Validity Lab

The two data sets we will be using are from published studies. The first data set is from a study on the development of a new measure called IDEA inventory of emerging adulthood.[1] In general, the concept of the IDEA measure is "The IDEA assesses individual differences in self-identification during emerging adulthood such as identity exploration, feeling "in-between," optimistic views about future possibilities, and self-focused independence and responsibility" (Faas et al., 2018, p. 259). For this example, we will use the negativity/instability subscale which includes items such as "confusion." "feeling restricted," "feeling stressed out," and "instability," and "high pressure." I am including several scales from this study some of which should be related (e.g., perceived stress) and some of which should not be related (e.g., social media use).

The second data set is based on results reported in a study[2] on whether AI large language models (generative pre-trained transformer; GPT) can decipher diary entries and make diagnosis of suicidal depression. The depressed vs. not depressed assessment by GPT corresponded with a psychiatric diagnosis by a clinician.

Convergent and Divergent Validity (Evaluation of the IDEA scale)
Download the idea.sav data from the data page on my website:
https://web.pdx.edu/~newsomj/data.htm
Compute the correlations among measures (convergent and divergent validity). In SPSS, go to **Analyze** -> **Correlate** -> **Binary** -> **Bivariate**. Then move over all of the variables (`ideaneg`, `support`, `narcis`, `physymps`, `belong`, `socmedia`, `stress`, and `swb`) to the Variables box at the right.

Compute simple regression (predictive validity).[3] Let's look at predictive validity for one measure. Conduct a simple regression with `ideaneg` as a predictor of `stress`. **Analyze** -> **Regression** -> **Linear…** Then move `stress` over to the **Dependent** box and move `ideaneg` to the **Independent(s)** box. And then click **ok**.

Sensitivity and Specificity Criterion Validity Example (Can GPT Diagnose Depression?)
Download the depress.sav data from the data page on my website:
https://web.pdx.edu/~newsomj/data.htm

Calculate a cross-tabs and get a chi-square. Compute the cross-tab matrix to obtain frequencies for the GPT-depression diagnosis sensitivity and specific computations. In SPSS, **Analyze** -> **Descriptive Statistics** -> **Crosstabs**. Move over `gpt` into the row box. Move over `clinician` into the column box. Click on the **Statistics** button. Check **Chi-square**. Click **Continue** and then **Ok**.

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[1] Grahe, J. E., Chalk, H. M., Alvarez, L. D. C., Faas, C. S., Hermann, A. D., & McFall, J. P. (2018). Emerging adulthood measured at multiple institutions 2: The data. *Journal of Open Psychology Data*, *6*(1), 4. https://doi.org/10.5334/jopd.38
Faas, C., McFall, J., Peer, J. W., Schmolesky, M. T., Chalk, H. M., Hermann, A., ... & Grahe, J. (2020). Emerging adulthood MoA/IDEA-8 scale characteristics from multiple institutions. *Emerging Adulthood, 8*(4), 259-269.
[2] Shin, D., Kim, H., Lee, S., Cho, Y., & Jung, W. (2024). Using large language models to detect depression from user-generated diary text data as a novel approach in digital mental health screening: Instrument validation study. Journal of Medical Internet Research, 26, e54617.
[3] Regression analysis generally requires that the dependent variable be continuous as in this analysis. In the case of a diagnosis or other binary variable as the criterion (e.g., pass/fail, dropout/graduate), we would be predicting a binary variable. That requires logistic regression, a special kind of regression analysis for a binary dependent variable.

R Code

Compute the correlations among measures (convergent and divergent validity).

```
> library(lessR)
> #lessR provides correlations among all variables (correlation matrix)
> #if just the data frame is mentioned in parentheses
> Correlation(d)
orrelation Matrix

           ideaneg support narcis physymps belong socmedia stress   swb
   ideaneg    1.00   -0.03  -0.08     0.23   0.14     0.09   0.27 -0.20
   support   -0.03    1.00   0.13    -0.14   0.16     0.21   0.03  0.47
    narcis   -0.08    0.13   1.00    -0.09   0.02    -0.00  -0.08  0.15
  physymps    0.23   -0.14  -0.09     1.00   0.08     0.05   0.30 -0.33
    belong    0.14    0.16   0.02     0.08   1.00     0.31   0.19  0.06
  socmedia    0.09    0.21  -0.00     0.05   0.31     1.00   0.15  0.11
    stress    0.27    0.03  -0.08     0.30   0.19     0.15   1.00 -0.12
       swb   -0.20    0.47   0.15    -0.33   0.06     0.11  -0.12  1.00


> #no significance test is printed, so could get the tests from a different package
> #remember to run install.packages("correlatio") first
> library(correlation)
> correlation(d)
```

Output Omitted

Calculate a cross-tabs and get a chi-square.

```
> library(lessR)
> #you will need to change your location
> d = Read("C:/Jason/SPSSWIN/pmclass/depress.sav", quiet=TRUE)

> #get chi-square with lessR
> BarChart (clinician, by=gpt, horiz = FALSE, beside = TRUE, stack100=TRUE)
>>> Suggestions
Plot(clinician, gpt)  # bubble plot
BarChart(clinician, by=gpt, horiz=TRUE)  # horizontal bar chart
BarChart(clinician, fill="steelblue")  # steelblue bars

Joint and Marginal Frequencies
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clinician
gpt     1   2 Sum
  1    47  16  63
  2    26 339 365
  Sum  73 355 428

Cramer's V (phi): 0.636

Chi-square Test of Independence:
     Chisq = 172.932, df = 1, p-value = 0.000
```