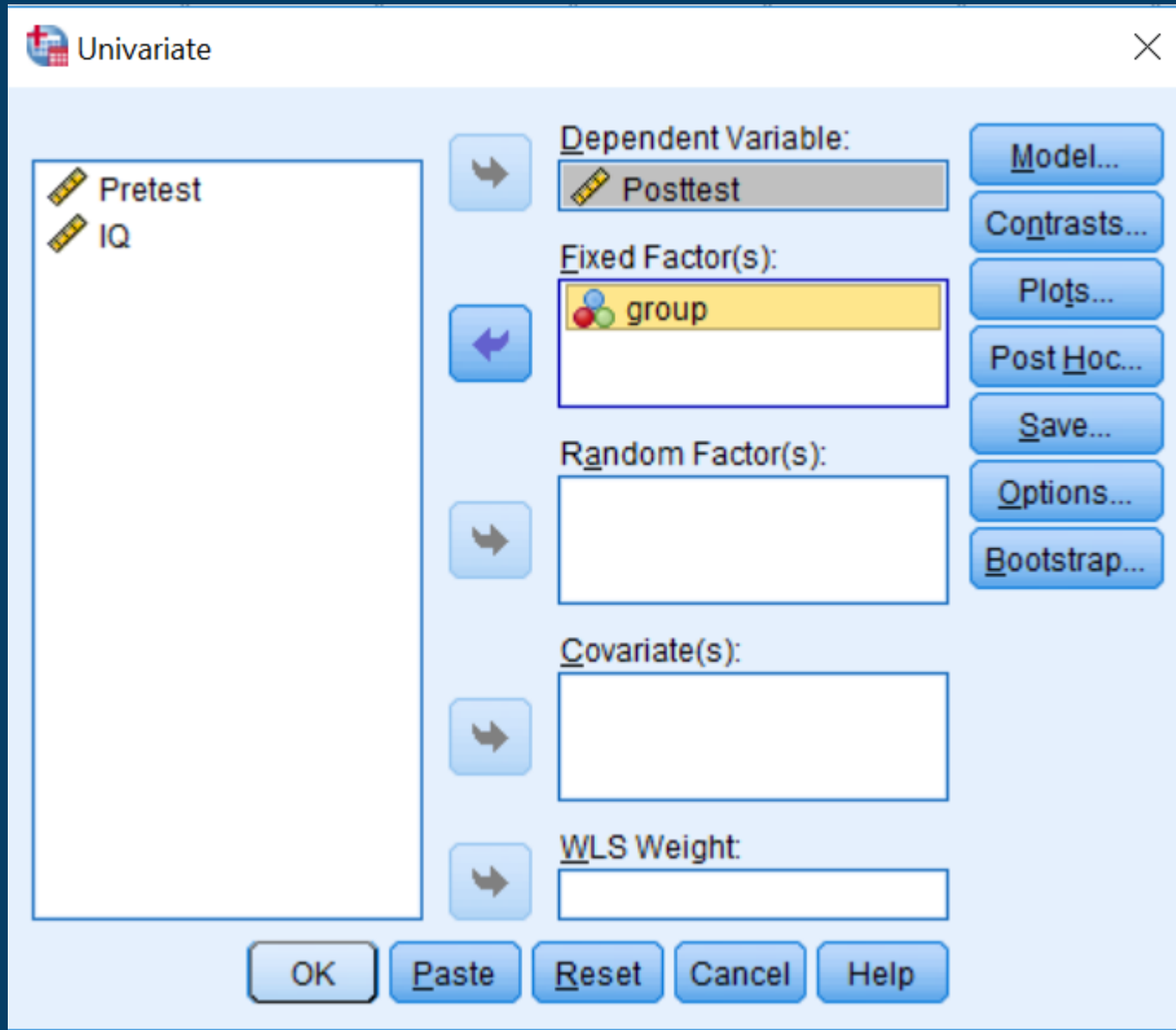
Were there significant differences between **two independent groups** in math scores?



- So, were the average reading scores different between Control Group and Treatment Group?
 - You could use a t-test or Analysis of Variance. Lets use ANOVA

ANALYSIS OF VARIANCE

- Analyze -> general linear model -> univariate



ANALYSIS OF VARIANCE

- Analyze -> general linear model -> univariate

Tests of Between-Subjects Effects

Dependent Variable: Posttest

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1789.747 ^a	1	1789.747	32.425	.000
Intercept	81571.286	1	81571.286	1477.836	.000
group	1789.747	1	1789.747	32.425	.000
Error	1324.714	24	55.196		
Total	83312.000	26			
Corrected Total	3114.462	25			

a. R Squared = .575 (Adjusted R Squared = .557)

Here is your predictor

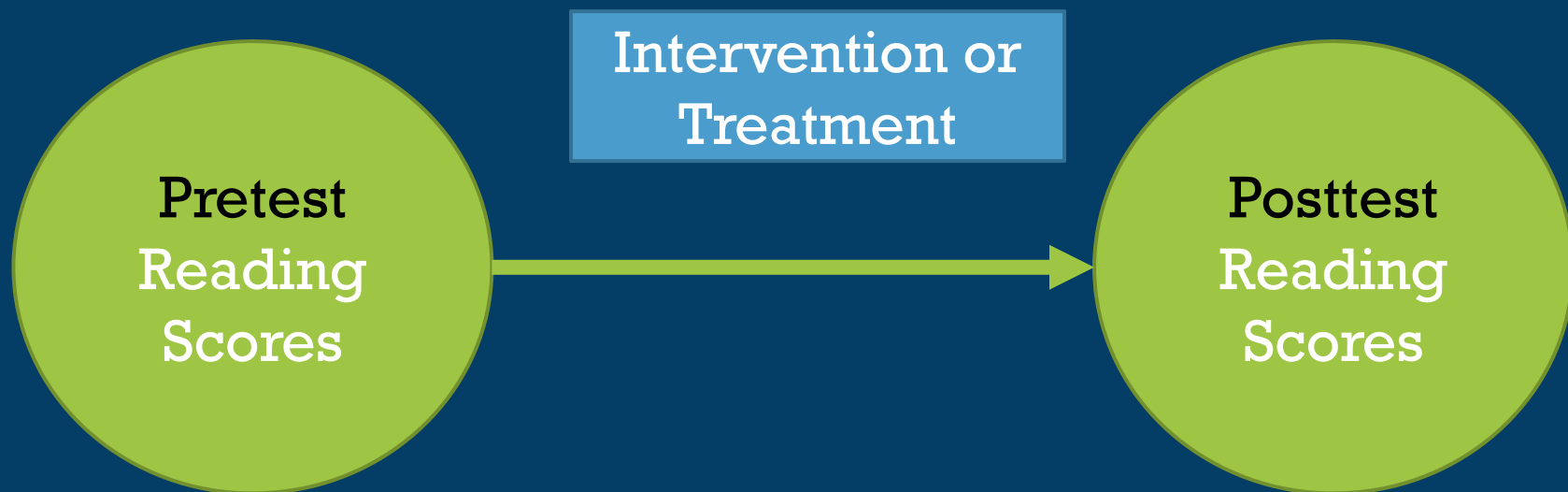
If this value is .05 or less then effect is statistically significant

LET'S DISCUSS....

- What research questions can you answer with this most basic design?
- What are some weaknesses in this design;
-

RESEARCH QUESTION #2:

Was there significant improvement in reading scores **for the same students** between pretest and posttest?



- So, were the average reading scores different between pretest and posttest?
- Use the paired sample t-test

PAIRED SAMPLE T-TEST

- Analyze -> compare means -> paired sample t-test

Paired-Samples T Test

Reading_pretest
Reading_posttest

Name: Reading_pretest
Type: Numeric
Measure: Scale

Paired Variables:

Pair	Variable1	Variable2
1	[Reading_pretest]	[Reading_posttest]
2		

Options...
Bootstrap...

↑
↓
↔

OK Paste Reset Cancel Help

PAIRED SAMPLE T-TEST

- Analyze -> compare means -> paired sample t-test

SPSS Output file (.spv)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	49.0385	26	12.90420	2.53072
	Posttest	55.5385	26	11.16147	2.18894

PAIRED SAMPLE T-TEST

- Analyze -> compare means -> paired sample t-test

SPSS Output

Paired Samples Test

Paired Differences

	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2- tailed)
				Lower	Upper			
Pair 1 Pretest - Posttest	-6.50000	6.81909	1.33733	-9.25429	-3.74571	-4.860	25	.000

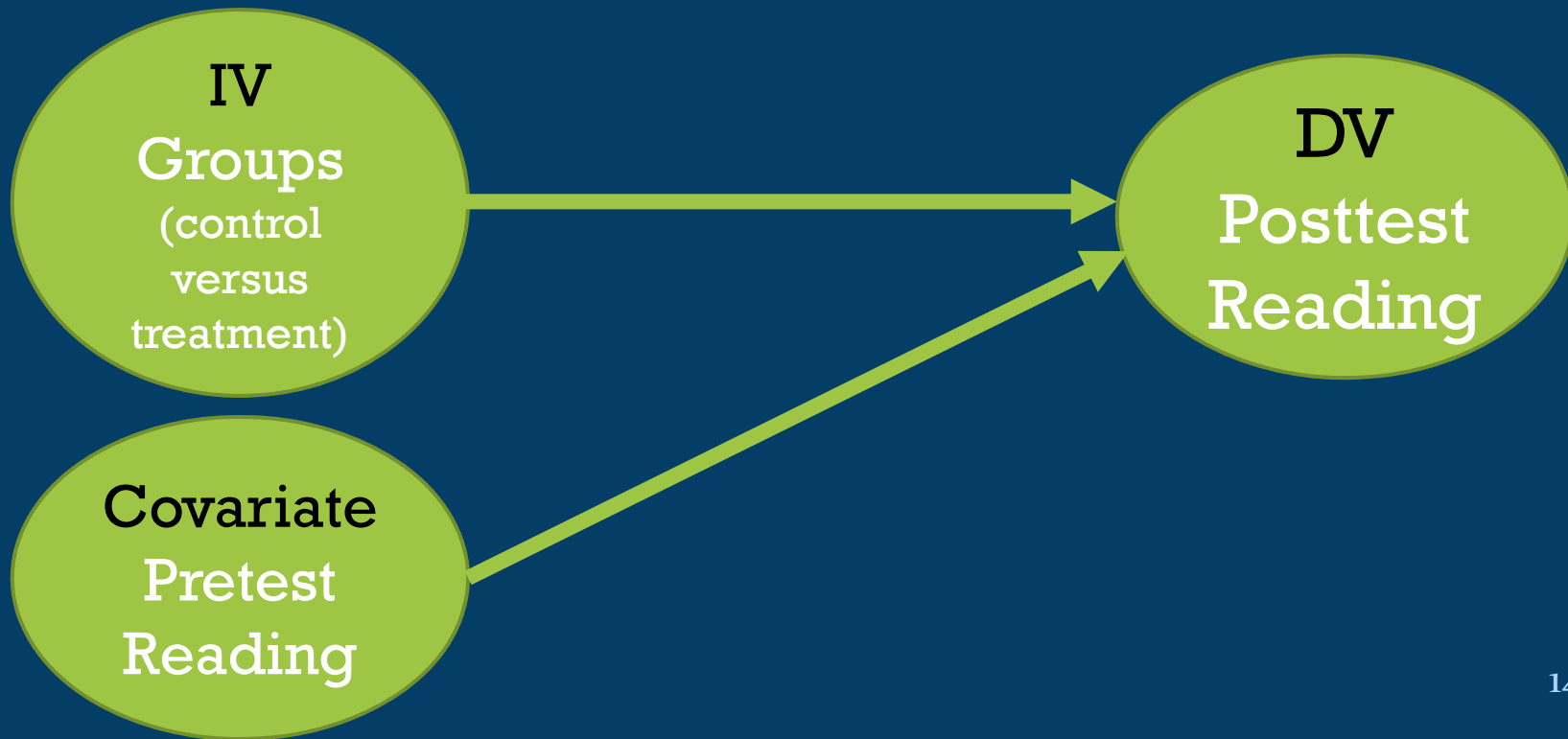
If the value is .05 or smaller, then the difference is statistically significant!

LET'S DISCUSS....

- What research questions can you answer with this most basic design?
- What are some weaknesses in this design;
- how can we improve the design?
 - Ok, let's use an improved design!

RESEARCH QUESTION #3:

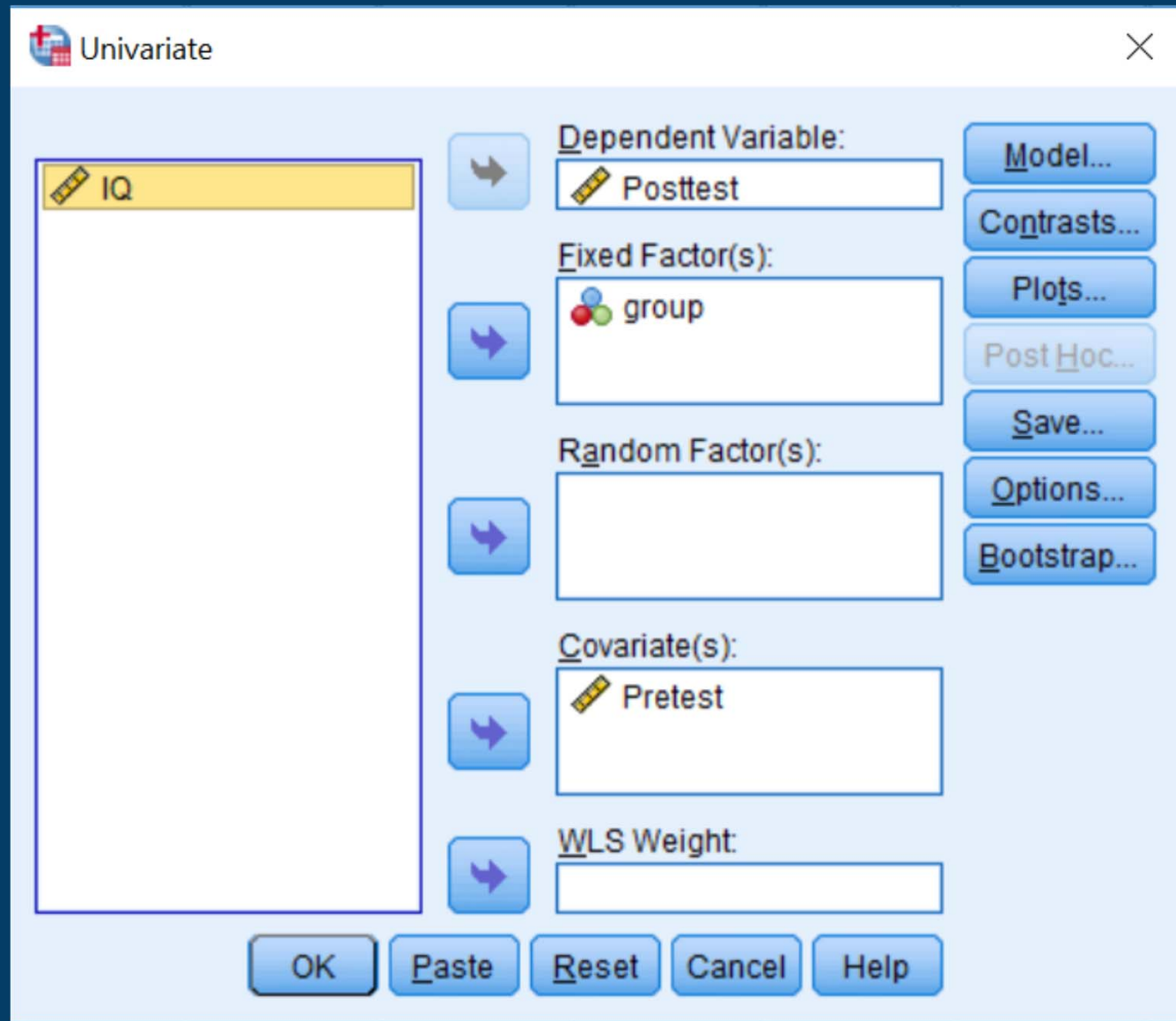
Were there significant differences between groups in posttest reading scores while controlling for initial pretested ability?



- You could use Analysis of Variance with a covariate

ANALYSIS OF VARIANCE WITH A COVARIATE

- Analyze -> general linear model -> univariate



ANALYSIS OF VARIANCE WITH A COVARIATE

- Analyze -> general linear model -> univariate

Tests of Between-Subjects Effects

Dependent Variable: Posttest

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2582.066 ^a	2	1291.033	55.774	.000
Intercept	954.728	1	954.728	41.245	.000
Pretest	792.319	1	792.319	34.229	.000
group	336.533	1	336.533	14.539	.001
Error	532.395	23	23.148		
Total	83312.000	26			
Corrected Total	83312.000	25			

Adjusted R Squared = .814)

Here is group predictor

covariate used to look at change in reading

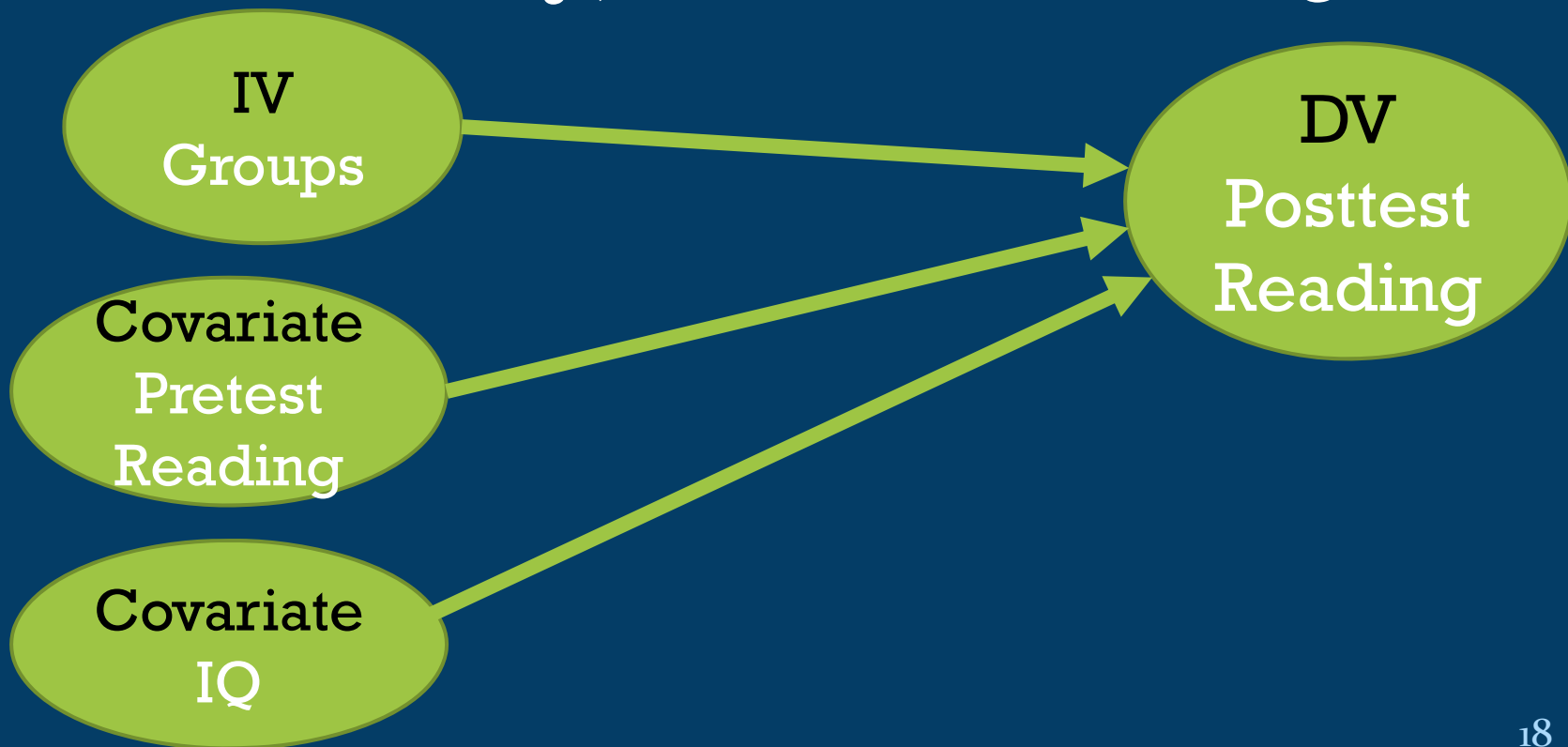
If this value is .05 or less then effect is statistically significant

LET'S DISCUSS....

- What research questions can you answer with this most basic design?
- What are some weaknesses in this design;
- how can we improve the design even more!
- Ok, let's use an improved design!

RESEARCH QUESTION #4:

Did group uniquely predict posttest reading scores, after controlling for , pretested ability, and estimated IQ?



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- You could use Analysis of Variance or REGRESSION

ANALYSIS OF COVARIANCE

Tests of Between-Subjects Effects

Dependent Variable: Posttest

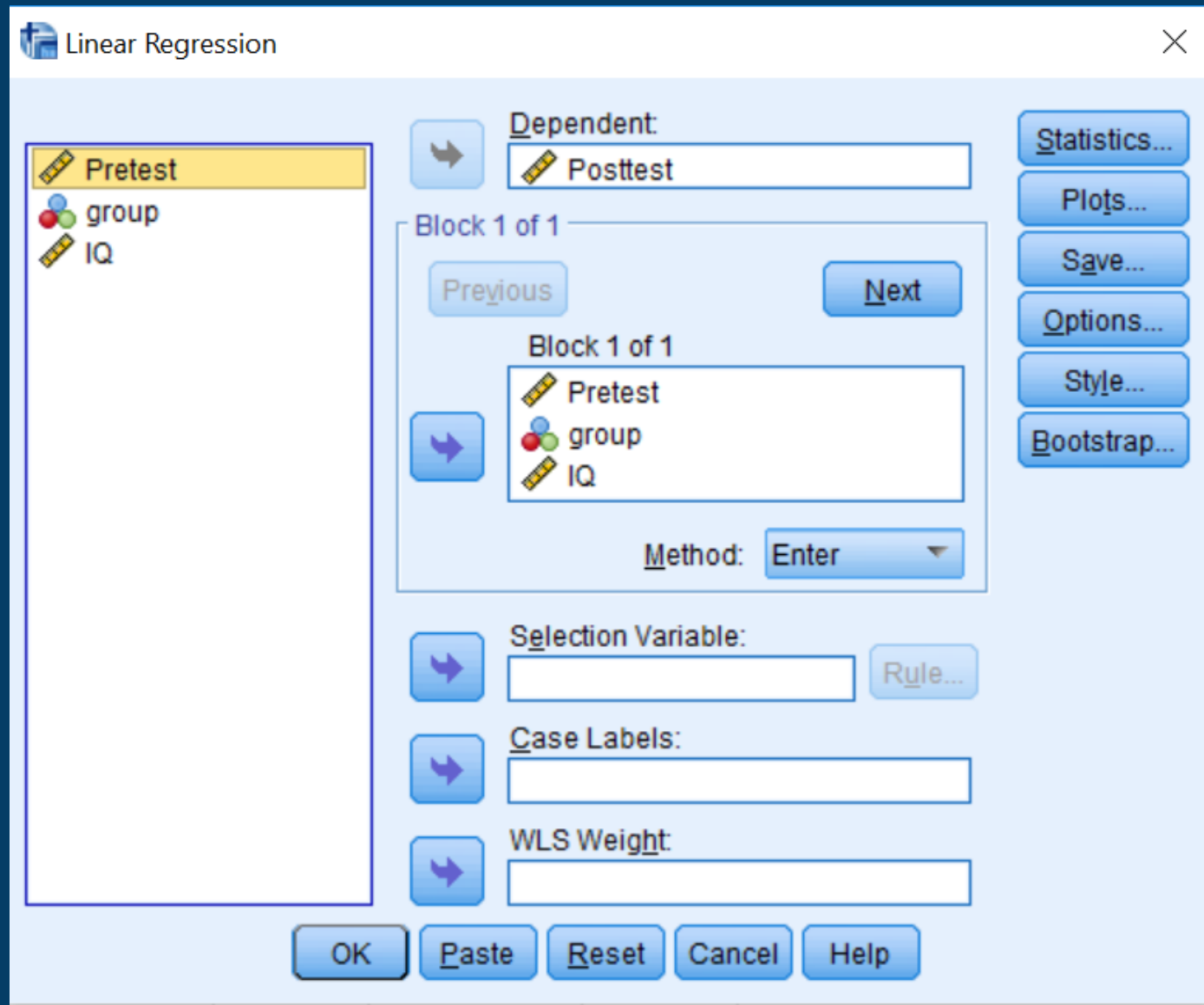
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2730.265 ^a	3	910.088	52.114	.000
Intercept	81.583	1	81.583	4.672	.042
Pretest	781.750	1	781.750	44.765	.000
IQ	148.199	1	148.199	8.486	.008
group	50.800	1	50.800	2.909	.102
Error	384.196	22	17.463		
Total	83312.000	26			
Corrected Total	3114.462	25			

a. R Squared = .877 (Adjusted R Squared = .877)

Look, Group is no longer significant!!
Why did this happen?
What can we do with this result?

ANOTHER WAY TO ANALYZE THE DATA: REGRESSION

- Analyze -> Regression-> Linear



The image shows the 'Linear Regression' dialog box in SPSS. On the left, a list of variables includes 'Pretest' (highlighted), 'group', and 'IQ'. In the center, 'Posttest' is entered in the 'Dependent' field. Below this, 'Block 1 of 1' is shown with 'Pretest', 'group', and 'IQ' listed in the independent variables field. The 'Method' is set to 'Enter'. On the right, there are buttons for 'Statistics...', 'Plots...', 'Save...', 'Options...', 'Style...', and 'Bootstrap...'. At the bottom, there are buttons for 'OK', 'Paste', 'Reset', 'Cancel', and 'Help'.

Linear Regression

Dependent: Posttest

Block 1 of 1

Previous Next

Block 1 of 1

Pretest
group
IQ

Method: Enter

Selection Variable: Rule...

Case Labels:

WLS Weight:

OK Paste Reset Cancel Help

Statistics...
Plots...
Save...
Options...
Style...
Bootstrap...

REGRESSION

- Analyze -> regression-> linear

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.839	4.471		1.753	.093
	Pretest	.530	.079	.613	6.691	.000
	group	4.328	2.537	.197	1.706	.102
	IQ	.130	.045	.301	2.913	.008

a. Dependent Variable: Posttest

Here is
Group
predictor

covariate
used to
control for
IQ

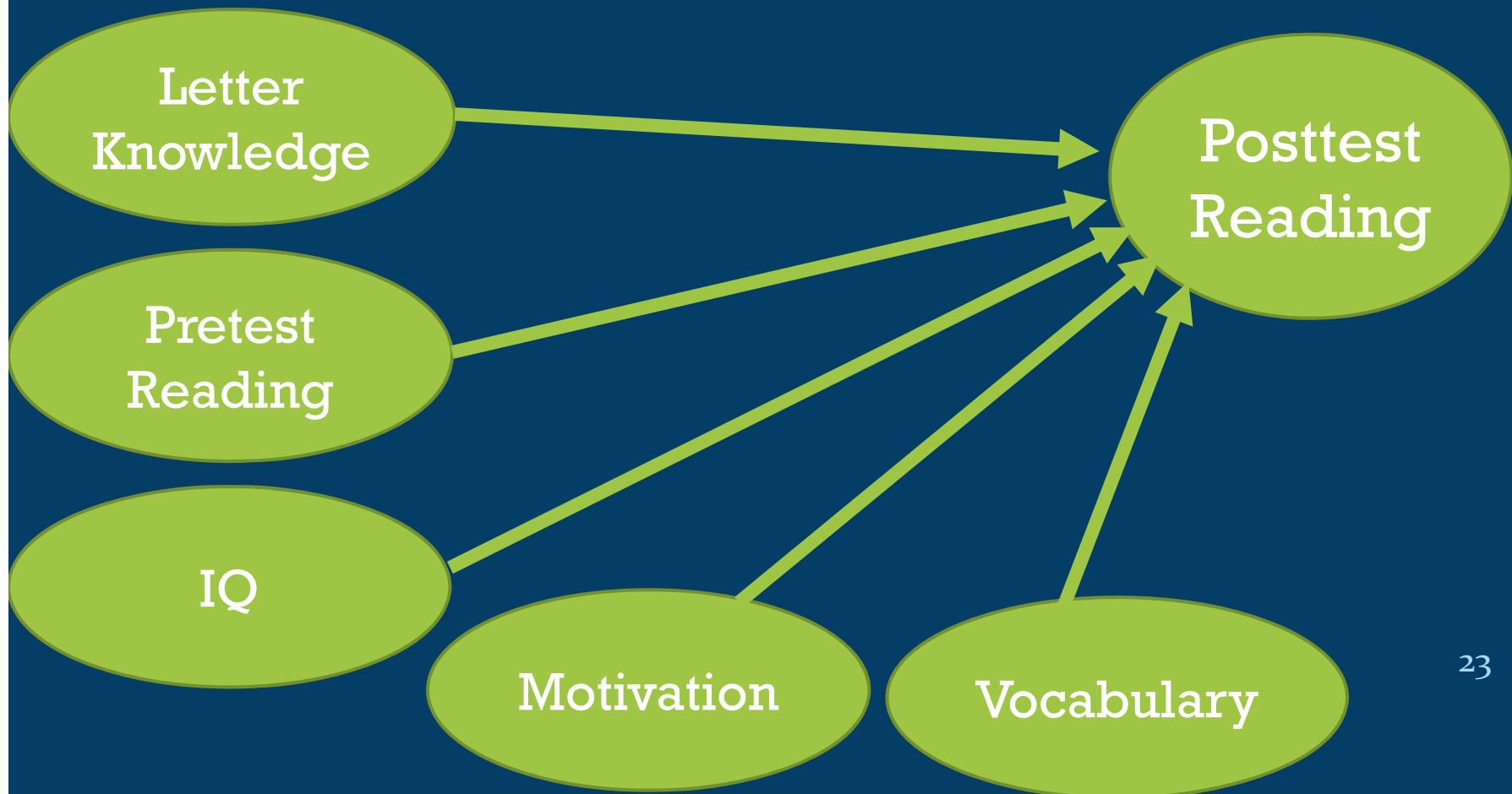
covariate
used to
look at
change in
reading

Look! Group
is no longer
significant!

REGRESSION IS USEFUL!!

- Especially useful when we wish to focus on several continuous predictors of an outcome
- So emphasis is no longer on comparing groups

WE COULD ANALYZE THIS!



LET'S DISCUSS....

- What research questions do you have?
- What kind of statistical analysis would be appropriate?

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