

# SEM Report — Title

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# 1 Research question

Write 3–6 lines: - What is the substantive question? - What are the constructs? - What would be convincing evidence?

## 2 Data

### 2.1 Sample

- N =
- Inclusion/exclusion =
- Grouping variable (if any) =
- Clustering (if any) = (e.g., students in classrooms)

### 2.2 Variables

Brief table (optional): - Indicators for each latent factor - Outcomes/predictors - Scale type (continuous vs ordinal Likert)

### 2.3 Missingness

- % missing overall =
- Key variables with missingness =
- Strategy (FIML / MI / listwise) + short justification

```
# Optional quick checks (edit to match your data)
# summary(dat)
# colMeans(is.na(dat))
```

## 3 Model

### 3.1 Conceptual model (diagram)

Insert a figure if you have one:

## 3.2 lavaan syntax

```
library(lavaan)

model <- '
  # Measurement
  f1 =~ x1 + x2 + x3
  f2 =~ y1 + y2 + y3

  # Structural
  f2 ~ f1
'
```

## 4 Estimation choices

Report and justify:

- **Estimator:** (e.g., ML / MLR / WLSMV)
- **Ordered indicators:** (yes/no; which variables)
- **Standardization:** (e.g., `std.lv=TRUE` or marker variable)
- **Missing data handling:** (FIML / MI)
- **Cluster-robust SE** (if clustered): yes/no; rationale

```
# Example fit call (edit as needed)
# fit <- sem(model, data = dat, estimator = "MLR", missing = "fiml")
# summary(fit, fit.measures = TRUE, standardized = TRUE)
```

## 5 Results

### 5.1 Global fit

Report a small set consistently (and add CI where relevant):  $\chi^2(df)$  = - CFI = - TLI = - RMSEA [90% CI] = - SRMR =

```
# Example
# fitMeasures(fit, c("chisq", "df", "cfi", "tli", "rmsea", "rmsea.ci.lower", "rmsea.ci.upper", "srmr"))
```

## 5.2 Key parameters

Focus on the parameters tied to your research question. - Main paths (standardized estimates + CI) - Loadings (and any problematic indicators) -  $R^2$  for outcomes

```
# Example: parameter table
# pe <- parameterEstimates(fit, standardized = TRUE)
# pe[pe$op %in% c("~", "=~"), c("lhs", "op", "rhs", "est", "se", "pvalue", "std.all")]
```

## 5.3 Interpretation (write-up)

Write 1–2 short paragraphs: - What do the results mean substantively? - Are effects small/medium/large in context? - What alternative explanations remain?

Include citations when relevant, e.g. (rosseel2012lavaan?).

## 6 Diagnostics and respecification (if applicable)

State what you checked: - Residuals inspected? yes/no - Modification indices used? yes/no  
If yes: what changes were made and why they are substantively defensible?

```
# Example (optional)
# modindices(fit, sort. = TRUE, maximum.number = 10)
```

## 7 Robustness / sensitivity checks (optional but appreciated)

Examples: - Alternative estimator (MLR vs ML) - Treat Likert as ordered vs continuous - With/without a debated residual covariance - With/without outliers

## 8 Limitations

- Design limits (causality, measurement, sample, generalizability)
- Model dependence / equivalent models
- Potential violations (non-normality, MNAR, clustering not modeled)

## 9 Conclusion

2-4 bullet points: - What did you learn? - What is the main takeaway for the research question? - What would you do next?

## 10 Reproducibility

```
sessionInfo()
```

```
R version 4.5.1 (2025-06-13 ucrt)
```

```
Platform: x86_64-w64-mingw32/x64
```

```
Running under: Windows 11 x64 (build 26100)
```

```
Matrix products: default
```

```
LAPACK version 3.12.1
```

```
locale:
```

```
[1] LC_COLLATE=Italian_Italy.utf8 LC_CTYPE=Italian_Italy.utf8
```

```
[3] LC_MONETARY=Italian_Italy.utf8 LC_NUMERIC=C
```

```
[5] LC_TIME=Italian_Italy.utf8
```

```
time zone: Europe/Rome
```

```
tzcode source: internal
```

```
attached base packages:
```

```
[1] stats      graphics  grDevices  utils      datasets  methods    base
```

```
other attached packages:
```

```
[1] lavaan_0.6-19
```

```
loaded via a namespace (and not attached):
```

```
[1] digest_0.6.37      fastmap_1.2.0      xfun_0.52          knitr_1.50
[5] htmltools_0.5.8.1 pbivnorm_0.6.0     rmarkdown_2.29     stats4_4.5.1
[9] cli_3.6.5          mnormt_2.1.1       compiler_4.5.1     rstudioapi_0.17.1
[13] tools_4.5.1        evaluate_1.0.4     yaml_2.3.10        quadprog_1.5-8
[17] rlang_1.1.6        jsonlite_2.0.0
```

### 10.1 References