# Dingy Output

 *Tests of Distinguishability and Nonindependence*
*August 20, 2018*

# 1. Text

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please make sure that you acknowledge that you have used this program. Also
should you decide to use the exact text included here, you will need to put
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text for accuracy. If you do find an error, please report it to David A.
Kenny.

 Tests of Distinguishability

 The focus of this analysis is to determine whether role makes a
statistical difference in the data, and if it does, what is that difference.
That is, are there differences between the MOTHER and the CHILD for the mixed
variables Relations quality? There are 82 dyads in the sample and no missing
data. The analyses employ the method of structural equation modeling using
the computer program lavaan. The means and standard deviations of each
variable for both the MOTHER and the CHILD are presented in Table 1. Note
that the estimates are maximum likelihood estimates and so the standard
deviations are a bit larger than conventional estimates.

 There are two ways in which role can make a difference. They are
differences between the variables in their means and their variances. That
is, are there mean or variance differences between the MOTHER and the CHILD
for the mixed variable Relations quality? For instance, the means and
variances of Relations quality might differ for the MOTHER and the CHILD.
Because there is just one mixed variable and no between- or within-dyads
variables, there are no correlations that can differ for the MOTHER and the
CHILD .

 Dingy estimates several models and compares their fit to determine the
best fitting model. To compare models, Dingy uses the chi square test, the
chi square difference test, the Root Mean Square Error of Approximation or
RMSEA, and the Sample Size Adjusted Bayesian Information Criterion or SABIC.
With large sample sizes, the chi square tests have so much power that they
are almost always statistically significant. Because the sample size for
this analysis would not be considered large, the chi square tests may be
informative. Here the RMSEA must be less than 0.08 to be considered a
good-fitting model. The SABIC is a "badness of fit" index with smaller
values indicating better fit. Its absolute value is not interpretable, but
values for different models can be compared. One advantage of the SABIC is
that a value can be computed for the model of full distinguishability even
though it is a saturated model with zero degrees of freedom. To learn more
about these measures of fit, go to davidakenny.net/cm/fit.htm (reverse the
slashes).

 Table 2 provides the measures of fit for three models which allow for
different types of distinguishability and Table 3 presents the tests of
hypotheses of equal means and variances. To begin, the test that the means
for each variable are equal (Model I versus Model II) is not statistically
significant (chi-square(1) = 0.10, p = .747). Thus, the data are consistent
with the hypothesis that the means are equal. The test that the variances
(Model II versus Model III) are equal is not statistically significant
(chi-square(1) = 0.00, p = .949). Thus, the data are consistent with the
hypothesis that the variances are equal.

 Test of Nonindependence

 Additionally, there is the question of whether the scores of the MOTHER
and the CHILD are correlated, i.e., nonindependent. There is one correlation
between the scores of the MOTHER and the CHILD, and the null hypothesis is
that this correlation is zero. Table 4 contains the results from these
tests. (Note that SABIC(Sat) refers to the SABIC for the saturated model.)
Treating dyad members as distinguishable, there is good evidence that there
is nonindependence or correlation between the scores of the MOTHER and the
CHILD. Alternatively, if we treat dyad members as indistinguishable, there
is good evidence that there is nonindependence or correlation between the
scores of the MOTHER and the CHILD.

# 2. Tables

Table 1: Descriptive Statistics for the MOTHER and the CHILD

 Member MOTHER CHILD
 Mean SD Mean SD
Relations quality 3.832 0.976 3.793 0.983

Table 2: Tests of Different Types of Distinguishability

Model Equal Means Equal Variances chi square df p RMSEA SABIC
 I Yes Yes 0.109 2 .947 0.000 3.867
 II No Yes 0.004 1 .949 0.000 5.015
 III No No 0 6.264

Table 3: Tests of Hypotheses of Different Types of Distinguishability

 Test chi square df p value
 Means I versus II 0.104 1 .747
Variances II versus III 0.004 1 .949

Table 4: Tests of Nonindependence across the MOTHER and the CHILD

 chi square df p value RMSEA SABIC SABIC(Sat)
 Distinguishable 12.583 1 <.001 0.376 17.594 6.264
Indistinguishable 12.543 1 <.001 0.375 15.049 3.758

# 3. lavaan Output

Test of Distinguishability or the I-SAT Model

lavaan (0.5-23.1097) converged normally after 14 iterations

 Number of observations 82

 Number of missing patterns 1

 Estimator ML
 Minimum Function Test Statistic 0.109
 Degrees of freedom 2
 P-value (Chi-square) 0.947

 lhs op rhs label est se z pvalue ci.lower ci.upper
1 SWB\_A\_2 ~1 m1 3.812 0.090 42.481 0.000 3.636 3.988
2 SWB\_A\_1 ~1 m1 3.812 0.090 42.481 0.000 3.636 3.988
3 SWB\_A\_2 ~~ SWB\_A\_2 v1 0.959 0.113 8.474 0.000 0.737 1.181
4 SWB\_A\_1 ~~ SWB\_A\_1 v1 0.959 0.113 8.474 0.000 0.737 1.181
5 SWB\_A\_2 ~~ SWB\_A\_1 0.361 0.113 3.192 0.001 0.139 0.583
 std.lv std.all
1 3.812 3.892
2 3.812 3.892
3 0.959 1.000
4 0.959 1.000
5 0.361 0.377