

## User Manual on the tool “MASEM of Risk Perception and Travel Behavior”

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**Based on:** Liu-Lastres, B., Yang, Y., & Zhang, C. X. (2024). Optimal-fit model of risk perception and travel-related behaviors during a global pandemic. *Journal of Destination Marketing & Management*, 31, 100958.

### 1. Introduction & Purpose

This web-based application is designed to conduct Meta-Analytic Structural Equation Modeling (MASEM) within the context of tourism risk perception. It is built upon the research of Liu-Lastres, Yang, and Zhang (2024), which synthesized findings from 108 articles to identify the optimal model explaining the relationships between tourists' risk perceptions and behavioral outcomes during a pandemic.

#### Key Features:

- **Replication:** Users can replicate the testing of the 8 competing models (Model 1–8) proposed in the original paper (and beyond).
- **Flexibility:** The tool allows users to hide/restore specific variables to test simplified models or focus on specific relationships.
- **Model Comparison:** Users can save multiple model configurations and compare their Goodness-of-Fit indices (e.g., AIC, BIC, CFI) in a consolidated table to identify the best-fitting model.
- **Visualization:** Provides an interactive path diagram with auto-layout features (separating perception variables from outcome variables).

### 2. Pre-loaded Data Sets

To facilitate immediate analysis, the tool comes **pre-loaded** with the synchronized correlation matrix ( $r$ ) and pairwise sample sizes ( $N$ ) derived from the meta-analysis of the 108 selected studies.

The tool includes 7 Key Variables, categorized into two groups:

#### A. Risk Perception & Beliefs (Left Column):

1. **Cognitive Risk Perception:** Assessments of likelihood and severity (e.g., health risks).

2. **Affective Risk Perception:** Emotional responses such as fear, anxiety, and worry.
3. **Efficacy Beliefs:** Confidence in coping with risks and the effectiveness of protective measures.

#### B. Behavioral Outcomes (Right Column):

4. **Travel Intention:** General intention to visit a destination.
5. **Travel Avoidance:** Intention to avoid travel or destinations.
6. **Risk Reduction Strategies:** Self-protective behaviors like mask-wearing or information searching.
7. **Other Behavioral Outcomes:** E.g., willingness to pay, support for tourism, or responsible travel behavior.

### 3. Step-by-Step Usage Guide

#### Step 1: Model Configuration (Setup Variables)

- View Variables: The 7 variables are displayed by default. Perception variables are arranged on the left, and behavioral outcomes on the right.
- Hide/Restore:
  - If you want to test a simpler model (e.g., excluding "Other Behavioral Outcomes"), click the Hide (Eye Off) icon next to the variable name.
  - Hidden variables move to a "Hidden List". You can click Restore to bring them back at any time.

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**Model Configuration**  
Manage the 7 variables from the paper. You can hide irrelevant ones.

Active Variables

Cognitive Risk  Affective Risk  Efficacy Beliefs  Travel Intention   
 Travel Avoidance  Risk Reduction  Other Behavior 

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## Step 2: Data Input (Pre-loaded)

- Review Data: The correlation matrix is pre-filled with data from Table 4 of the original paper.
- Harmonic Mean: The default method for calculating the total sample size ( $N$ ) is the Harmonic Mean, consistent with the methodology used in the paper.
- Edit (Optional): While not required for replication, you can manually modify specific correlation coefficients ( $r$ ) or sample sizes ( $N$ ) in the grid if you wish to test sensitivity or update the data with new studies.

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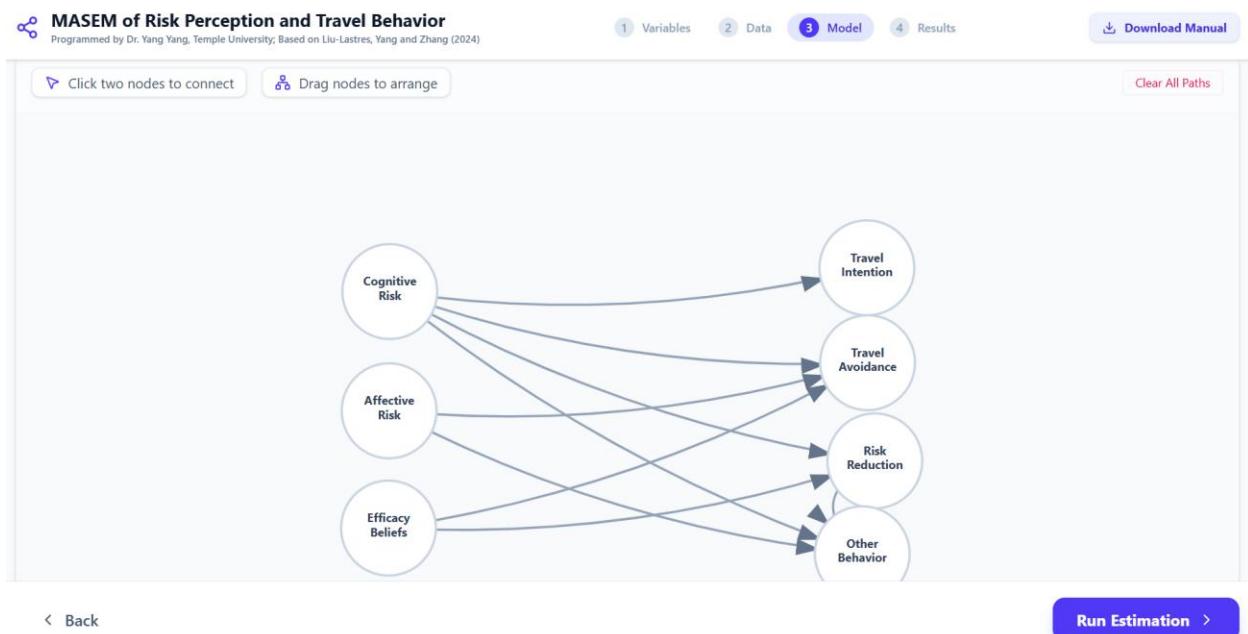
**① Pre-loaded Data:** Correlation matrix and sample sizes are pre-loaded from *Liu-Lastres et al. (2024), Table 4*.  
Values are editable if you need to adjust or correct specific entries.

Matrix (r   N)	Cognitive Risk	Affective Risk	Efficacy Beliefs	Travel Intention	Travel Avoidance	Risk Reduction	Other Behavior
<b>Cognitive Risk</b>	1.00 <i>r</i> 0.479 N 13851	<i>r</i> 0.212 N 2655	<i>r</i> -0.17 N 62268	<i>r</i> 0.347 N 3109	<i>r</i> 0.398 N 26466	<i>r</i> -0.09 N 4654	
<b>Affective Risk</b>	<i>r</i> 0.479 N 13851	1.00 <i>r</i> -0.03 N 11799	<i>r</i> 0.007 N 1256	<i>r</i> 0.155 N 1256	<i>r</i> 0.356 N 5346	<i>r</i> -0.27 N 40521	
<b>Efficacy Beliefs</b>	<i>r</i> 0.212 N 2655	<i>r</i> -0.03 N 11799	1.00 <i>r</i> 0.385 N 11506	<i>r</i> -0.07 N 4959	<i>r</i> 0.482 N 31665	<i>r</i> 0.217 N 2324	
<b>Travel Intention</b>	<i>r</i> -0.17 N 62268	<i>r</i> 0.007 N 1256	<i>r</i> 0.389 N 11506	1.00 <i>r</i> -0.06 N 1799	<i>r</i> 0.167 N 9475	<i>r</i> 0.176 N 4734	
<b>Travel Avoidance</b>	<i>r</i> 0.347 N 3109	<i>r</i> 0.155 N 1256	<i>r</i> -0.07 N 4959	<i>r</i> -0.06 N 1799	1.00 <i>r</i> 0.388 N 1235	<i>r</i> 0.453 N 1007	
<b>Risk Reduction</b>	<i>r</i> 0.398 N 26466	<i>r</i> 0.356 N 5346	<i>r</i> 0.482 N 31665	<i>r</i> 0.167 N 9475	<i>r</i> 0.388 N 1235	1.00 <i>r</i> 0.308 N 2812	
<b>Other Behavior</b>	<i>r</i> -0.05 N 4654	<i>r</i> -0.27 N 40521	<i>r</i> 0.217 N 2324	<i>r</i> 0.176 N 4734	<i>r</i> 0.453 N 1007	<i>r</i> 0.308 N 2812	1.00

< Back Next Step >

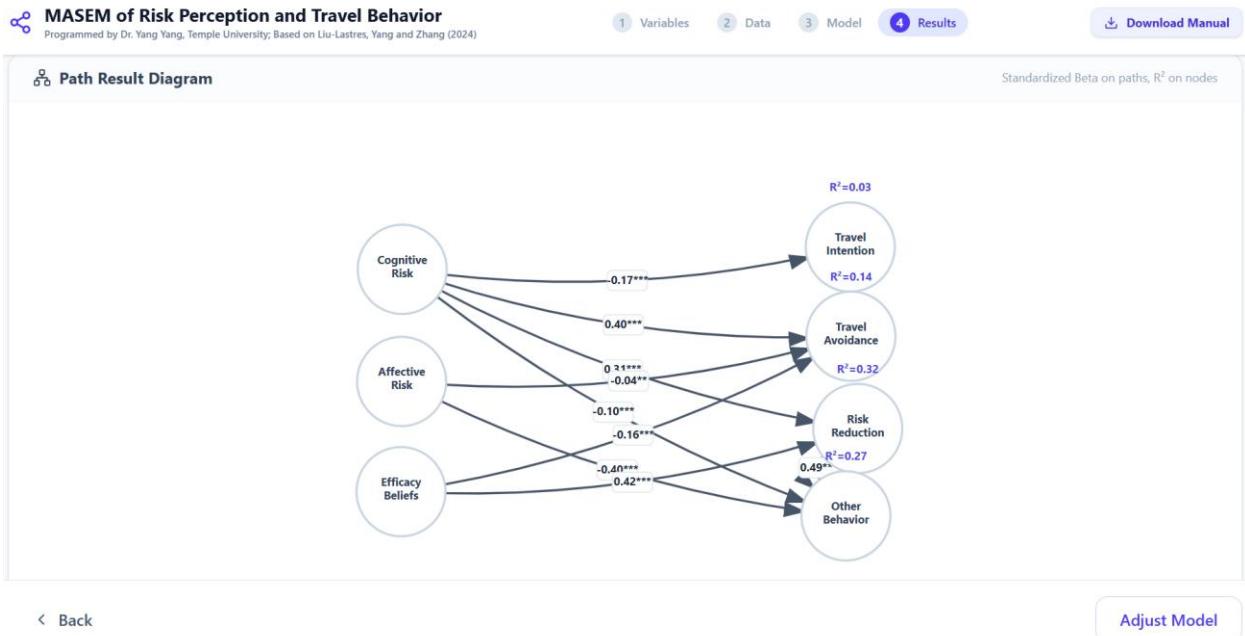
### Step 3: Building the Path Model

- Create Paths: Use the Diagram panel to hypothesize your model.
  - Click a source node (e.g., *Cognitive Risk Perception*).
  - Click a target node (e.g., *Travel Avoidance*).
  - A connection arrow will appear.
- Design Strategy: You can reconstruct the paper's Optimal Model (Model 4) by connecting the three perception variables (independent) to the behavioral outcomes in a specific sequence (e.g., Satisfaction -> Loyalty).
- Auto-Layout: The diagram automatically curves lines to avoid overlapping with nodes, ensuring the model remains readable even with complex connections.



## Step 4: Estimation & Analysis

- Run Estimation: Click the "Run Estimation" button.
- View Diagram Results: The path diagram will update to show:
  - Path Coefficients (beta): Standardized estimates on the connecting lines (with significance stars, e.g., \*\*\* p<.001).
  - $R^2$ : The variance explained is displayed above each endogenous variable node.
- View Detailed Tables: Scroll down to see the "Path Coefficients" table and detailed "Model Fit Indices" (Chi-Square, SRMR, RMSEA, CFI, TLI, AIC, BIC).



## Step 5: Model Comparison

- Save Model: If you are satisfied with the current result, enter a name (e.g., "Model 4 - Full Mediation") in the text box and click "Save Model".
- Compare: The saved model will appear in the "Model Comparison" table at the bottom.
- Iterate: You can go back to Step 3, change the paths (e.g., remove a link to test a competing hypothesis), run estimation again, and save it as "Model X".
- Evaluate: Use the comparison table to find the model with the lowest AIC/BIC or highest CFI, identifying the optimal fit structure.

The screenshot shows the MASEM software interface. At the top, there are tabs for Variables, Data, Model, and Results, with 'Results' being the active tab. Below the tabs, there is a 'Download Manual' button. The main area displays two tables: one for 'Paths' and one for 'Model Comparison'.

**Paths Table:**

Path	Beta	SE	p-value
Efficacy Beliefs → Travel Avoidance	-0.157	0.017	<.001***
Cognitive Risk → Risk Reduction	0.310	0.015	<.001***
Efficacy Beliefs → Risk Reduction	0.416	0.015	<.001***
Cognitive Risk → Other Behavior	-0.097	0.018	<.001***
Affective Risk → Other Behavior	-0.401	0.018	<.001***
Risk Reduction → Other Behavior	0.489	0.017	<.001***

**Model Comparison Table:**

Model Name	Paths	Chi <sup>2</sup>	CFI	SRMR	AIC	BIC	Actions
Model 1	9	3779.6	0.426	0.201	59405	59507	<button>Restore</button> <button>Delete</button>
Model 2	9	2753.6	0.583	0.182	58382	58497	<button>Restore</button> <button>Delete</button>

At the bottom left is a 'Back' button, and at the bottom right is an 'Adjust Model' button.

## 4. Troubleshooting & Error Codes

If the estimation fails or produces warnings, check the following common issues:

- **"Missing correlation or sample size for pair: X - Y"**
  - Cause: A required cell in the matrix (step 2) is empty or set to 0.
  - Fix: Ensure all active variables have valid correlation ( $r$ ) and sample size ( $N$ ) data in the matrix grid.

- **"Matrix is singular (cannot invert)"**
  - Cause: Extreme multicollinearity (two variables are highly correlated, e.g.,  $r > 0.95$ ), making them mathematically indistinguishable.
  - Fix: Check if any correlation coefficients in the "Data" step are too close to 1.0.
- **"df = 0" (Saturated Model)**
  - Cause: You have drawn arrows connecting *every possible pair* of variables.
  - Result: The model fits "perfectly" (Chi-square = 0, CFI = 1.00) because there are no degrees of freedom left to test validity.
  - Fix: Remove theoretically insignificant paths to improve model parsimony and obtain meaningful fit indices.
- **"Total N is invalid"**
  - Cause: One or more pairwise sample sizes ( $N$ ) are missing or zero.
  - Fix: Verify the matrix input; ensure every relationship has a sample size count.