Ch6 Lab - More on Unique Contribution of Predictors

5. · Strength of unique contribution of exp to totsleep
↑ r^2 - line 21 and 22 of formulasheet (part + partial)

part → $r^2 y(1.2) = \frac{SS\hat{y}_{1.2}}{SS_y}$ → $SS\hat{y}_{1.2}$ is SS_{change} (line 19), so...

part r^2 is ratio of SS_{change} (ie. unique to exp) to SS_{Total} for totsleep.
see Venn diagram, ratio of area b over a+b+c+d

From printout, $SS\hat{y}_{1.2}$ is SS_{Reg}(model 2) − SS_{Reg}(model 1) = 419.853 − 192.726
$SS\hat{y}_{.12}$ − $SS\hat{y}_{.2}$ = 227.127

SS_y is just SS_{tot} = 1109.928

So, $r^2 y(1.2) = \frac{227.127}{1109.928} = \boxed{0.2046}$

2nd formula: $R^2 y_{.12} - R^2 y_{.2}$
$R^2(\text{model 2}) - R^2(\text{model 1}) = .378 - .174 = \boxed{.204}$

part $r = \sqrt{r^2 y(1.2)} = \sqrt{.2046} = \pm .452$ → part r for exp on table (2pp)

3rd formula: $r^2 y(x_1 - \hat{x}_{1.2})$ → see corr. matrix, variable **rese.b**

partial → $r^2 y1.2 = \frac{SS\hat{y}_{1.2}}{SS_y - SS\hat{y}_{.2}}$ same as part, but you are removing SS_{Reg} with bodywt as predictor.

partial r^2 is ratio of SS_{change} to $SS_{TOT} - SS\hat{y}_{.2}$ (amount of variability in totsleep not accounted for by bodywt)
See Venn diagram, area b over area a+b

From printout, $SS\hat{y}_{.2}$ is SS_{Reg} from model 1 = 192.726

$r^2 y1.2 = \frac{227.127}{1109.928 - 192.726} = \boxed{0.2476}$ or $\frac{R^2 y.12 - R^2 y.2}{1 - R^2 y.2} = \frac{.204}{1 - .174} = \boxed{.247}$

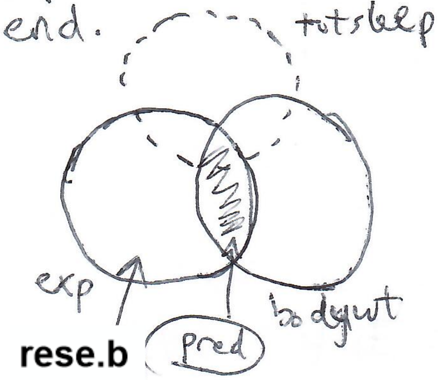
partial $r = \sqrt{r^2 y1.2} = \sqrt{.2476} = \pm .497$ → partial r for exp on table

6. If correlation **rese.b with** totsleep (−.452) is part r for exp, that means it is related to the unique contribution of exp in predicting totsleep, without the effects of bodywt.

What variable would have the effects of exp but with all overlap with bodywt removed? A residual of the regression ~~with~~ bodywt predicting exp.

Regress one predictor onto the other, not to generate predicted scores, but to remove effects of one predictor through residual scores.

Could compute pred + res scores using formulas on line 7, but it's more a means to an end.



Line 21, 3rd formula:

rese.b

$$r^2_{y(1.2)} = r^2_{y(x_1 - \hat{x}_{1.2})}$$

like $Y - \hat{Y}$

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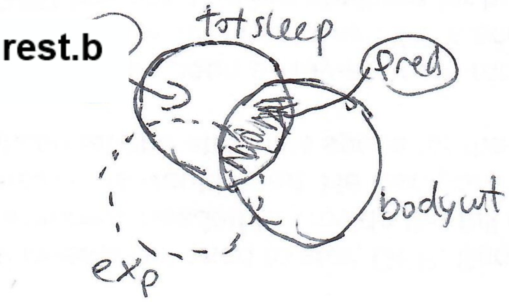
7. If correlation of **rese.b & rest.b** (−.498) is partial r for exp, that means it's related to the unique contribution of exp in predicting the part of totsleep not accounted for by other predictors.

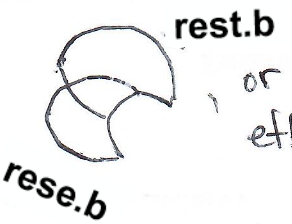
rest.b is a residual of the regression with bodywt predicting totsleep.

Again, we are more interested in removing effects of bodywt than the regression itself.



So, **rese.b**  (the part of exp not overlapping with bodywt), and **rest.b** 

(the part of totsleep not overlapping with bodywt), then the correlation would cover



, or the part of exp overlapping with totsleep, removing the effects of bodywt on both.

8. Standardized regression coefficients - making Z-scores for each variable. $Z = \frac{Y - \bar{Y}}{S_Y}$ - SPSS does this.

To turn unstandardized coefficient to standardized, see line 23 formulas.

$$\beta_1 = \frac{r_{y1} - r_{y2} r_{12}}{1 - r^2_{12}} = b_1 \frac{S_1}{S_Y}$$ if 1 is exp and 2 is bodywt...

$$\beta_1 = (-1.634)\left(\frac{1.473}{4.492}\right) = \boxed{-.536}$$

or

$$\beta_1 = \frac{(-.605) - (-.417)(.536)}{1 - (.536)^2} = \frac{(-.605) - (-.2235)}{1 - (.2873)} = \frac{-.3815}{.7127} = \boxed{-.5353}$$

$$\beta_2 = (-.006)\left(\frac{101.4634}{4.4922}\right) = \boxed{-.135} \rightarrow -.129 \text{ on printout (rounding)}$$

$$\beta_2 = \frac{(-.417) - (-.605)(.536)}{1 - (.536)^2} = \frac{(-.417) - (-.324)}{1 - .2873} = \frac{-.0927}{.7127} = \boxed{-.130}$$

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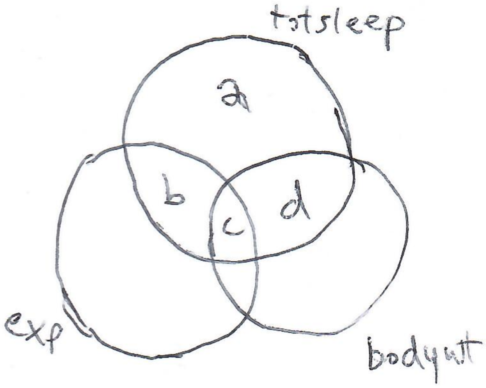
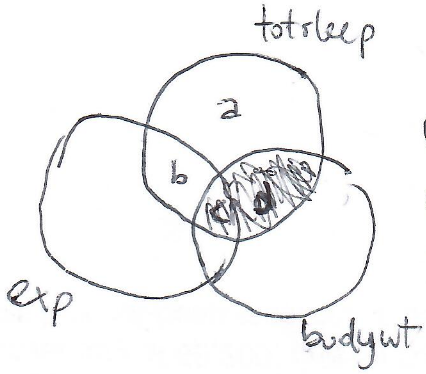
9. Unique contribution of exp - r^2 part of .204, meaning 20.4% of variability in tot sleep can be accounted for uniquely by exp. This is a highly significant contribution.

Venn Diagrams → part + Partial



Part: area b as a proportion of the total variability in totsleep (a+b+c+d)

$$\frac{b}{a+b+c+d}$$



partial: remove variability accounted for by other predictors (ie. area c+d, predicted by bodywt), so its area b as a proportion of the total variability in totsleep <u>not</u> accounted for by bodywt (a+b)

$$\frac{b}{a+b}$$

partial will always be larger, because it has the same numerator but a smaller denominator.