

BIOS 6312 - Modern Regression Analysis  
 Spring 2021  
 Lab #4

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4. We would turn to  $\beta_2$  to understand the association between 6-month A1c and the REACH treatment alone.  $\beta_2$  represents the mean difference in 6-month A1c between those who are in the control group and those who received the REACH treatment and who all have the same centered baseline A1c.
5. Because The Rapid Education/Encouragement And Communications for Health Study was a randomized controlled trial, there theoretically should be no confounders (as treatment was randomly assigned). Therefore, centered baseline A1c likely is associated with 6-month A1c (the outcome) but not treatment assignment (the exposure). Centered baseline A1c would be considered a precision variable. When centered baseline A1c is excluded from the model, the standard error of each coefficient increases. In other words, there was a decrease in relative efficiency.
6. There is sufficient evidence that mean 6-month A1c varies across treatment ( $p < 0.001$ ).
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$$9. \hat{y} = \hat{\beta}_0 + (\hat{\beta}_1 * A1c_0) + (\hat{\beta}_2 * I(treat3 = "REACH")) + (\hat{\beta}_3 * I(treat3 = "REACH + FAMS")) + (\hat{\beta}_4 * age) + (\hat{\beta}_5 * I(race = "Black")) + (\hat{\beta}_6 * I(race = "Hispanic")) + (\hat{\beta}_7 * I(race = "Asian")) + (\hat{\beta}_8 * I(race = "Other")) + (\hat{\beta}_9 * gender)$$

$$\hat{y} = \hat{\beta}_0 + (\hat{\beta}_1 * A1c_0) + (\hat{\beta}_3 * I(treat3 = "REACH + FAMS")) + (\hat{\beta}_4 * age) + (\hat{\beta}_5 * I(race = "Black")) + (\hat{\beta}_9 * gender)$$

$$\hat{y} = 9.966806 + (.518084 * 7.2) - (0.6755915 * 1) - (0.020955 * 60) - (0.2665947 * 1) + (0.0242438 * 1)$$

$$\hat{y} = 11.52177$$

Thus, the prediction interval is

$$\hat{y} \pm (1.96 * \hat{\sigma})$$

$$= 11.52177 \pm 1.96 * 1.7331$$

$$= [8.12, 14.9]$$

10. **Residual-versus-age plot:** The lowess curve lies about the line  $y = 0$  which indicates that the plot does not provide evidence of a serious departure from linearity. There is little clear graphical evidence of heteroscedasticity, as the errors are distributed fairly evenly about the lowess curve. This plot suggests possible right-skewness of the errors which would be evidence of a deviation from the normality assumption.