17.871
Spring 2009
Quiz

1. In three sentences or less, critique the following study's research design. Focus on the finding in the underlined paragraph. (2 points)

SCIENCE NEWS
BORDERLINE AID: PSYCHOTHERAPY SOOTHES PERSONALITY AILMENT
By Bruce Bower June 16th, 2007; Vol.171 #24 (p. 374)

Borderline personality disorder, a psychiatric condition marked by volatile relationships and stormy emotions, has the reputation of being tough to treat. A new study, however, indicates that any of three types of psychotherapy stimulates substantial improvement in people with this disorder.

Psychotherapy that centers on emotional themes arising in the interaction between patient and therapist, known as transference-focused therapy, stimulates the most change in people with borderline personality disorder, according to a team led by psychologist John F. Clarkin of New York Hospital–Cornell Medical Center in White Plains, N.Y.

Dialectical behavior therapy, a currently popular brand of psychotherapy that teaches patients how to control and alter their emotional reactions, also produced good responses, as did supportive psychotherapy that provides basic advice on dealing with daily challenges.

Contrary to earlier belief in [psychiatry], borderline patients respond to structured treatments of various orientations with symptom improvement," Clarkin says. "We now must explore the mechanisms of treatment effects." The new report is in the June American Journal of Psychiatry.

In their new study, published in the *American Journal of Psychiatry*, Clarkin's group randomly assigned each of 90 outpatients diagnosed with borderline personality disorder to one of the three psychotherapies. For 1 year, each participant attended one or two weekly sessions with a seasoned therapist.

Overall, patients in each group displayed notable 1-year improvements on measures of depression, anxiety, social adjustment, and overall ability to function in daily life.

Of the three approaches, however, only transference-focused therapy led to fewer instances of verbal and physical assaults on others and increased patients' ability to reflect on their own motivations and those of others. Clarkin and his colleagues developed the transference-focused approach, which draws on psychoanalytic concepts (SN: 6/9/07, p. 363).

Psychiatrist Glen O. Gabbard of Baylor College of Medicine in Houston calls the work "a landmark study." Research with larger groups of patients must confirm that transference-focused therapy sparks broader improvement than the other forms of psychotherapy do, Gabbard says.

For the rest of the quiz, we will be analyzing Olympic medal wins. Here's a description of the data:[1]

- `medaltot` counts the total (unweighted) number of gold, silver, and bronze medals each country receives in each Olympic games between 1960 and 1996
- `host` is coded to 1 when a country hosts the Olympics and 0 otherwise
- `gdp` is real GDP in millions of 1996 dollars
- `pop` is population in millions of people
- `planned` is coded 1 for non-Soviet countries with centrally planned economies and 0 otherwise
- `soviet` is coded 1 for Soviet (Warsaw Pact) countries and 0 otherwise

```
. sum year medaltot gold silver bronze gdp pop host planned soviet

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
        year |      1610    1979.585    11.52345       1960       1996
    medaltot |      1259    5.105639    16.18698          0        195
        gold |      1259    1.657665    6.344098          0         83
      silver |      1259    1.648928    5.281189          0         69
      bronze |      1258    1.800477     5.03377          0         46
-------------+--------------------------------------------------------
        host |      1610    .0062112    .0785903          0          1
         gdp |      1610    117279.5    509393.1       39.1    7280000
         pop |      1599     26.7737    97.27237   .0149604       1220
     planned |      1610    .0192547    .1374615          0          1
      soviet |      1610    .0416149    .1997696          0          1


. corr medaltot gdp pop host planned soviet year
(obs=1254)

             | medaltot      gdp      pop     host  planned   soviet     year
-------------+------------------------------------------------------------------
    medaltot |   1.0000
         gdp |   0.6445   1.0000
         pop |   0.3218   0.2836   1.0000
        host |   0.3323   0.2676   0.0816   1.0000
     planned |   0.0612  -0.0019   0.2885  -0.0114   1.0000
      soviet |   0.4520   0.0312   0.0455   0.0235  -0.0278   1.0000
        year |  -0.0124   0.0312   0.0330  -0.0217  -0.0042  -0.1295   1.0000
```

[1] Andrew B. Bernard and Meghan R. Busse, "Going for the Gold: Who Will Win the 2004 Olympic Games in Athens" *Review of Economics and Statistics* Vol. 86, Issue 1 - February 2004.

2. (5 points)

Many top amateur athletes choose not to pursue Olympic dreams because of the difficulties and opportunity costs. However, some have speculated that top athletes are more likely to pursue training when their own country is about to host the Olympics. Thus, we might expect countries to win more medals when they host the games. To test this "host hypothesis," the following regresses medal total on being a host country.

```
. reg medaltot host

      Source |       SS       df       MS              Number of obs =    1259
-------------+------------------------------           F(  1,  1257) =  154.89
       Model |  36160.5608     1  36160.5608           Prob > F      =  0.0000
    Residual |  293458.389  1257  233.459339           R-squared     =  0.1097
-------------+------------------------------           Adj R-squared =  0.1090
       Total |   329618.95  1258  262.018243           Root MSE      =  15.279

------------------------------------------------------------------------------
    medaltot |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        host |    60.3739   4.851067    12.45   0.000     50.85682    69.89098
       _cons |   4.626101    .432339    10.70   0.000     3.777915    5.474286
------------------------------------------------------------------------------
```

Based on this regression,

a) What is the average medal total for non-host countries? (1 point)
b) What is the average medal total for host countries? (1 point)
c) Is the effect of hosting the Olympics statistically significant (different from zero)? (1 point)
d) Does this regression result provide strong support for the "host hypothesis"? List two potential problems. (2 points)

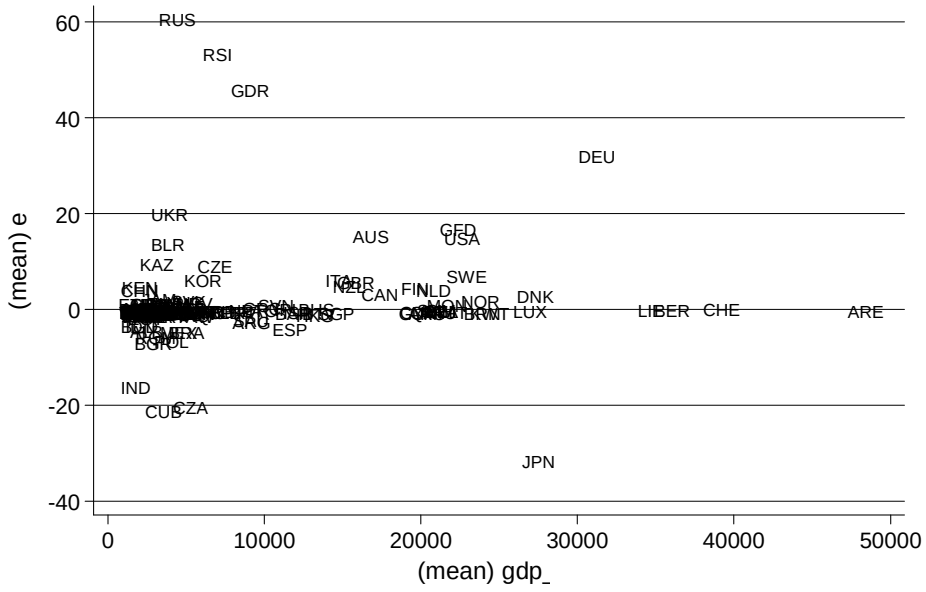
3. (5 points)

```
. reg medaltot host gdp pop planned soviet year

      Source |       SS       df       MS              Number of obs =    1254
-------------+------------------------------           F(  6,  1247) =  379.14
       Model |   211703.84     6  35283.9734           Prob > F      =  0.0000
    Residual |  116051.114  1247   93.064245           R-squared     =  0.6459
-------------+------------------------------           Adj R-squared =  0.6442
       Total |  327754.954  1253   261.57618           Root MSE      =   9.647

------------------------------------------------------------------------------
    medaltot |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        host |   30.13657   3.180924     9.47   0.000     23.89602    36.37712
         gdp |   .0000163   5.38e-07    30.25   0.000     .0000152    .0000173
         pop |     .02062   .0031939     6.46   0.000     .0143541     .026886
     planned |   5.395831   2.283157     2.36   0.018     .9165778    9.875084
      soviet |   33.37109   1.322257    25.24   0.000       30.777    35.96518
        year |   .0365459   .0239807     1.52   0.128    -.0105011    .0835928
       _cons |  -71.96728   47.50529    -1.51   0.130    -165.1664    21.23183
------------------------------------------------------------------------------
```

a) Interpret the gdp coefficient. (1 point)
b) Interpret the new coefficient for host. Why do you think it changes from the bivariate regression (speculate)? (2 points)
c) On average, by how many medals will the typical prediction from this model be off? (1 point)
d) Assume for the moment that this model includes all relevant control variables. Given this assumption, does this regression result provide strong support for the host hypothesis? What additional assumption (or assumptions) is necessary? (1 point)

4. (2 points)

The figure below plots residuals (e) from the multiple regression model (above) against gdp after collapsing (taking the mean of) the data by country.



a) What is the (general) equation for the residual? (1 point)
b) What's the model's worst prediction? (1 point)

5. (2 points)
In the regression below, I recode gdp and pop so that they vary between 0 and 1.

```
. reg medaltot host gdp pop planned soviet year

      Source |       SS       df       MS              Number of obs =    1254
-------------+------------------------------           F(  6,  1247) =  379.14
       Model |   211703.84     6  35283.9734           Prob > F      =  0.0000
    Residual |  116051.114  1247   93.064245           R-squared     =  0.6459
-------------+------------------------------           Adj R-squared =  0.6442
       Total |  327754.954  1253   261.57618           Root MSE      =   9.647

------------------------------------------------------------------------------
    medaltot |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        host |   30.13657   3.180924     9.47   0.000     23.89602    36.37712
         gdp |   118.5046   3.917052    30.25   0.000     110.8199    126.1894
         pop |   25.15612   3.896463     6.46   0.000     17.51177    32.80047
     planned |   5.395831   2.283157     2.36   0.018     .9165778    9.875084
      soviet |   33.37109   1.322257    25.24   0.000       30.777    35.96518
        year |   .0365459   .0239807     1.52   0.128    -.0105011    .0835928
       _cons |  -71.96634   47.50529    -1.51   0.130    -165.1655    21.23278
------------------------------------------------------------------------------
```

a) Interpret the gdp coefficient. (1 point)
b) What variable has the second largest effect on medal total? (Ignore the year variable.) Interpret its coefficient. (1 point)