

SEM 16.0

Supplementary Material

JMP SEM Help:

https://www.jmp.com/support/help/en/16.0/?os=win&source=application&utm_source=helpmenu&utm_medium=application#page/jmp/structural-equation-models.shtml#



OVERVIEW

- Model Specification
- Model Comparison Table
 - Model summary results
 - Nested model comparisons
- Results

MODEL SPECIFICATION

Action box:
 -Add model constraints here
 -Click "Run" to estimate your model, "Reset" to start from scratch

Diagram box:
 -1st and 2nd icon changes the layout of the diagram.
 -3rd icon allows you to customize the appearance of your model

Red triangles menus:
 -Contain extra options and tables relevant to where they are.

Tabs:
 -"Lists": Contains a list of parameters in your model
 -"Status": Checks to make sure your model is identified and provides extra details

Build you model:
 -Use this pane to create your model

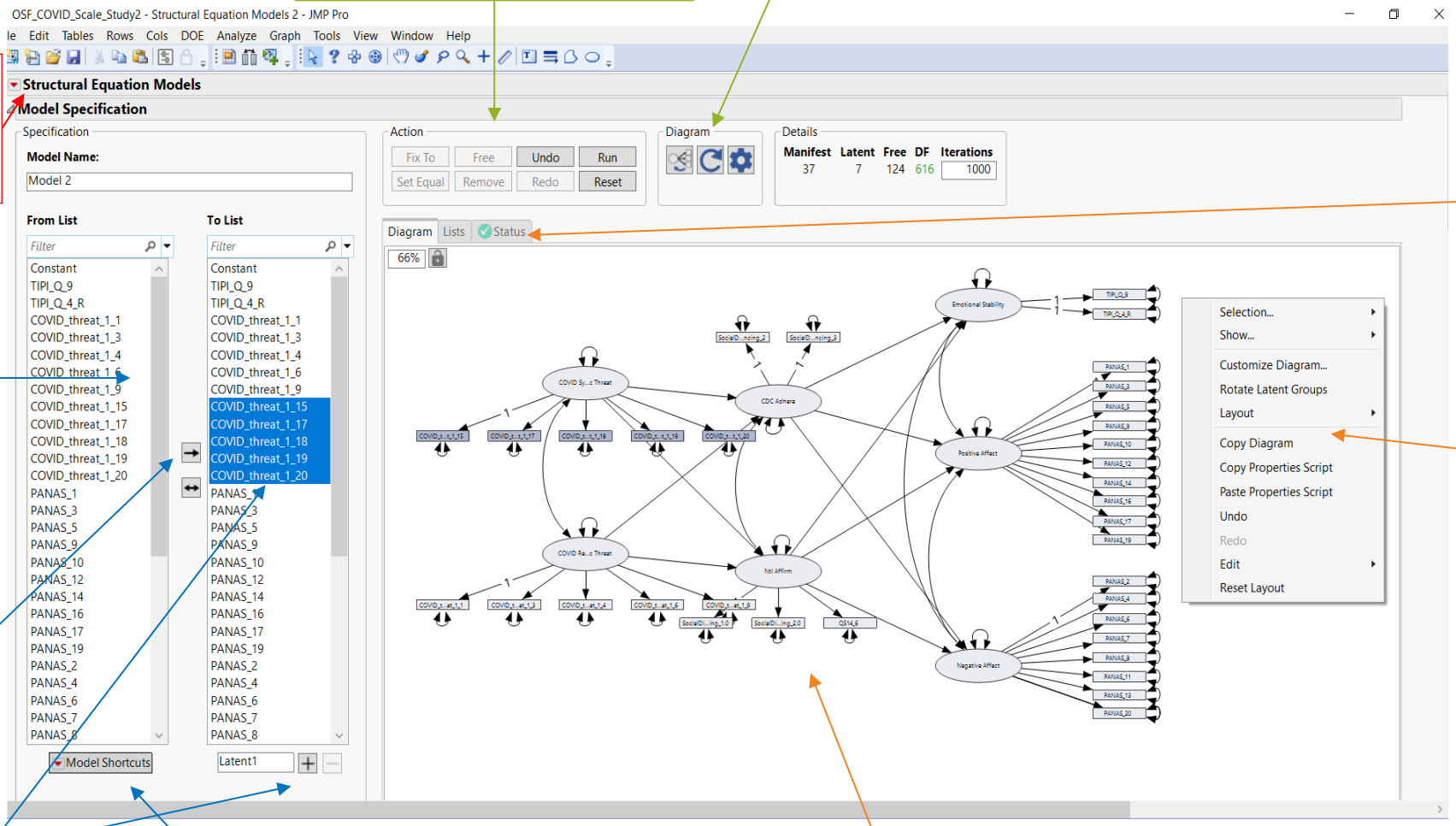
Add a path:
 -Select variable(s) in the "From" and "To" list
 -Click here to add a directional path (->) or (<->) to add a bidirectional path

Create latent variable:
 -Select variables in the "To" list
 -Click "+"

Model Shortcuts:
 -Predefined standard SEMs (e.g., latent growth models) and more can be found in here.

Extra path diagram options:
 -Right click in the path diagram window to bring up additional options

Path Diagram window:
 -Contains your model and updates as you build it
 -The diagram is dynamic, click, drag, rotate and move objects around.



MODEL COMPARISON: Summary Results

Model Comparison results:
 -Summary results for all models are stored in this table making it easy to compare all of your models

Default models:
 -By default SEM runs 2 models upon launch. (This can be toggled on/off)
 -**Unrestricted model:** Fits all means, variances, and covariances of the specified model variables. This model has 0 degrees of freedom (DF)
 -**Independence model:** Fits only the means and variances of the specified model variables.

#	Show	Model Name	-2 Log Likelihood	Number of Parameters	AICc	AICc Weight	.2	.4	.6	.8	BIC	ChiSquare	DF	Prob> ChiSq	CFI	RMSEA	Lower 90%	Upper 90%
1	<input type="checkbox"/>	Unrestricted	47246.924	740							51916.263	0.0000	0		1.0000	0.0000	0.0000	0.0000
2	<input type="checkbox"/>	Independence	58688.828	74	58860.197	0.0000					59155.762	11441.905	666	<.0001*	0.0000	0.1715	0.1688	0.1743
3	<input checked="" type="checkbox"/>	Model A: (Complex, More parameters)	49725.84	124	50046.781	0.9494					50508.27	2478.9161	616	<.0001*	0.8271	0.0742	0.0711	0.0772
4	<input checked="" type="checkbox"/>	Model B: (Simpler, Nested within Model A, Less parameters)	49738.357	122	50052.643	0.0506					50508.167	2491.4336	618	<.0001*	0.8261	0.0742	0.0712	0.0773

Compare Selected Models [Clear Selection](#)

- Structural Equation Model: Model A: (Complex, More parameters)
- Structural Equation Model: Model B: (Simpler, Nested within Model A, Less parameters)

2 Log Likelihood (-2LL):
 -The log-likelihood of the fitted model multiplied by -2.
 -This value can be used to compare nested models and is used to derive some model fit indices.

Number of Parameters:
 -# of estimated parameters for the model.
 -More parameters represent more complex models.
 -Degrees of freedom (DF) will be less, as estimated parameters increases.

AICc:
 The corrected Akaike information criterion.
 -This value can be used to compare models, smaller numbers indicate a better model fit relative to other models.

BIC:
 -The Bayesian information criterion.
 -Smaller numbers indicate a better model fit relative to other models.

CFI:
 -Bentler's Comparative Fit Index.
 -Between 0 and 1.
 -Values > 0.90 represent good model fit

RMSEA:
 -Root Mean Square Error of Approximation
 -Between 0 and 1.
 -Values less than 0.10 represent good model fit

-Fit indices help you compare your models and find the ones that fit the data the best. They account for model-data fit but also penalize for model complexity.
 -Fit indices used in conjunction with knowledge of a domain help users to find models that represent data well and reflect real world relationships among variables.

MODEL COMPARISON:

Nested Model Comparison

Nested model comparison:

- To run, select 2 rows (or more) and select "Compare Selected Models"
- Only appropriate for nested model comparisons
- Model B (simpler model) is nested within Model A (more complex model) here

What is a nested model?

- A model is nested if the simpler model (the model with the smaller number of estimated parameters) can be obtained from the more complex model (the model with the larger number of estimated parameters) by fixing one or more parameters
- The simpler model must be a direct subset of the more complex model

Model Comparison																		
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Chi-Square Difference Test						
Model nested...	...in model	ΔChiSquare	ΔDF	Prob>ChiSq	ΔCFI	ΔRMSEA
Model B: (Simpler, Nested within Model A, Less parameters)	Model A: (Complex, More parameters)	12.5175	2	0.0019*	-0.001	0.0001

Difference tests are meaningful only for nested models

ChiSquare difference:

- The difference of the ChiSquare between the simpler model (Model B) and more complex model (Model A)

$$2491.4336 - 2478.9161 = 12.5175$$

DF difference

- The difference between the degrees of freedom between the simpler model (Model B, more DF) and complex model (Model A, less DF)

CFI and RMSEA difference

- Difference between the values of the CFI and RMSEA between the two models.

Fit Indices: (AICc, BIC, CFI, RMSEA and others)

- Can be used to compare both nested and non-nested models.
- Note, fit indices do not represent direct statistical significance tests.

Which model fits better?

- In this example, the chisquare difference test is statistically significant (prob>ChiSq = .0019, which is less than < .05)
- We would conclude the **more complex model (Model A) fits statistically better relative to the simpler model (Model B).**
- We would also want to consider whether this difference is practically important and evaluate other aspects of our model (such as local fit)

MODEL RESULTS

Results:
 -Results are displayed in tables throughout the report
 -All results can be exported as a data table by "right clicking" on the table

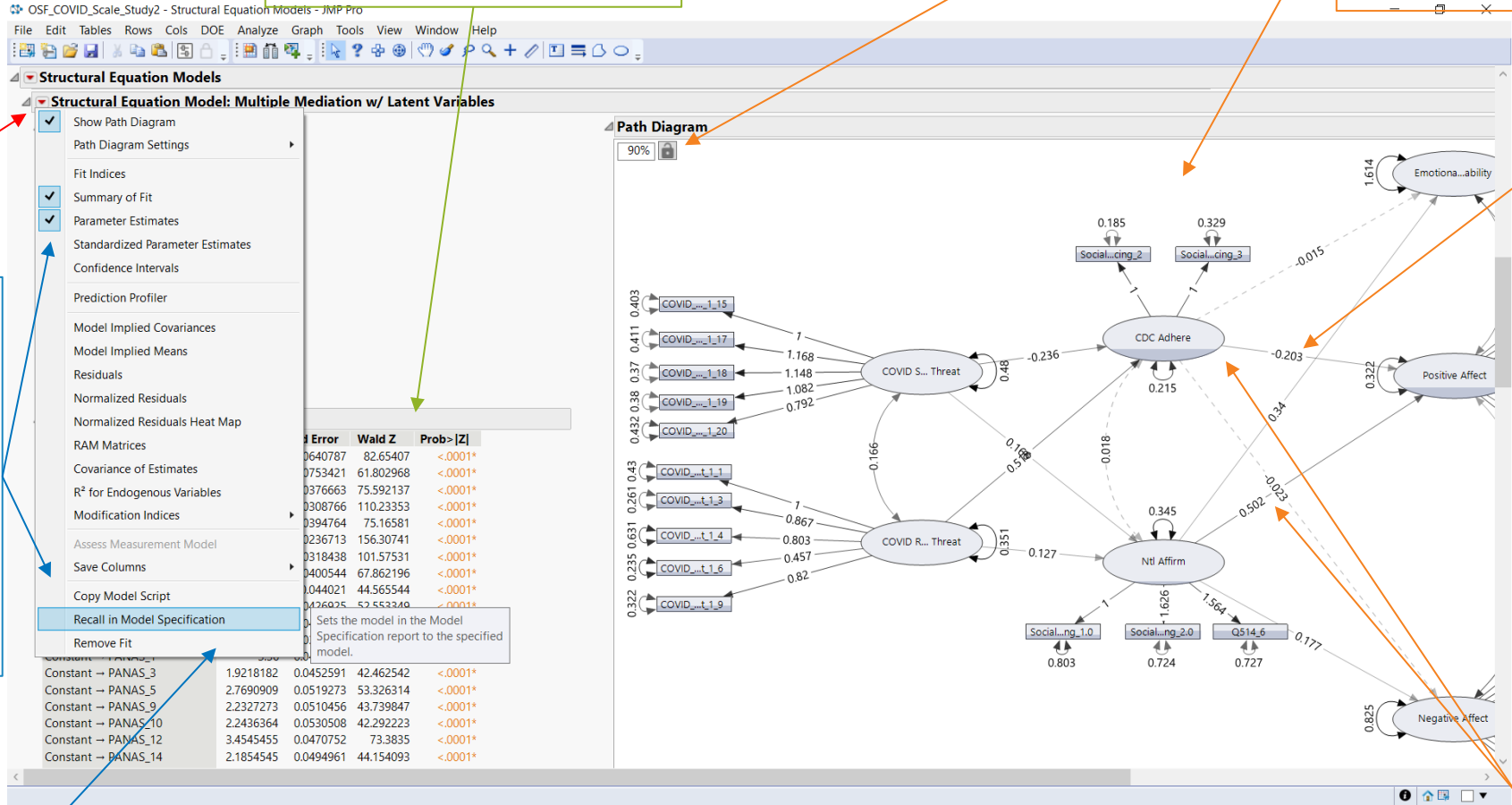
Path diagram lock:
 -If you want to freeze your diagram in place so that JMP does not auto-redraw the diagram. Press the lock button here.

Path diagram customization:
 -The path diagram is fully customizable in the results, "right click" on the diagram to access the customize options
 -Use "undo" or "control-z" to revert any change

Red triangles menus:
 -Contain extra options and tables relevant to where they are.

SEM Results Tables:
 -SEM contains many type of results for evaluating the model.
 -By default only the summary of fit and parameter estimates are turned on.
 -Click the "red triangle" to obtain additional results.

Recall Model:
 -Use the "Recall in Model Specification" option to bring your model back to the top window if you want to modify it and run a new model.



Path diagram model results:
 -Estimates appear here on the path diagram
 -Under "right click" you can choose which estimates to display

Path diagram visualization:
 -R² is visualized through the shade of the variables. The greater the shade the more variance that is explained for that variable by the model.
 -Dashed lines represent paths that not statistically significant
 -The thickness of the lines represents the magnitude of the standardized estimates