Observed-Variable Path Analysis

Standalone verified Python analysis

Test: Observed-Variable Path Analysis

Design: Multiple regression path model predicting G3 from prior grade, study time, failures, and absences.

Variables: G3, G1, studytime, failures, absences

Null hypothesis: All direct path coefficients to G3 are zero.

Formula: G3=beta0+beta1 z(G1)+beta2 z(studytime)+beta3 z(failures)+beta4 z(absences)+e.

Source rows: 649

Calculated metrics:

g1_path: 2.5469681421179513

studytime_path: 0.11489800361983993

failures_path: -0.29098094744247344

absences_path: 0.128899115849754

r_squared: 0.6921660445654284

n_cases: 649

Independent reference values:

g1_path: 2.5469681421179513

studytime_path: 0.11489800361983993

failures_path: -0.29098094744247344

absences_path: 0.128899115849754

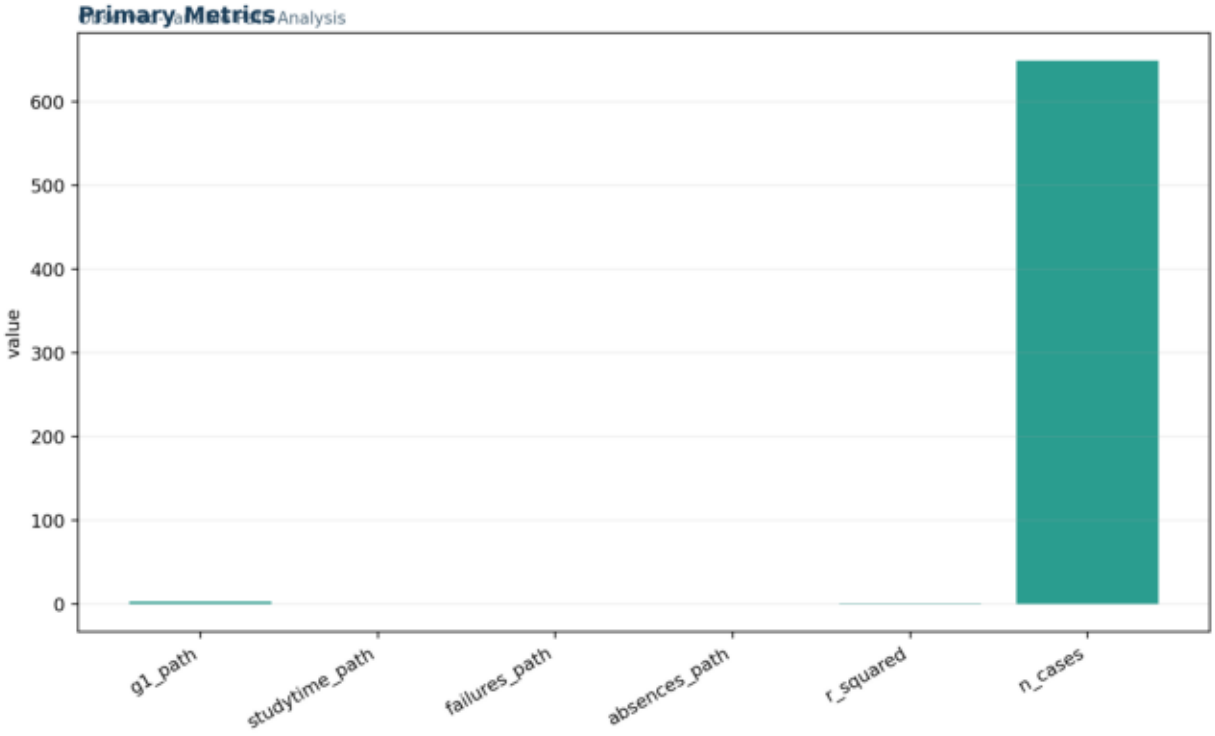
r_squared: 0.6921660445654284

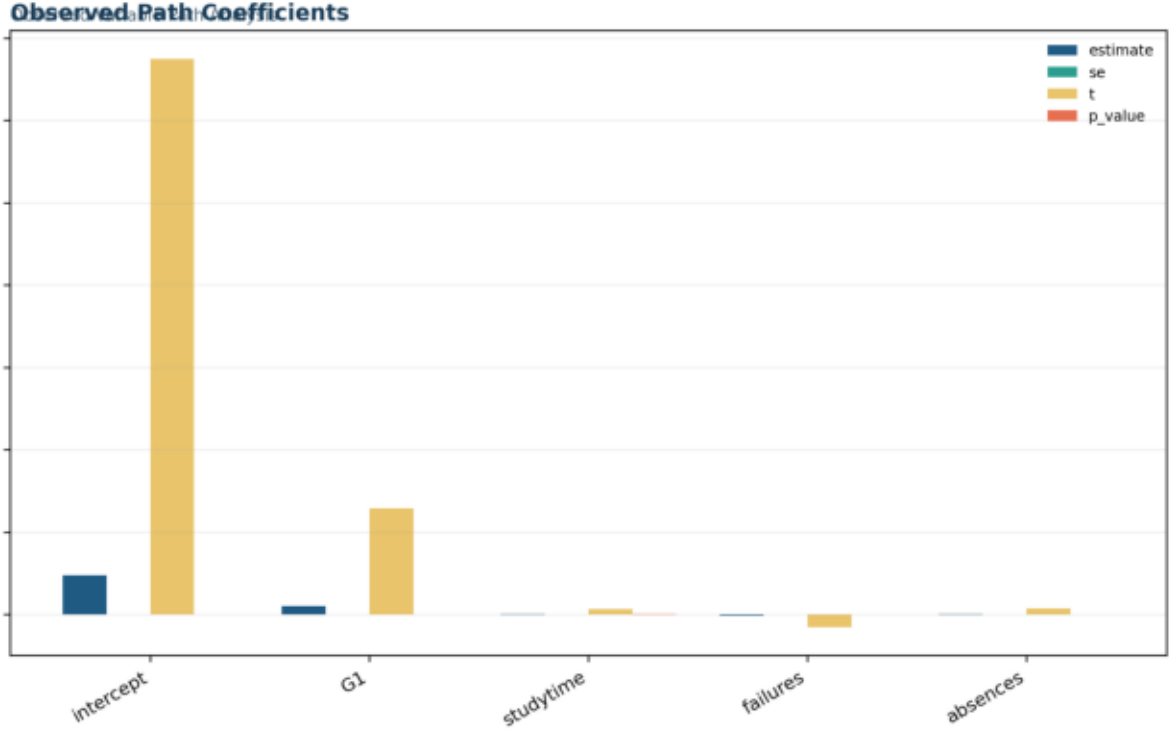
n_cases: 649

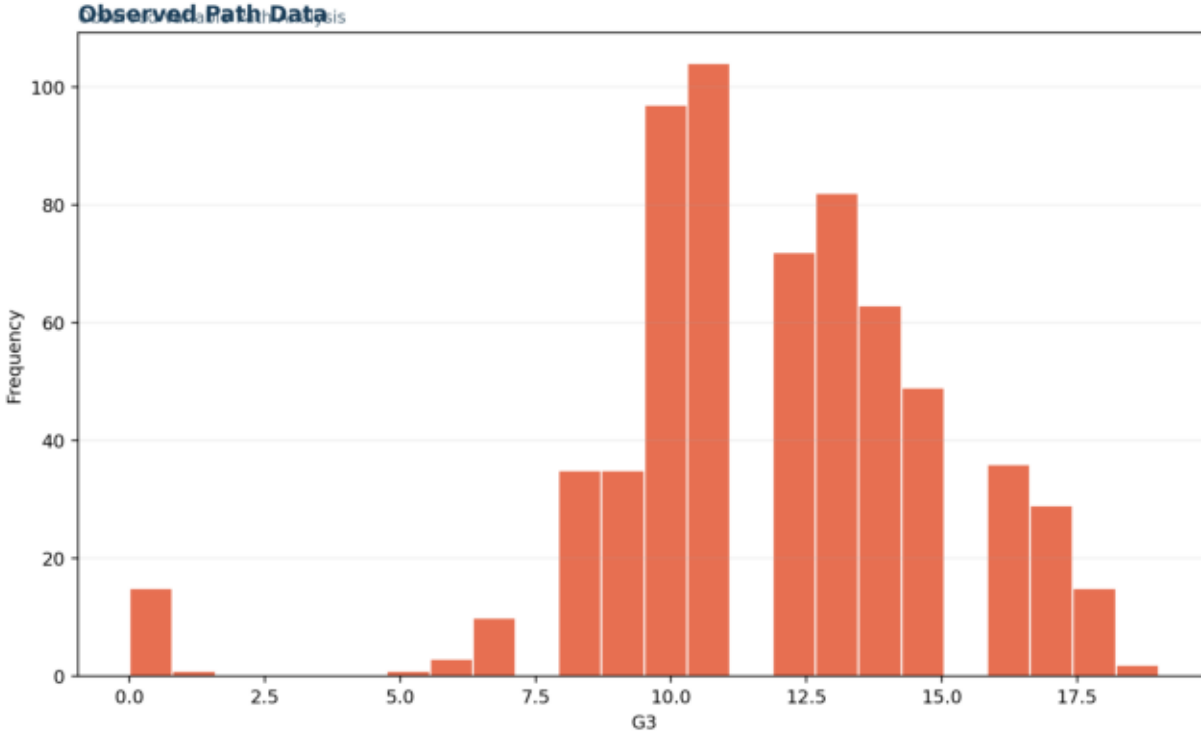
Interpretation:

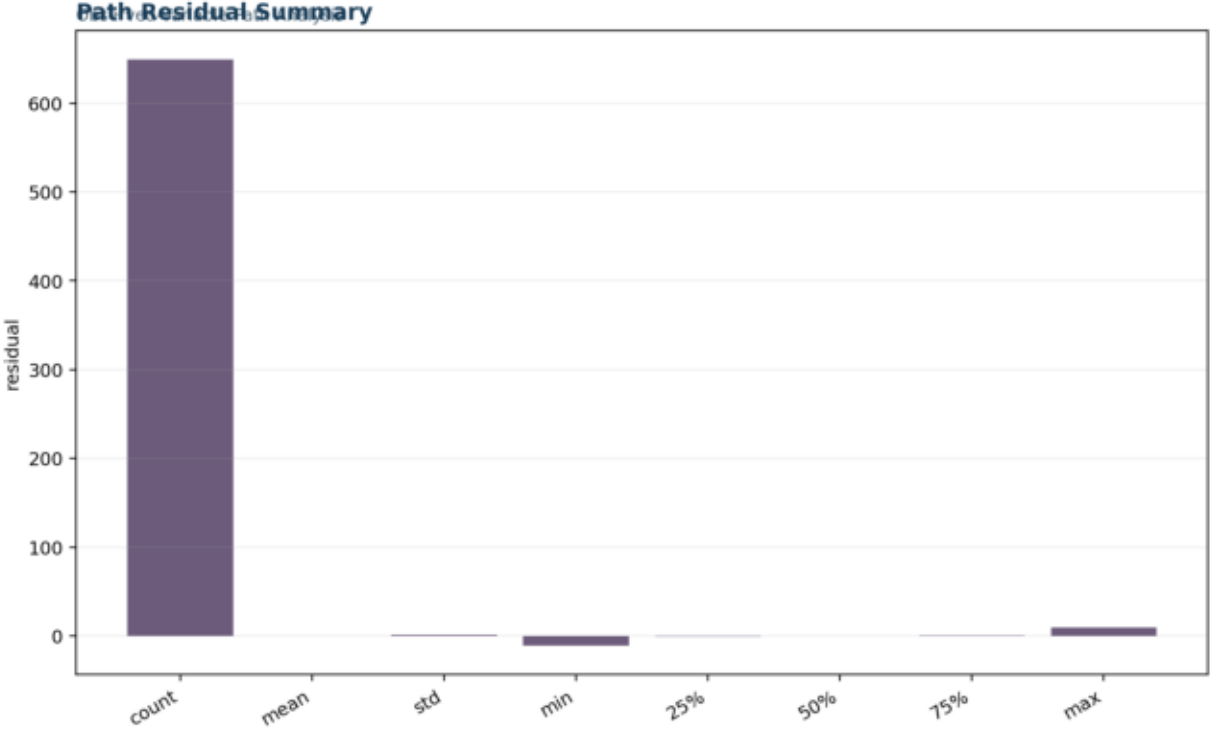
Path analysis uses observed variables and no latent measurement equation.

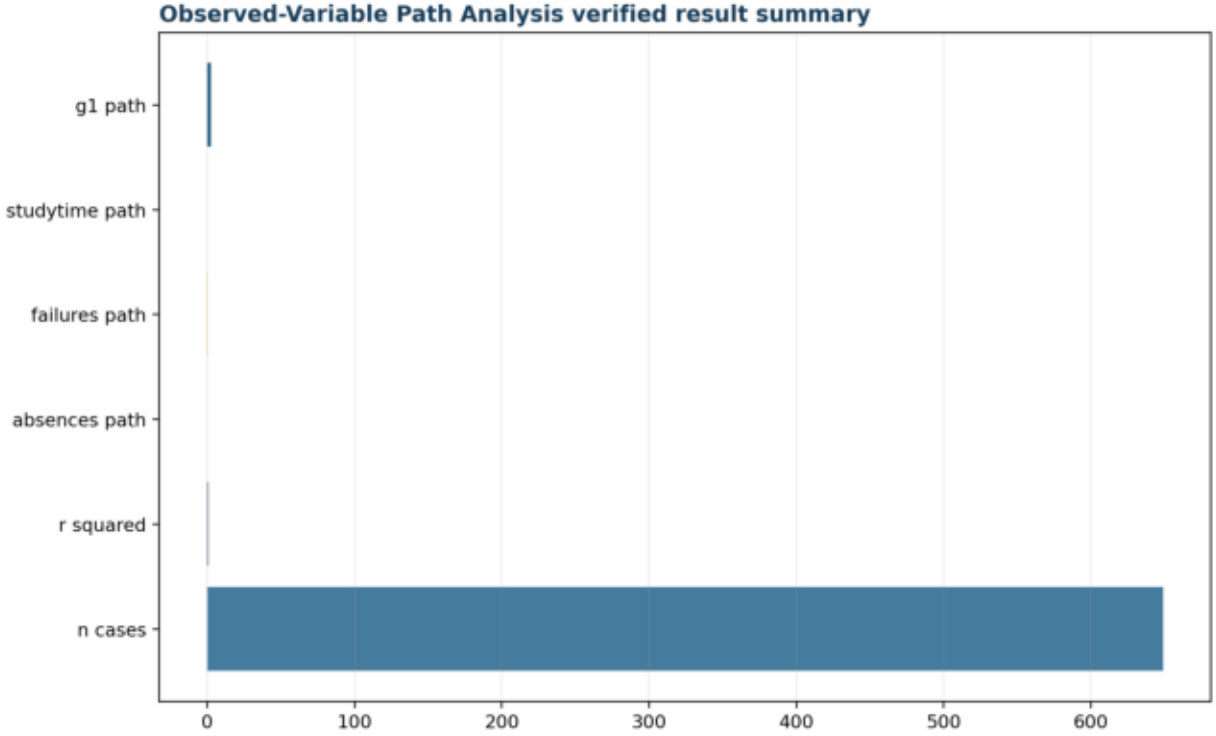
Observed-path R-squared=0.692166.


Primary Metrics
Analysis
600
500
400
300
200
100
0
value
g1_path
studytime_path
failures_path
absences_path
r_squared
n_cases


Observed Path Coefficients
estimate
se
t
p_value
175
150
125
100
75
50
25
0
intercept
G1
studytime
failures
absences


Observed Path Data
Frequency
100
80
60
40
20
0
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
G3


Path Residual Summary
residual
600
500
400
300
200
100
0
count
mean
std
min
25%
50%
75%
max


Observed-Variable Path Analysis verified result summary
g1 path
studytime path
failures path
absences path
r squared
n cases
0
100
200
300
400
500
600

Primary Metrics

metric	value
g1_path	2.54697
studytime_path	0.114898
failures_path	-0.290981
absences_path	0.128899
r_squared	0.692166
n_cases	649

Observed Path Coefficients

term	estimate	se	t	p_value
intercept	11.906	0.0705783	168.692	0
G1	2.54697	0.0788056	32.3196	6.34314e-137
studytime	0.114898	0.0735063	1.5631	0.118519
failures	-0.290981	0.0767924	-3.78919	0.000165314
absences	0.128899	0.0718305	1.79449	0.0732038

Observed Path Data

G3	G1	studytime	failures	absences
11	-4.15227	0.0835885	-0.374017	0.0733768
11	-0.873896	0.0835885	-0.374017	-0.357587
12	0.218895	0.0835885	-0.374017	0.504341
14	0.947422	1.28912	-0.374017	-0.788551
13	-0.145369	0.0835885	-0.374017	-0.788551
13	0.218895	0.0835885	-0.374017	0.504341
13	0.583158	0.0835885	-0.374017	-0.788551
13	-0.509632	0.0835885	-0.374017	-0.357587
17	1.31169	0.0835885	-0.374017	-0.788551
13	0.218895	0.0835885	-0.374017	-0.788551
14	0.947422	0.0835885	-0.374017	-0.357587
13	-0.509632	1.28912	-0.374017	-0.788551
12	0.218895	-1.12194	-0.374017	-0.788551
13	0.218895	0.0835885	-0.374017	-0.788551
15	0.947422	1.28912	-0.374017	-0.788551
17	2.04021	-1.12194	-0.374017	0.504341
14	0.583158	1.28912	-0.374017	1.36627
14	0.583158	0.0835885	-0.374017	-0.357587
7	-1.23816	-1.12194	4.683	-0.357587
12	0.218895	-1.12194	-0.374017	0.504341
14	0.218895	0.0835885	-0.374017	-0.788551
12	-0.145369	-1.12194	-0.374017	-0.788551
14	0.218895	0.0835885	-0.374017	-0.788551
10	-0.509632	0.0835885	-0.374017	-0.357587
10	-0.509632	1.28912	-0.374017	-0.357587
12	-0.509632	-1.12194	-0.374017	0.504341

Path Residual Summary

index	residual
count	649
mean	5.27707e-15
std	1.79246
min	-10.433
25%	-0.663654
50%	0.170421
75%	0.919633
max	9.54179