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

Arthur Capelier-Mourguy

Lancaster University

17th of July 2018

Outline

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

Assessing stress levels after and before a 30 minutes intervention, "mindfulness meditation" or "video games".

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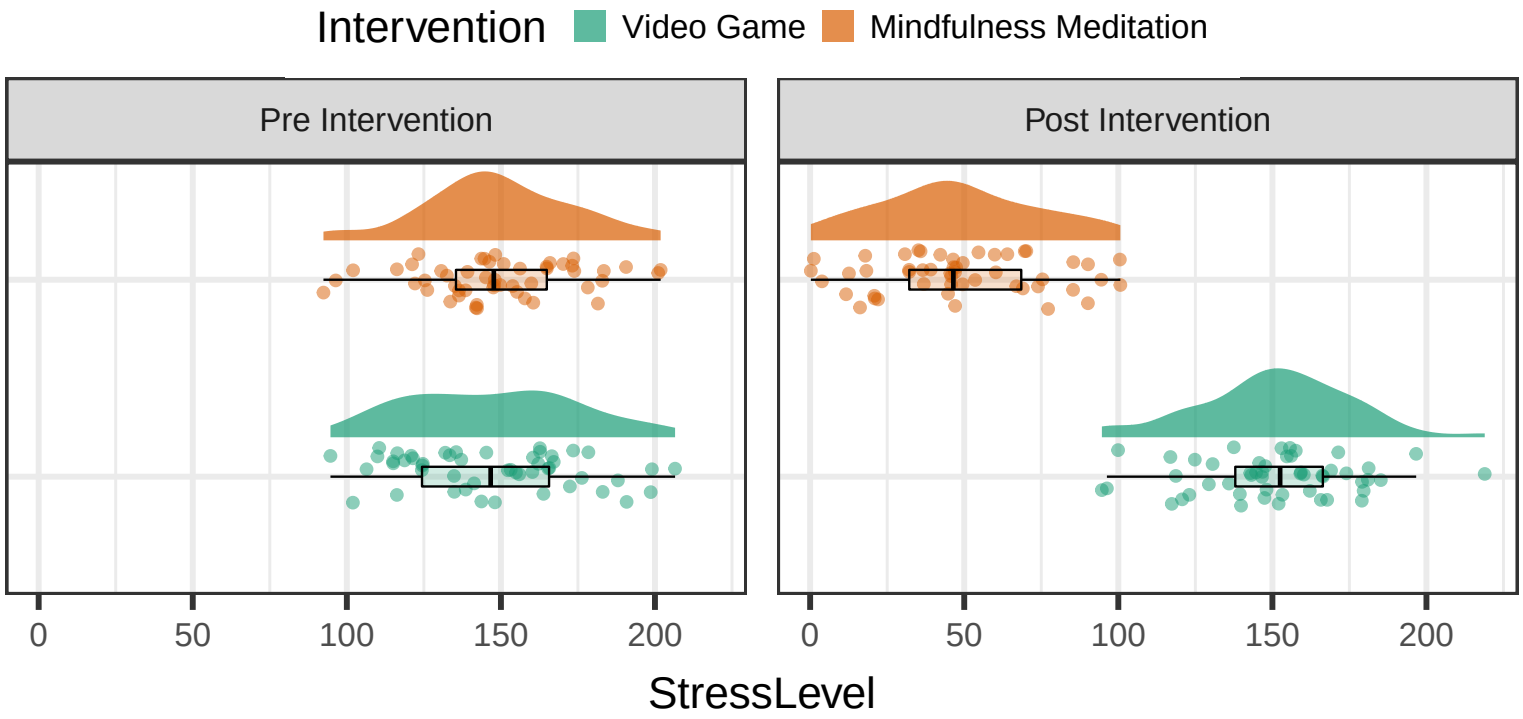

ANOVA and regression results

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`aov(StressLevel ~ Intervention*PrePost)`

Parameter	Sum Square	F value	$Pr(>\mathrm{F})$
Intervention	114381	164.8	$< 2e{-}16$
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Regression results

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Parameter	Estimate	Std. Error	t value	$Pr(>\|t\|)$
(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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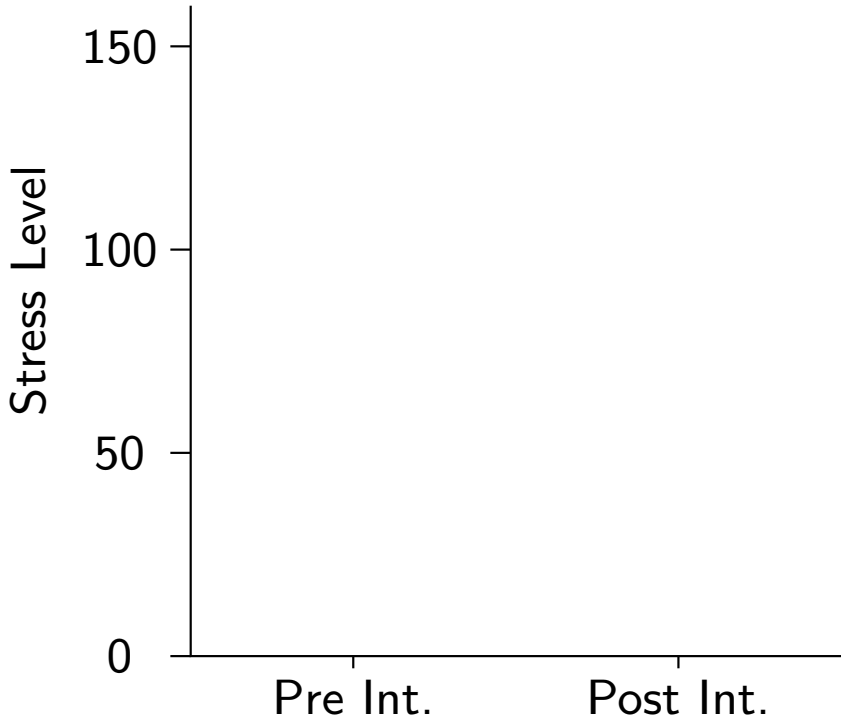
For Video Game Pre Int., $Stress = 147.5 + 2 \times 0 + 3.5 \times 0 - 104 \times 0 \times 0$



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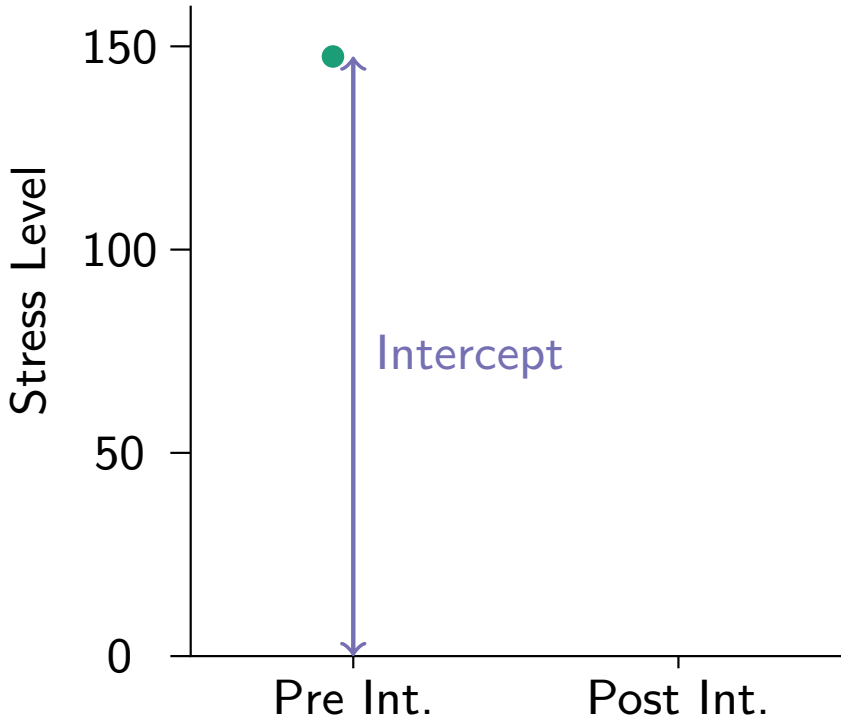

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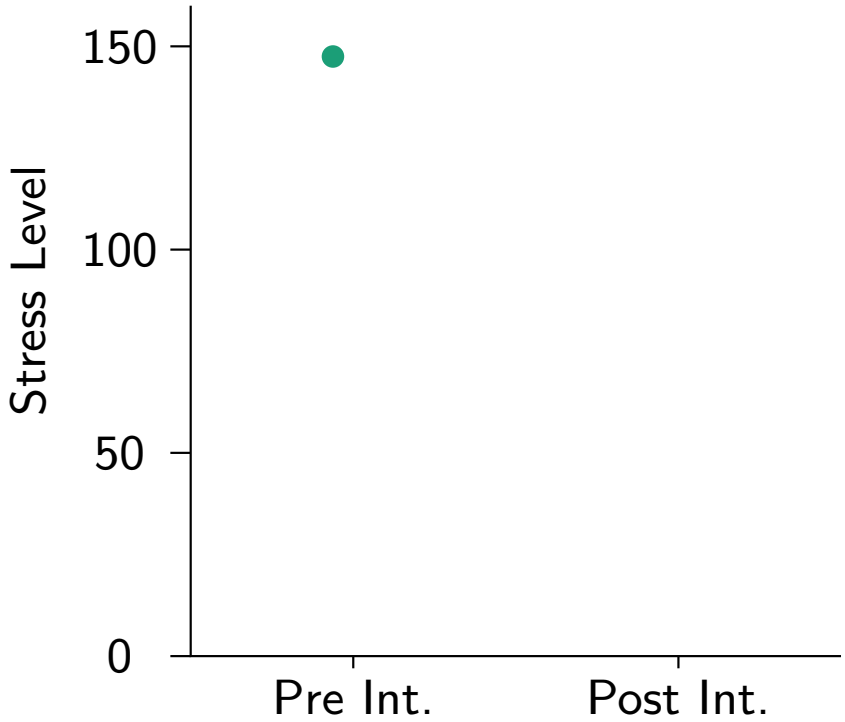
For Video Game Post Int., $Stress = 147.5 + 2 \times 1 + 3.5 \times 0 - 104 \times 1 \times 0$



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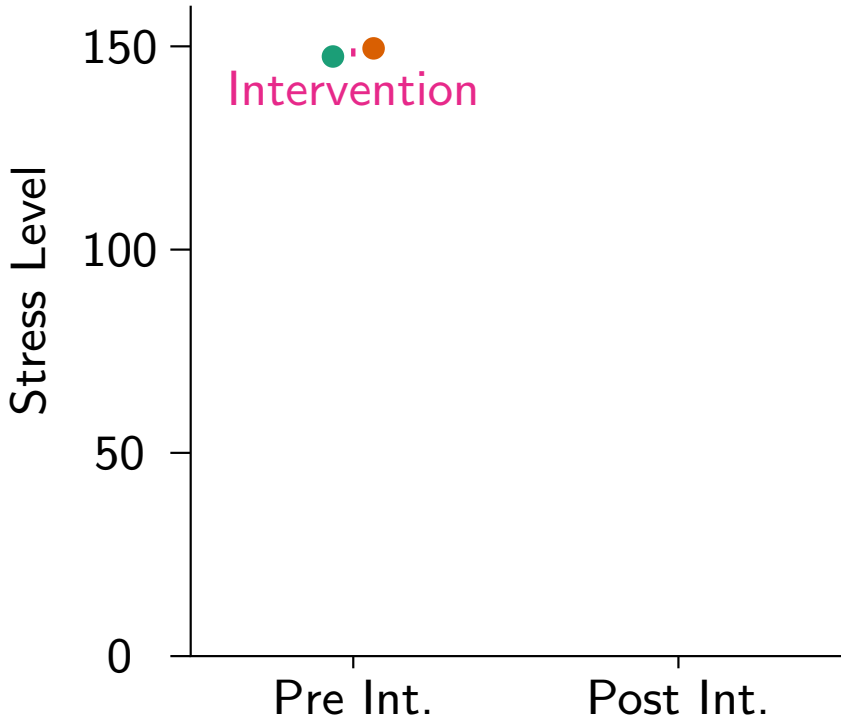
For Video Game Post Int., $Stress = 147.5 + 2$



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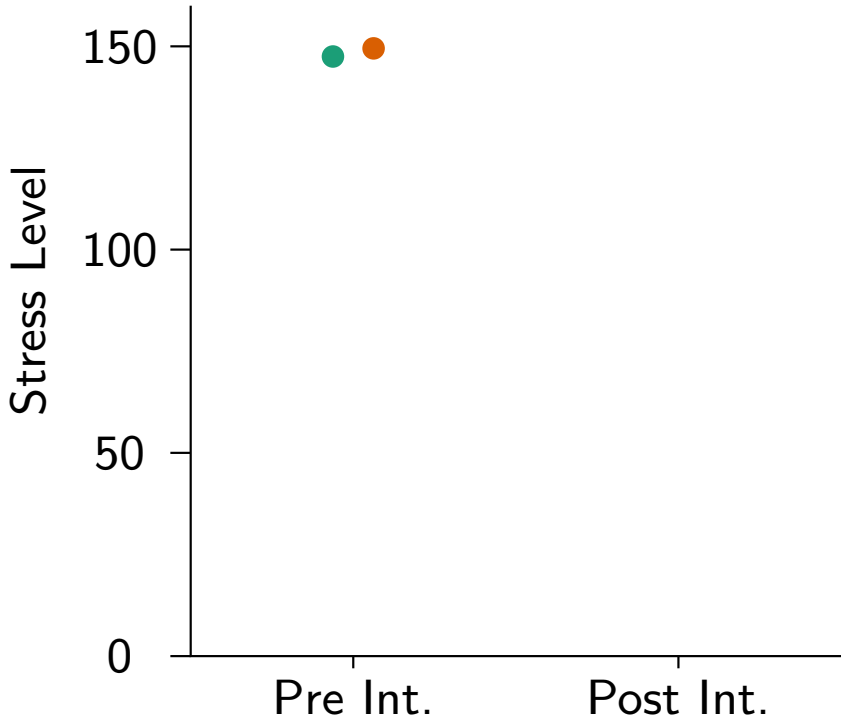

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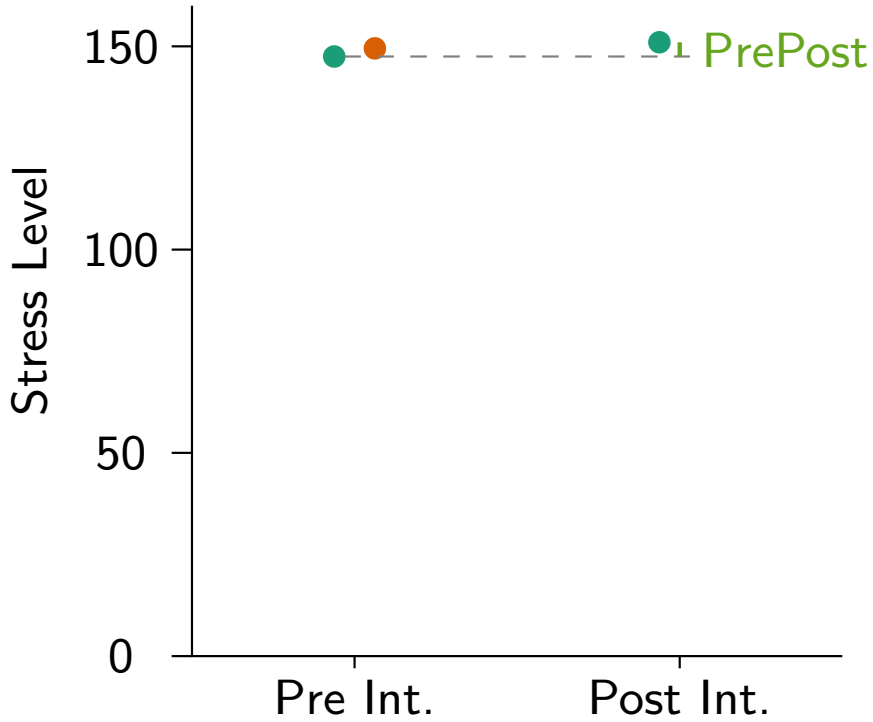

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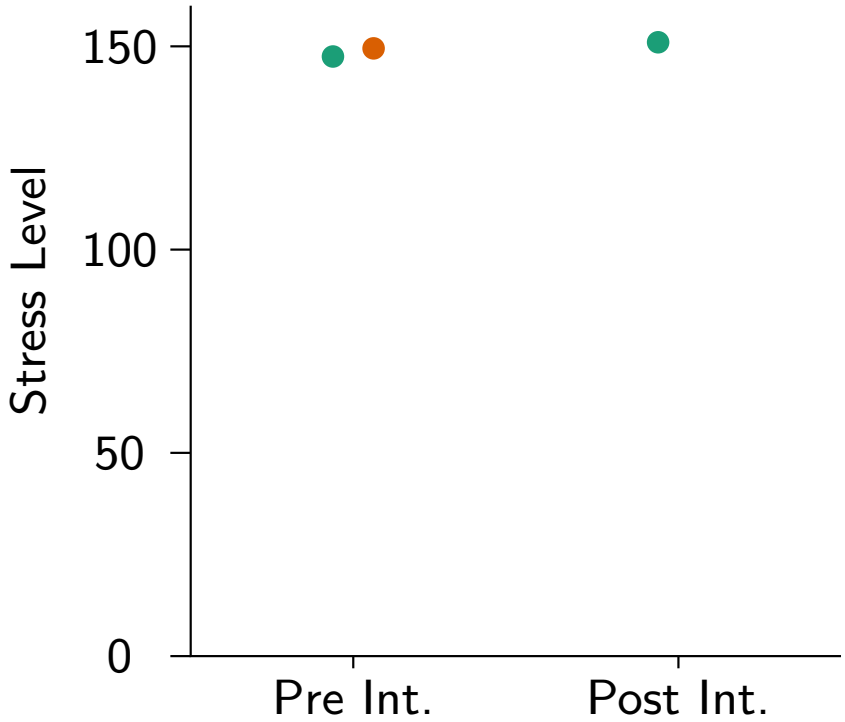

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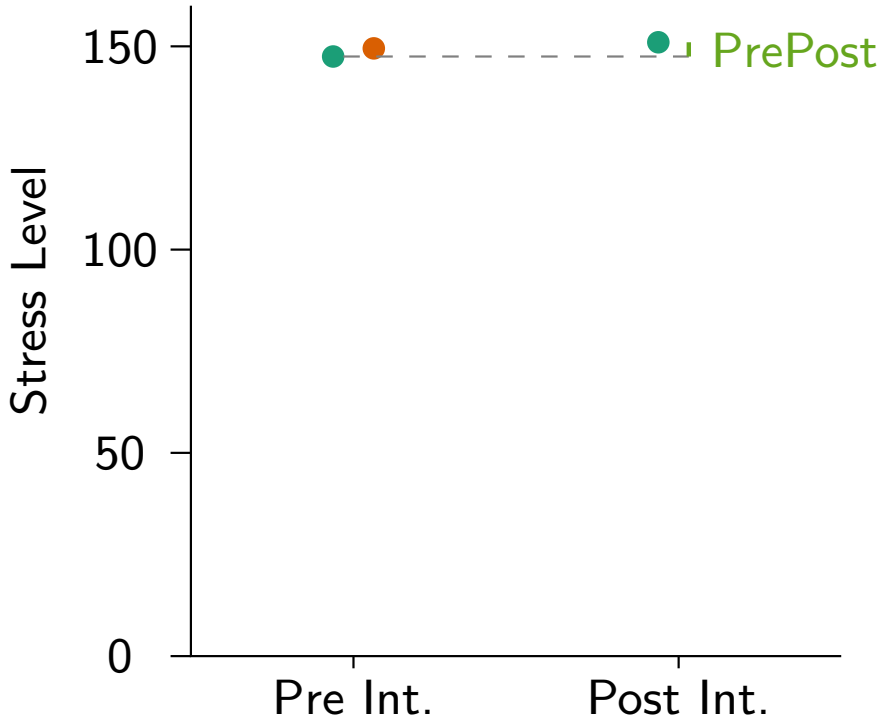

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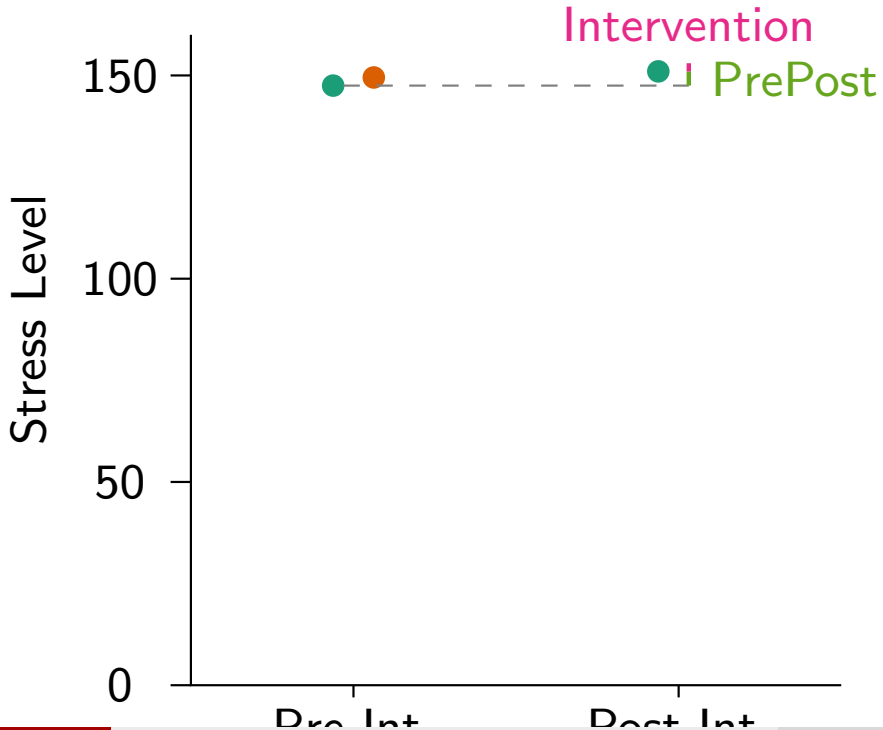

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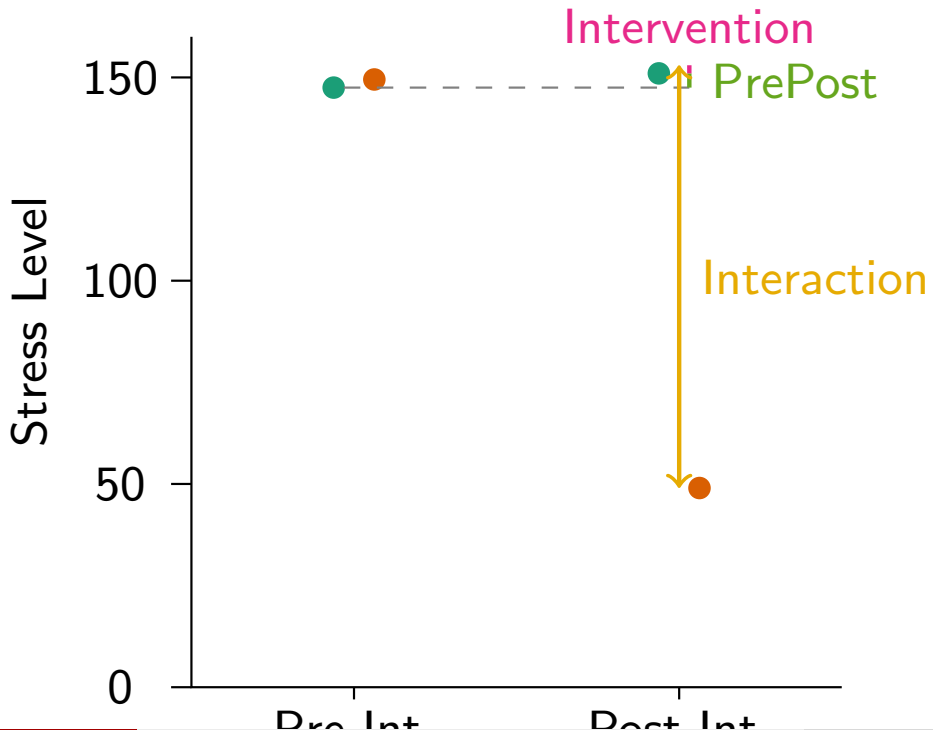

Changes to the simulated data

Regression results

Graphically understanding the regression results

The experiment in a nutshell

Impact of the choice of reference levels

What's the take home message?