

Upcoming RSE Webinar - July 13th



Invitation to RSE Webinars Research Problem, Purpose, and Questions for a Repeated Measure Design – July 13

Greetings [General](#):

You are invited to attend a webinar titled: [Research Problem, Purpose, and Questions for a Repeated Measure Design](#). Information about the webinar is included below:

July 13 , 2023 4-5 pm AZ Time	Title: Research Problem, Purpose, and Questions for a Repeated Measure Design Description: This webinar provides detailed explanations and examples for developing appropriate research problems, purposes, and questions for a repeated measure study. Participants may bring their examples to discuss.	Research Methodology Group (RMG) Dr. Jim Rice Collaborate link Visit RMG for additional method resources.
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There are two ways to easily access the webinar:

1. Using a Google Chrome or Firefox browser, you can access any workshop by clicking on the [Collaborate link](#). As you login to Collaborate please add your name and role at UOPX (i.e., Faculty, Student, Alumni, Staff, External).
2. Using phone dialing +1-571-392-7650 PIN: 587 656 6322

The recording, PowerPoint slides of the previous webinars, and schedule for the future [2023 webinars](#) are available at this site.

After attending the webinar please provide us with your feedback by completing this [brief survey](#) (it takes less than a minute).

Thank you and see you there 😊

Best regards,

Dr. Smith

Using a Repeated Measure Design

A Dissertation Option for Quantitative Research

Dr. Jim Rice

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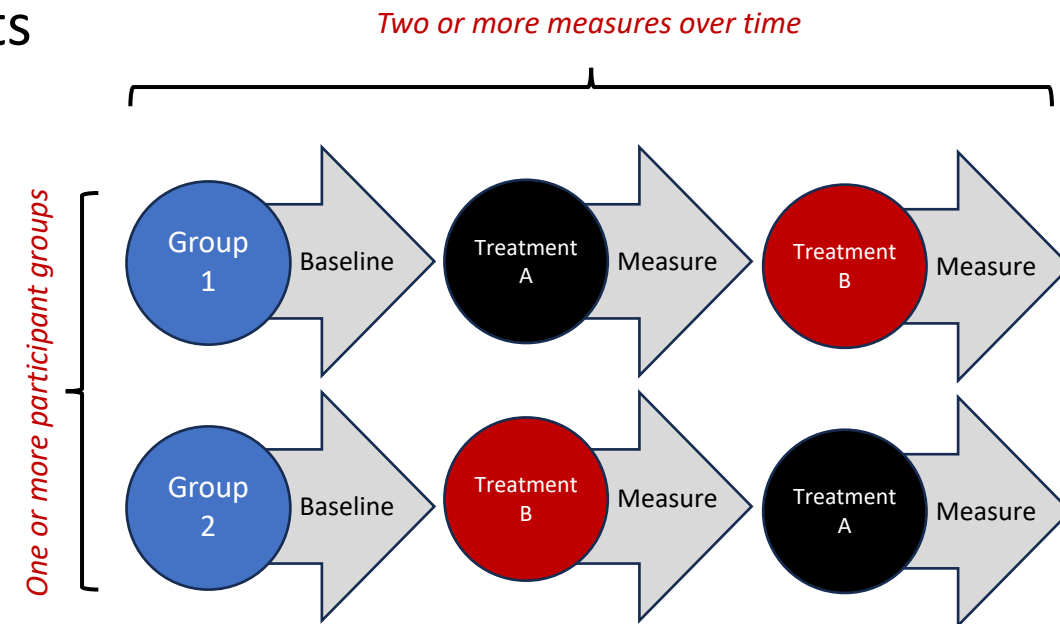
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What is a Repeated Measure Design?

A quantitative repeated measures research design, also known as a within-subjects design or longitudinal design, is a research approach that involves collecting data from the same participants multiple times over time. Attributes include:

- Same Participants
- Multiple Measures
- Controlled Conditions
- Statistical Analysis
- Increase Statistical Power

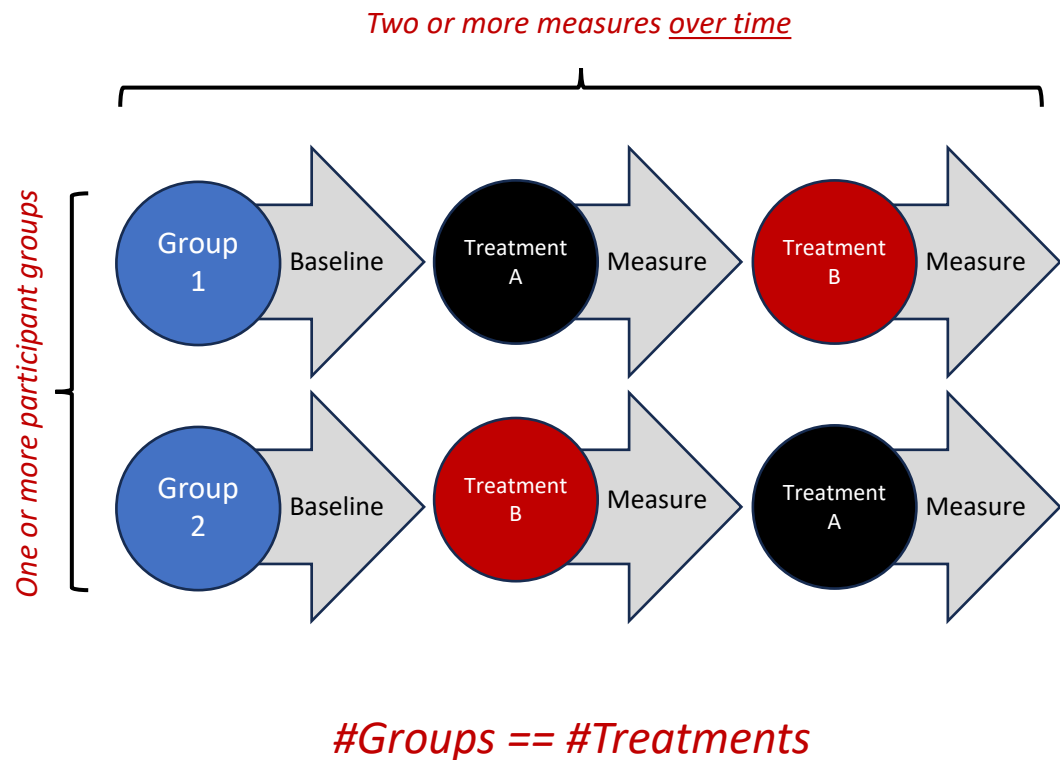
NOTE: Challenges include attrition, practice effects, and carry over effect



#Groups == #Treatments

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Repeated Measure Design



Repeated measure designs are a special type of experimental design without an independent control group. It appears to violate experimental design rules. But in fact, RMD have some substantial benefits, including:

- Increased statistical power
- Better control for individual differences
- Improved sensitivity to change
- “Cost”-effective data collection

These advantages make this design particularly valuable for longitudinal studies, intervention evaluations, and investigations into the dynamics of variables within individuals.

Business Research Problem

- Effectiveness of Training Programs
- Customer Satisfaction and Loyalty
- Employee Engagement and Job Satisfaction



There are many business-related problems that are appropriate for repeated measure designs. These include anytime the population sample can be maintained over sufficient time to enable repeated measures. For this reason, it is common for employee, leadership, and process studies. But, not as common in market or consumer related studies.

Many education-related problems are appropriate for RM designs. These include anytime the population sample can be maintained over sufficient time to enable repeated measures

Did you just envision a classroom setting? 😊

Education Research Problem

- Learning Outcomes in Educational Interventions
- Effectiveness of Teaching Methodologies
- Academic Progress and Development



"The purpose of this quantitative repeated measures study is to examine the long-term effects of a mindfulness-based stress reduction intervention on stress levels, well-being, and academic performance among college students over one academic year."

Know Your Repeated Measure Design (RMD) Data Variable Types

- Continuous
- Categorical
- Ordinal
- Binary
- Frequency

Keep in mind! The variable type is VERY important to determining the statistical analysis technique used



Recommendation: Consult a statistician or statistical expert when developing the measurement instrument.

Support for... But not, by itself, definitive

Causality requires several specific conditions.

- Temporal precedence
- Association
- Elimination of alternative explanations
- Replication

Common limitations to assertion of causality include potential carryover effects, participant attrition, and practice effects. These limitations can introduce bias or influence the observed results, highlighting the importance of careful study design, statistical analysis, and interpretation of findings.

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Repeated Measure Design – Sample Size Calculation

Most common approach to calculating the sample size is to use G*Power

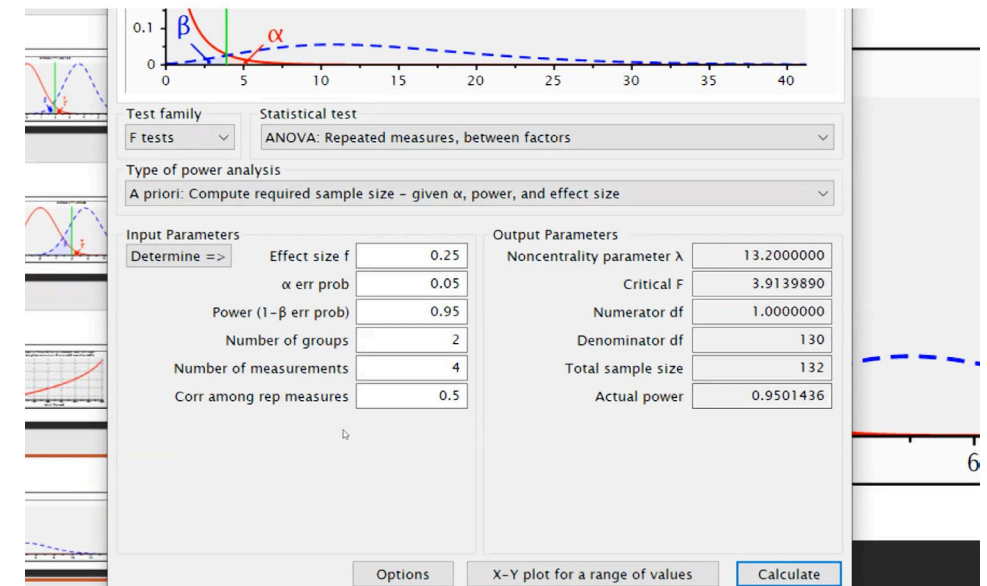
FOR Repeated Measures ANOVA Consider

Hypothesized Effect Size: $n^2 = .01, .03, \text{ or } .05$

Required Power: .80 or higher

Number of Groups?

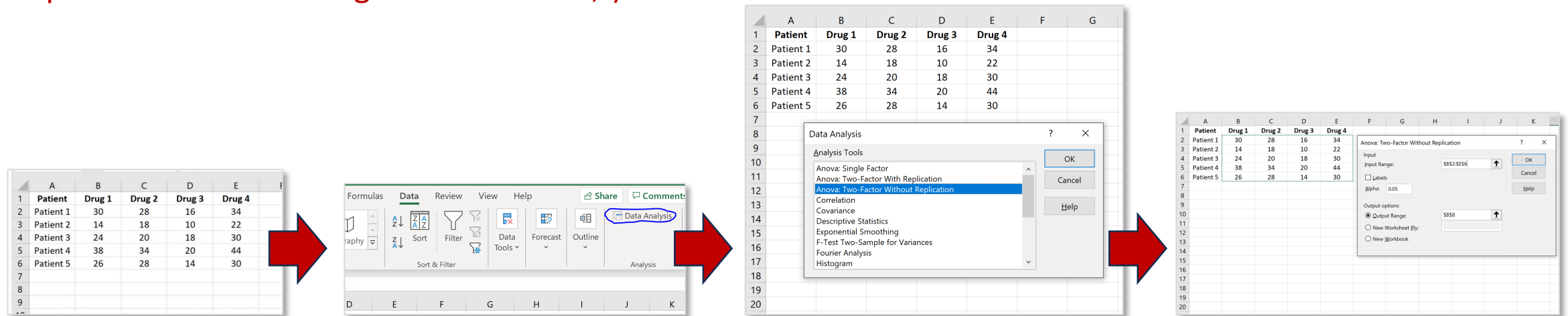
Number of Observed Outcomes?



Research Methodology Advanced Tools (Director). (2021, October 1). *G power ANOVA fixed and repeated measures sample size calculation (one-way ANOVA)(repeated measures)*. https://www.youtube.com/watch?v=f_-ITGkXZQA

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Repeated Measure Design – Homework ;-)



The final screenshot shows the ANOVA results in Excel. The 'SUMMARY' table provides a breakdown of the data by row and column. The 'ANOVA' table shows the results of the Two-Factor ANOVA.

SUMMARY	Count	Sum	Average	Variance
Row 1	4	108	27	60
Row 2	4	64	16	26.66667
Row 3	4	92	23	28
Row 4	4	136	34	104
Row 5	4	98	24.5	51.66667
Column 1	5	132	26.4	76.8
Column 2	5	128	25.6	42.8
Column 3	5	78	15.6	14.8
Column 4	5	160	32	64

ANOVA	SS	df	MS	F	P-value	F crit
Source of Variation						
Rows	680.8	4	170.2	18.10638	5.07E-05	3.259167
Columns	698.2	3	232.7333	24.75887	1.99E-05	3.490295
Error	112.8	12	9.4			
Total	1491.8	19				

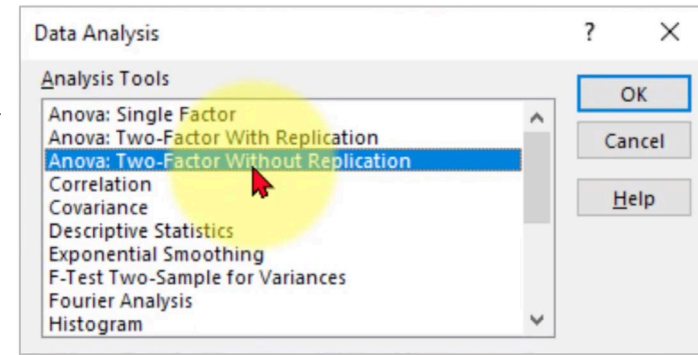
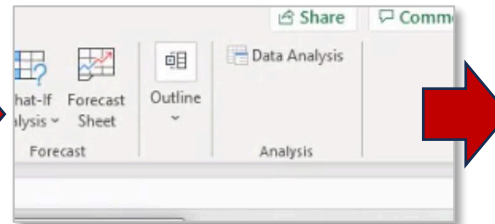
Bobbit, Z. (2020, April 1). How to perform a repeated measures ANOVA in Excel [Academics]. *Statology*.

<https://www.statology.org/repeated-measures-anova-excel/>

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Repeated Measure Design – Homework ;-)

	before training	training 1	training 2	training 3	training 4	follow up
	pre	week 1	week 2	week 3	week 4	post
1	80	78	76	75	66	62
2	57	57	55	49	48	45
3	66	66	65	64	61	54
4	64	64	58	55	52	50
5	69	68	62	59	57	53
6	65	65	63	60	57	55
7	70	70	70	68	65	62



Source of Variation	SS	df	MS	F	P-value	F crit
Rows	1659.476	6	276.5794	77.47666	6.64E-17	2.420523
Columns	908.4048	5	181.681	50.89329	9.36E-14	2.533555
Error	107.0952	30	3.569841			
Total	2674.976	41				

Math Guy Zero (Director). (2021, September 10). *Within group (repeated measures) ANOVA with Excel* [Streaming]. <https://www.youtube.com/watch?v=ATrwtCI4ExE>

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Repeated Measure Design

Common Tools

- MS Excel
- SPSS
- SAS
- DATATab

Questions

