Regression Vs. ANOVA: Is a main effect really a main effect?

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Lancaster University

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Outline

1. Introduction
   - Defining the problem
   - Content of this talk
2. Toy Example
   - Using categorical variables only
   - Using continuous variables
3. Real Data Example
   - Methods
   - Results
4. Conclusion

Defining the problem

What you might see

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All stats in R have the same syntax

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What this talk is not about

- How to use R
- How to build a good mixed-effects model
- The *p*-value debate

The simulated data with two categorical variables

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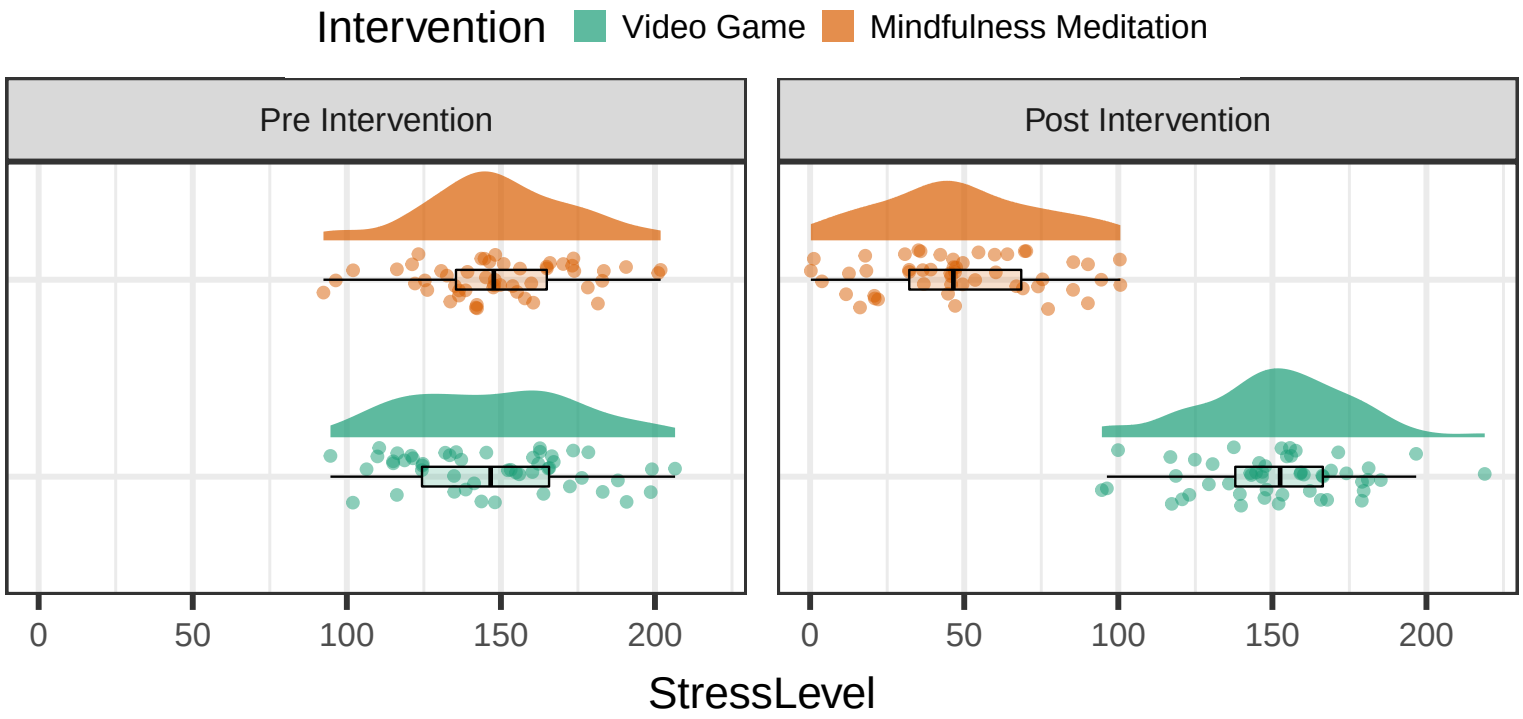

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`aov(StressLevel ~ Intervention*PrePost)`

Parameter	Sum Square	F value	$Pr(>\mathrm{F})$
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(Intercept)	147.305	3.674	40.099	$< 2e{-}16$
Intervention	1.801	5.195	0.347	0.729
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Graphically understanding the regression results

$$Stress = 147.5 + 2 \times Int + 3.5 \times PrPo - 104 \times Int \times PrPo$$

$$Int = \begin{cases} 0 \text{ if Video Game} \\ 1 \text{ if Meditation} \end{cases}, \quad PrPo = \begin{cases} 0 \text{ if Pre Intervention} \\ 1 \text{ if Post Intervention} \end{cases}$$

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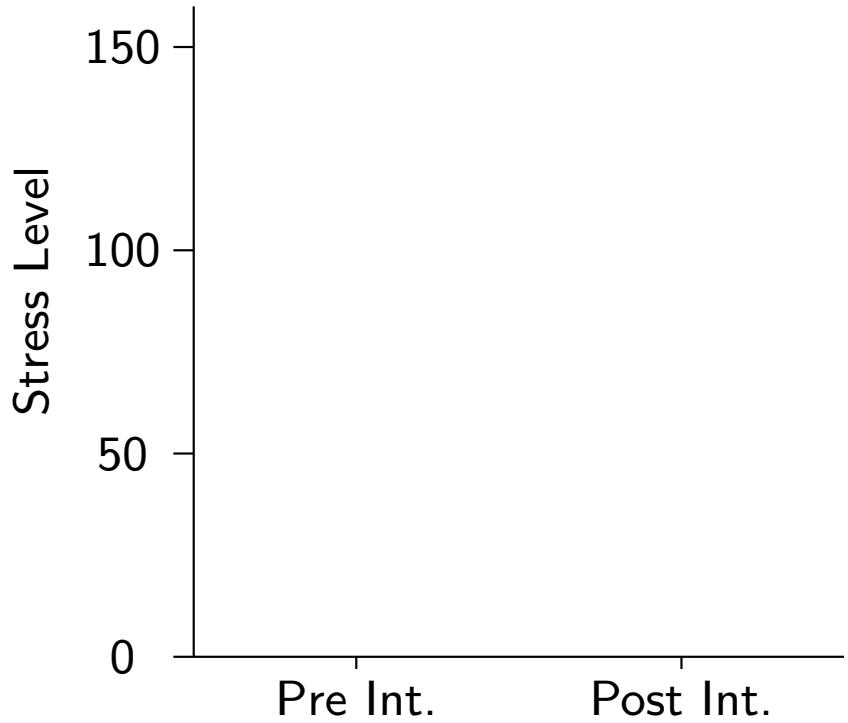

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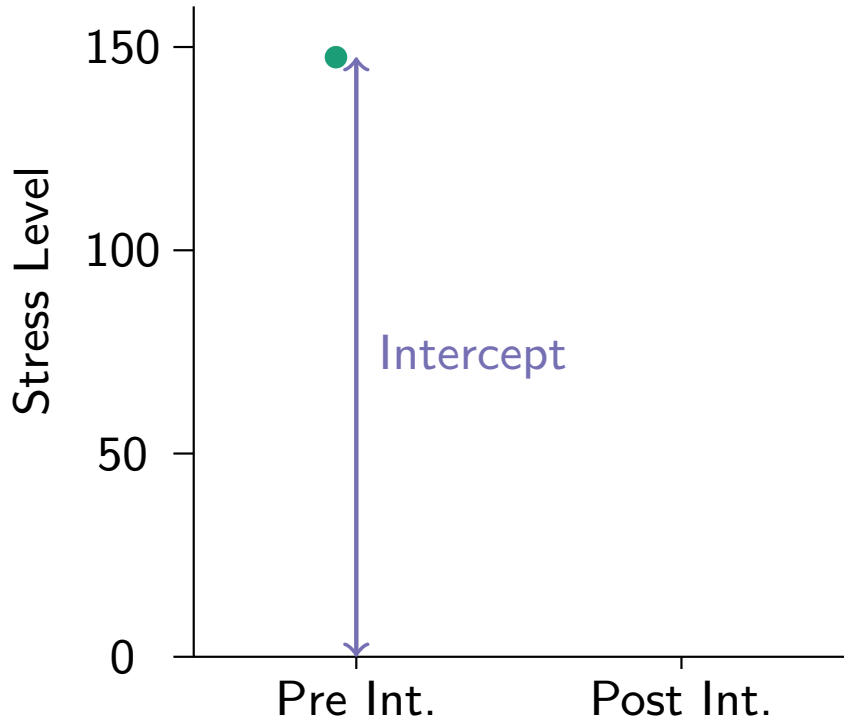

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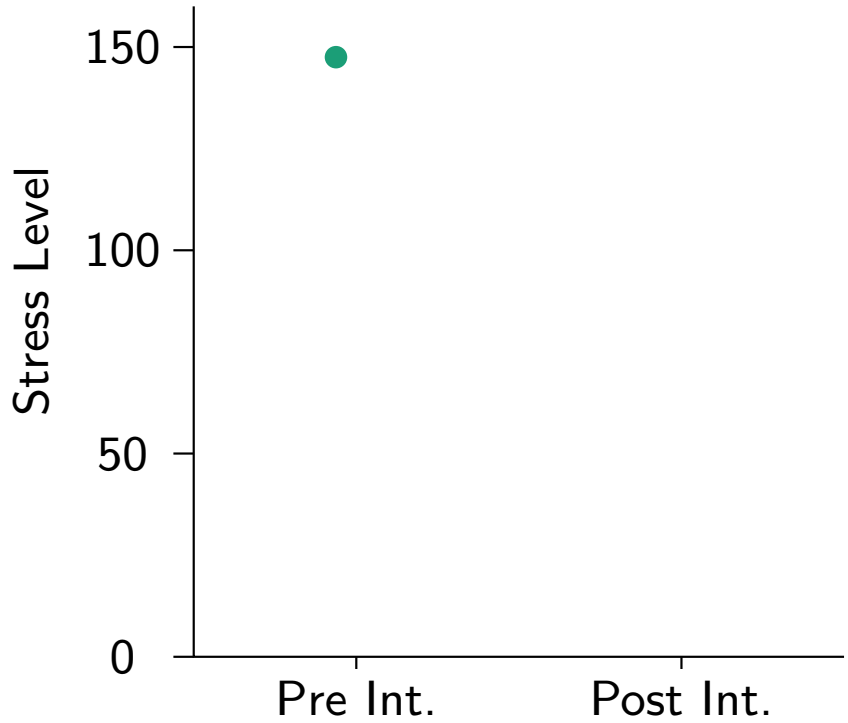

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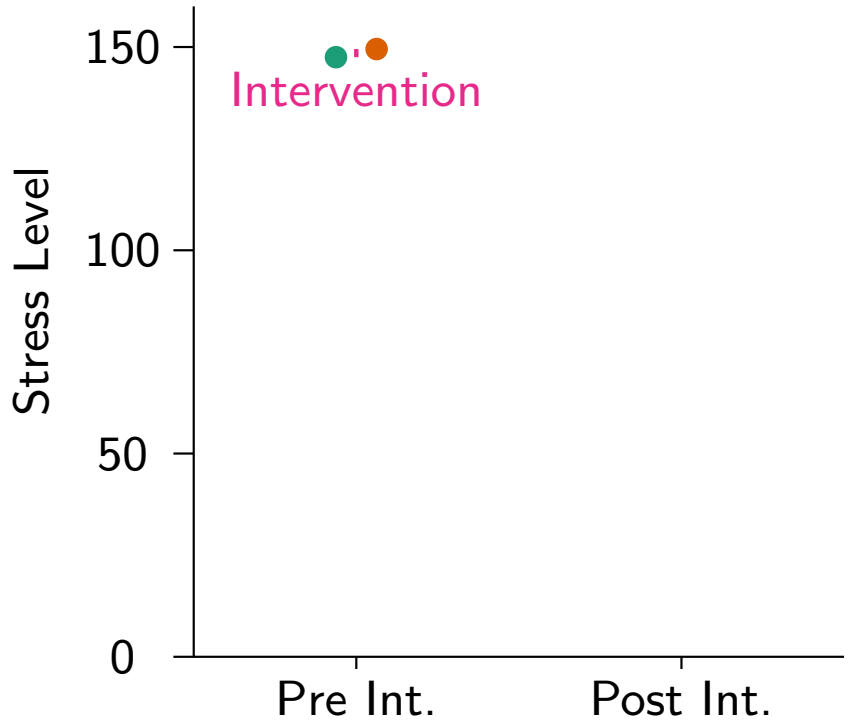

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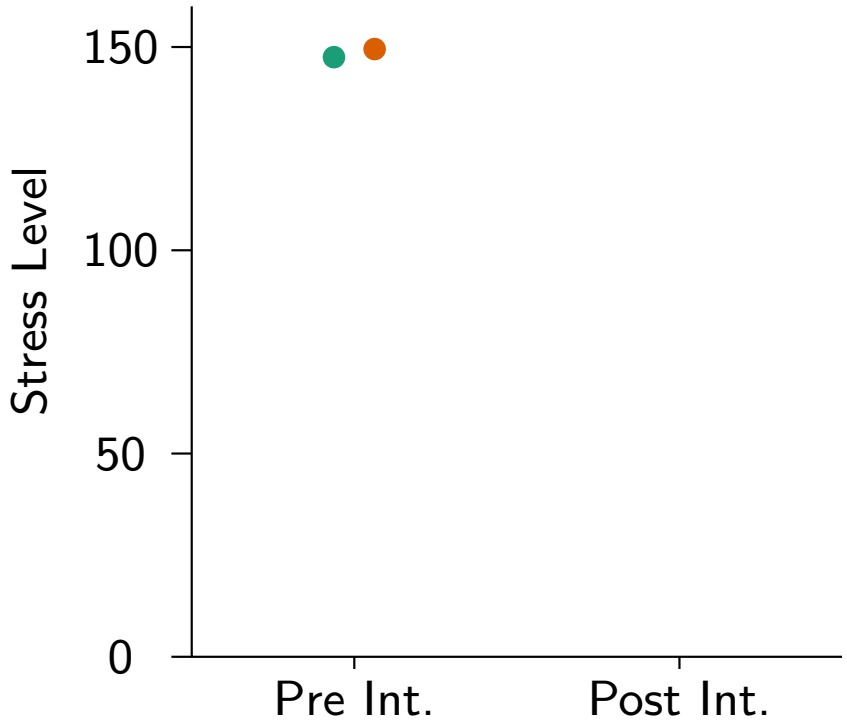

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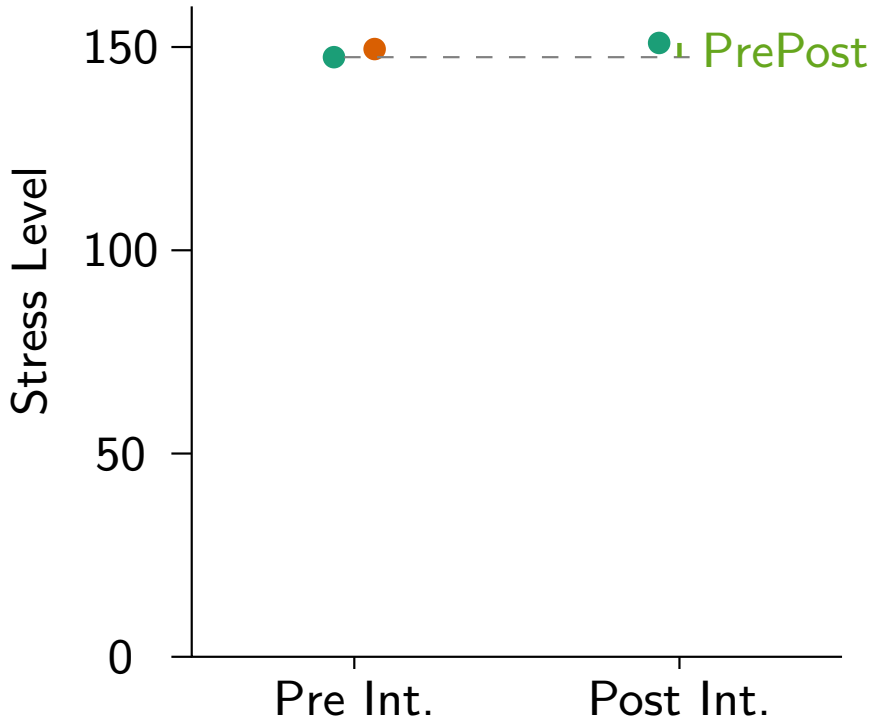

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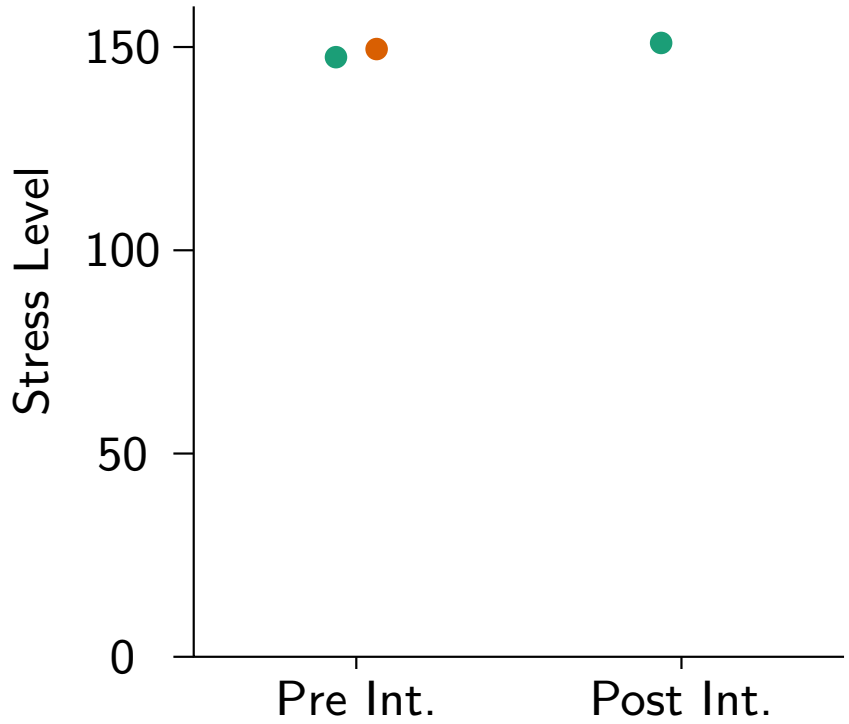

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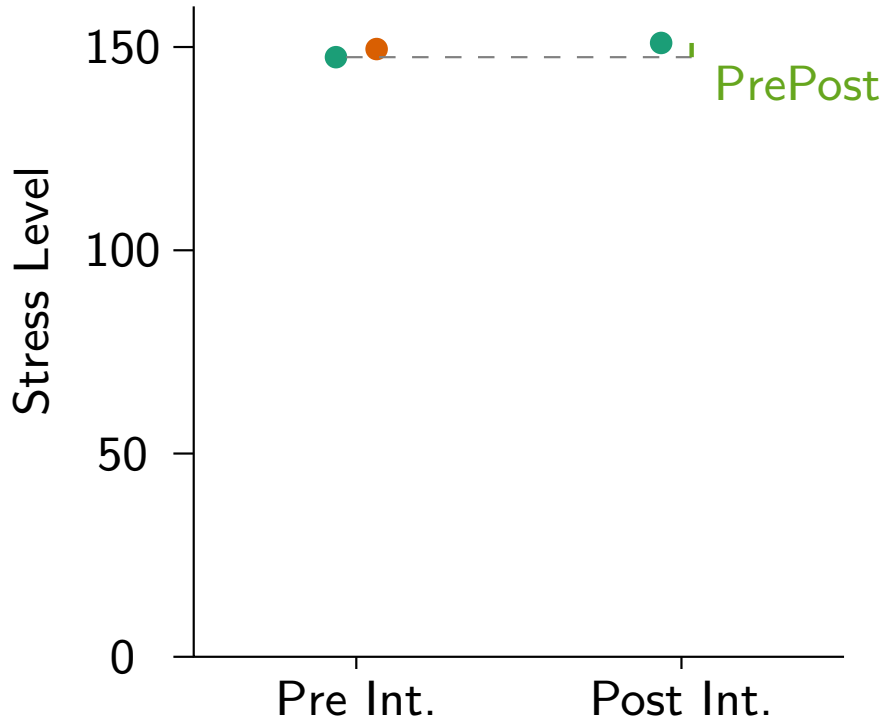

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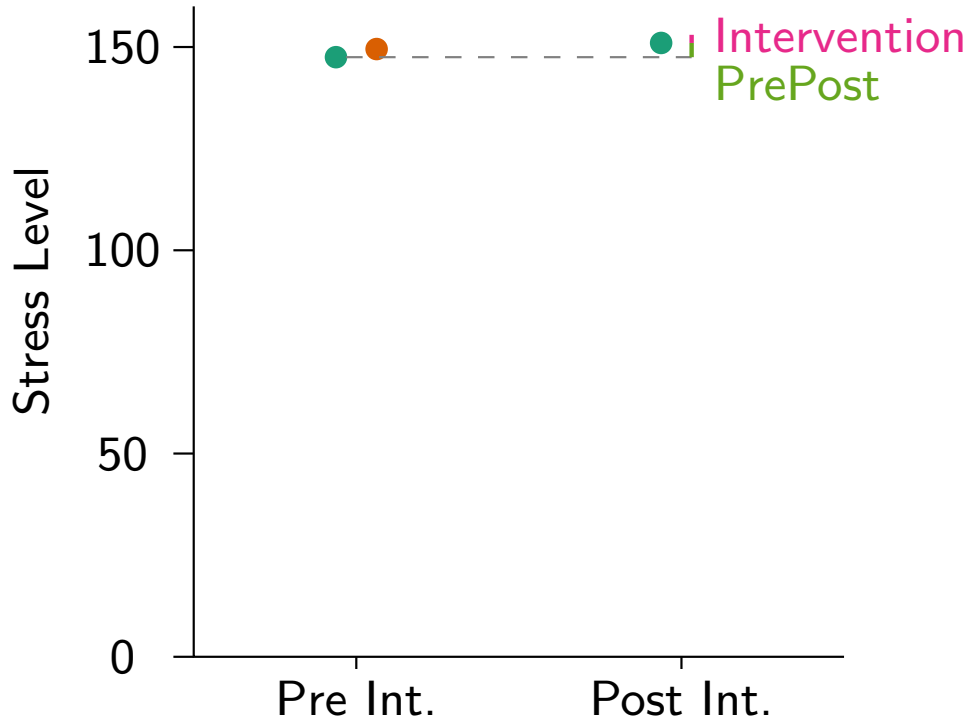

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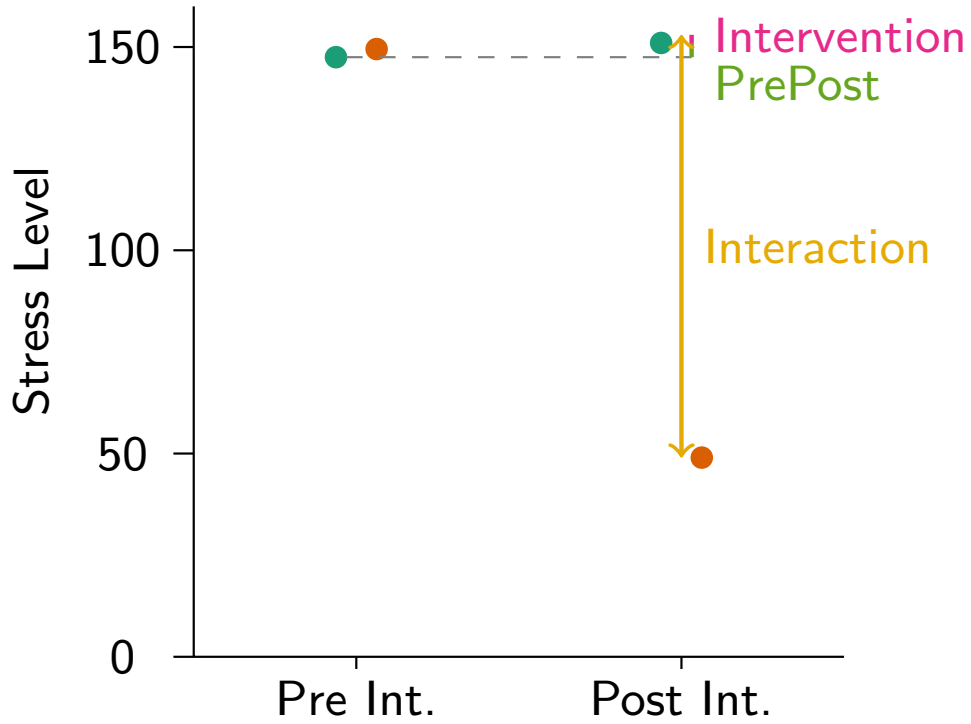

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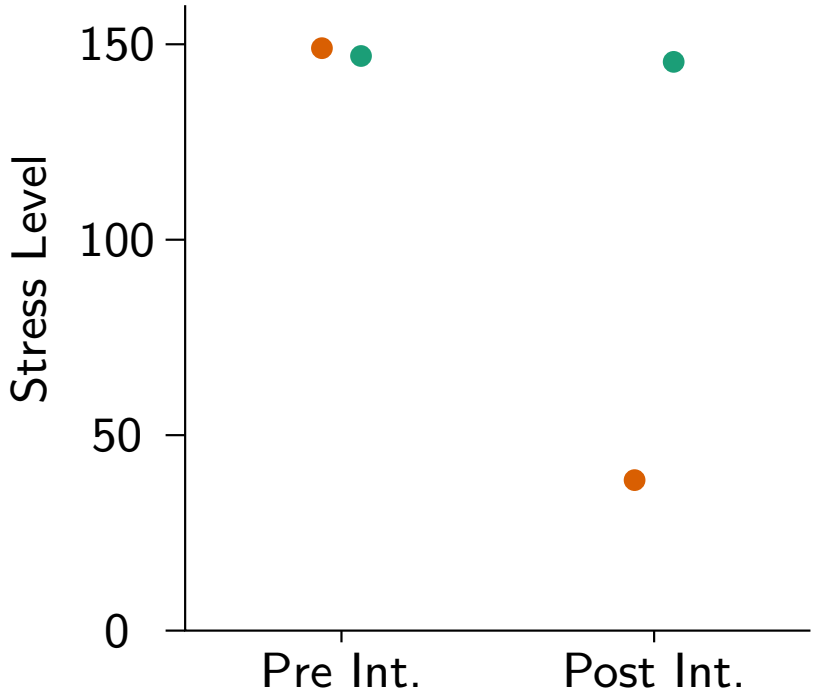

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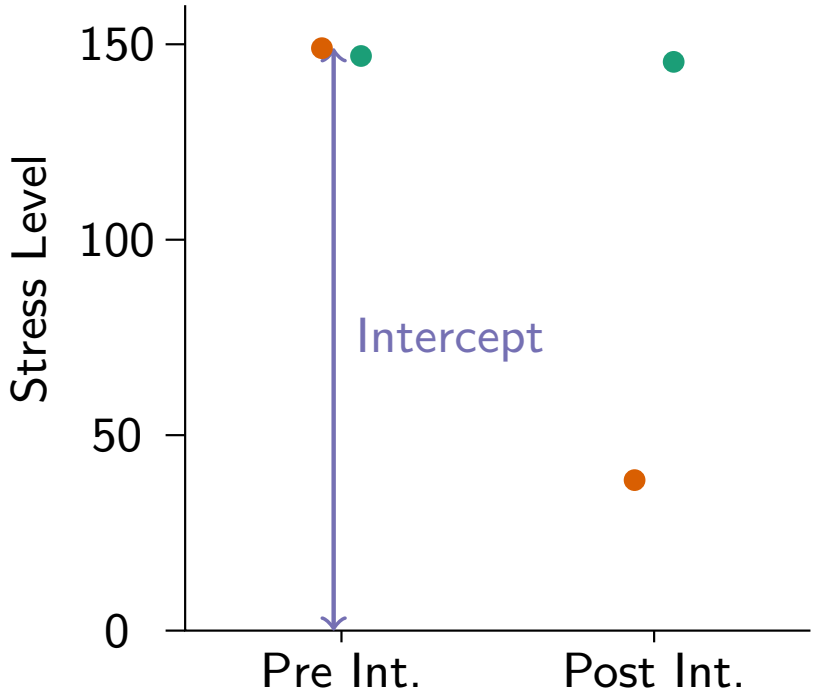

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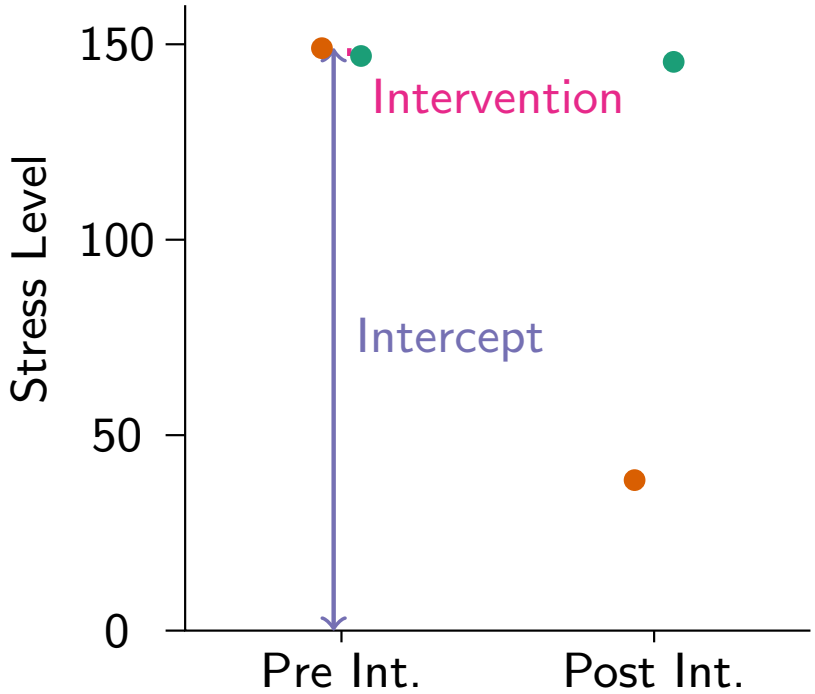

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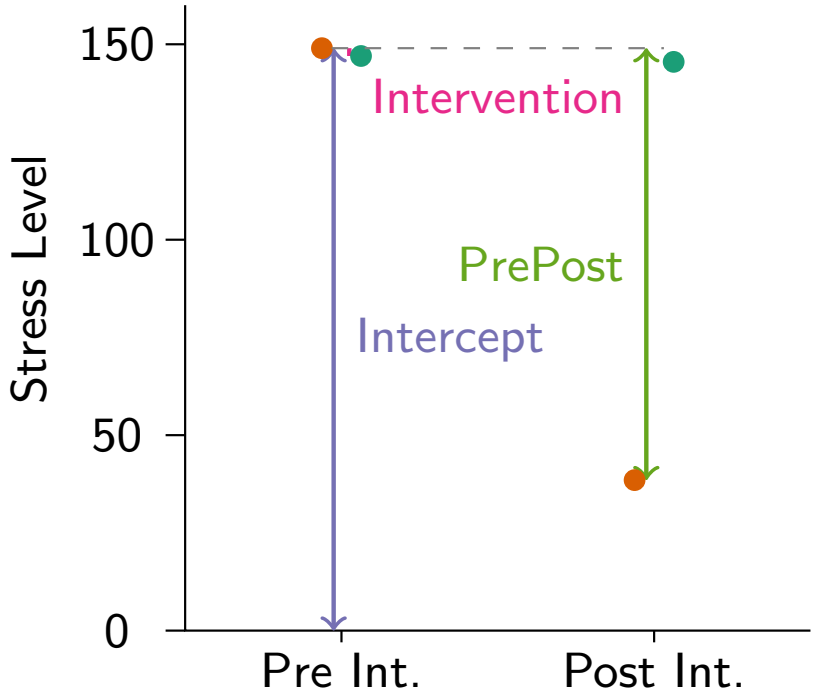

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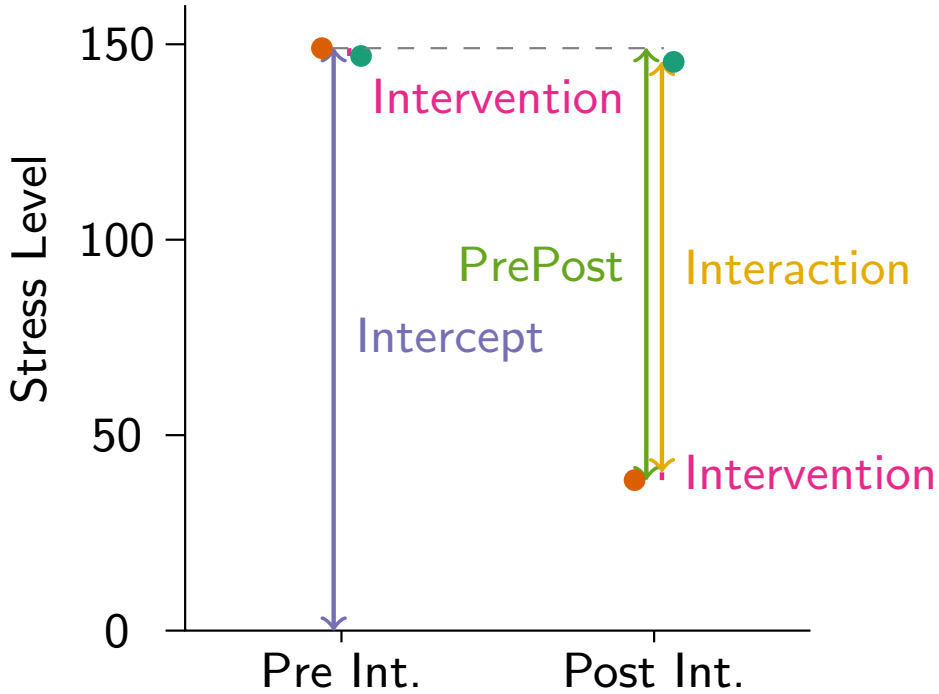

A slightly less meaningfull example with a continuous variable

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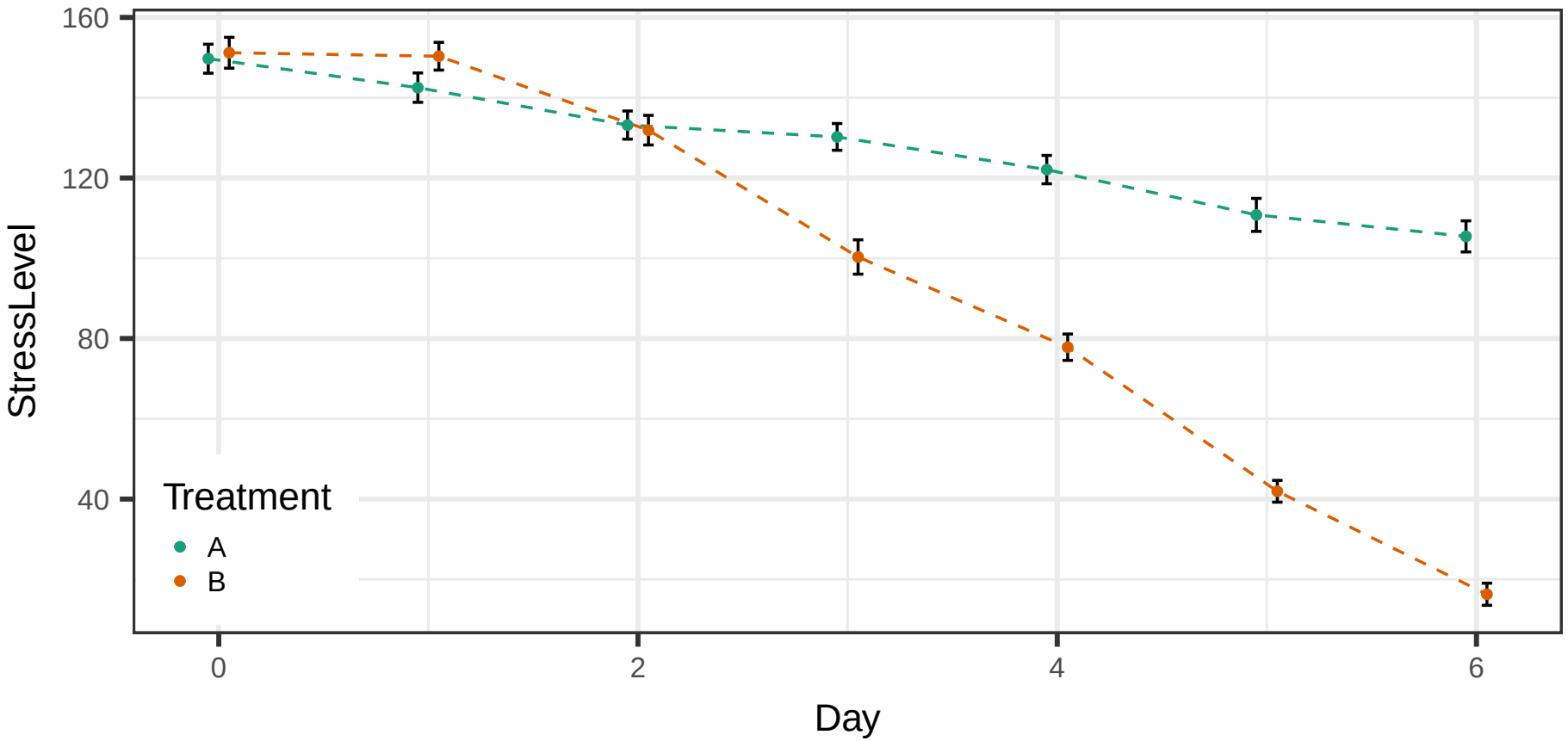

Regression results

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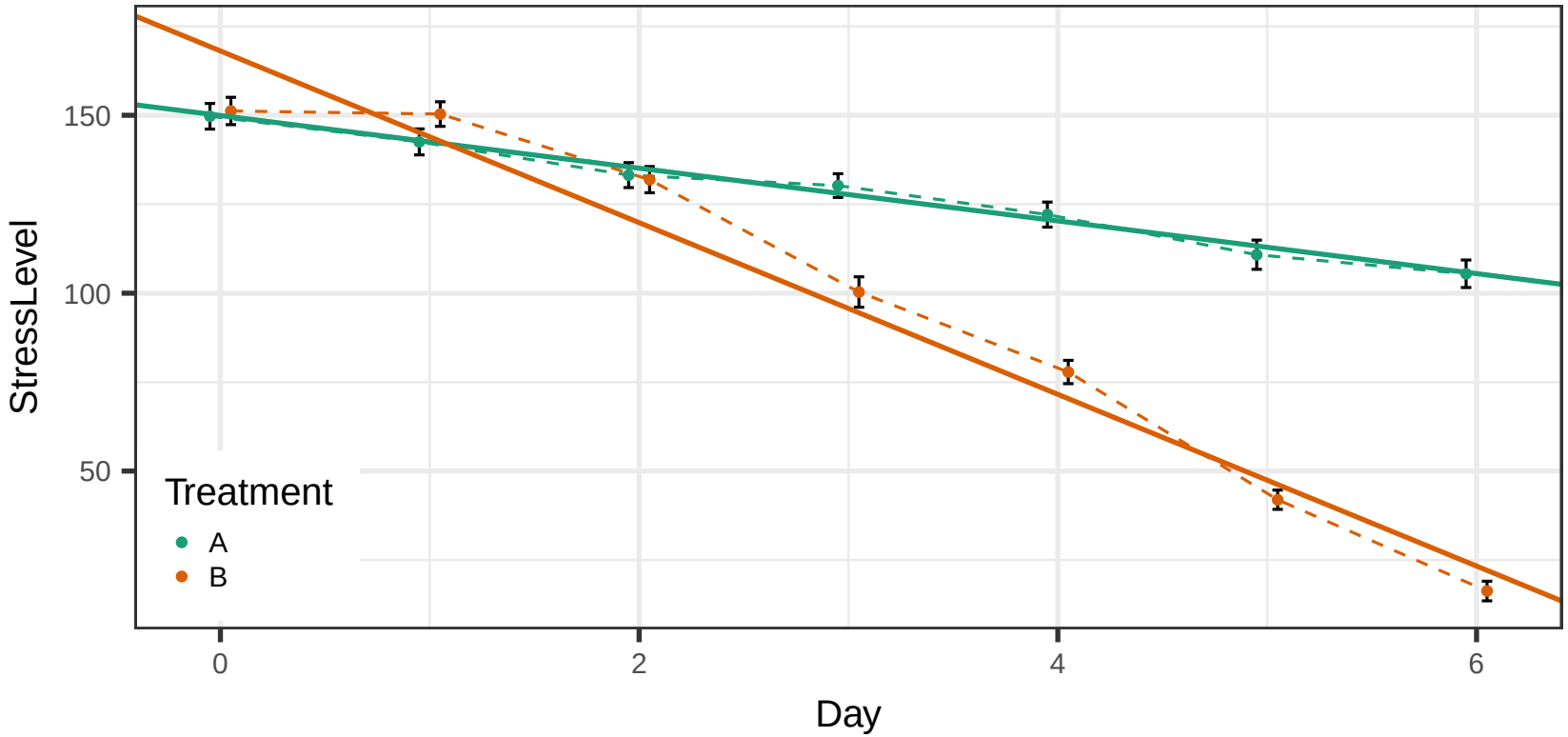
(Intercept)	149.9317	2.5003	59.967	$< 2e{-}16$
TreatmentB	18.1489	3.5359	5.133	$3.71e{-}7$
Day	-7.4051	0.6934	-10.679	$< 2e{-}16$
TreatmentB:Day	-16.7244	0.9807	-17.054	$< 2e{-}16$



The experiment in a nutshell

Something

What's the take home message?