Supplementary Materials for Are robust standard errors the best approach for interval estimation with non-normal data in structural equation modeling?

Overview

The supplementary materials here contain additional results for Studies 1-3.

Study 1

Table 1 presents a count of the number of cases that had valid results for overall model fit in each condition - based on either normal theory likelihood (ML), or that with robust corrections (MLM). Cases that did not have valid results included those that did not converge to a solution, or those under which a valid test of model fit and *p*-value could not be computed. Table 2 presents the number of replications that had an improper estimate, operationalized as a negative variance estimate (Heywood case) or covariance matrix among latent variables that was not positive definite. Table 3 presents overall model rejection rates based only on valid replications. Tables 4 through 9 present empirical standard deviations and bias for the parameters of interest in Study 1 (i.e., first factor loading, first error variance, factor covariance). Figure 1 presents the proportion of cases (rounded to 2 decimal places) under each cell of the design with a valid CI. Figure 2 presents median CI width.

Table 1: Number of cases under each condition in Study 1 where overall model estimation succeeded

Ν	Condition	ML	MLM
100	Normal	1000	1000
200	Normal	1000	1000
500	Normal	1000	1000
100	VM Moderate	999	999
200	VM Moderate	1000	1000
500	VM Moderate	1000	1000
100	VM Severe	1000	1000
200	VM Severe	1000	1000
500	VM Severe	1000	1000
100	CN Severe	984	979
200	CN Severe	999	999
500	CN Severe	1000	1000
100	CN Moderate	999	998
200	CN Moderate	1000	1000
500	CN Moderate	1000	1000
100	Copula Moderate	1000	1000
200	Copula Moderate	1000	1000
500	Copula Moderate	1000	1000
100	Copula Severe	999	999
200	Copula Severe	1000	1000
500	Copula Severe	1000	1000

Note. VM = Vale and Maurelli method; CN = Contaminated normal; Copula = Multivariate Gumbel Copula; ML = Maximum likelihood estimation; MLM = Maximum likelihood estimation with robust corrections. Note that the number of cases for ML and MLM differs slightly in some cases due to the overall test statistic not being computable for MLM.

Ν	Condition	Improper parameter estimates
100	Normal Normal	0
200	Normal Normal	0
500	Normal Normal	0
100	VM moderate	3
200	VM moderate	0
500	VM moderate	0
100	VM severe	1
200	VM severe	0
500	VM severe	0
100	CN moderate	11
200	CN moderate	0
500	CN moderate	0
100	CN severe	52
200	CN severe	3
500	CN severe	0
100	Copula moderate	0
200	Copula moderate	0
500	Copula moderate	0
100	Copula severe	10
200	Copula severe	0
500	Copula severe	0

Table 2: Number of solutions with one or more improper parameter estimates

Note. VM = Vale and Maurelli method; CN = Contaminated normal; Copula = Multi-variate Gumbel Copula.

N	Condition	ML	MLM
100	Normal	0.06	0.08
200	Normal	0.06	0.06
500	Normal	0.06	0.06
100	VM Moderate	0.21	0.09
200	VM Moderate	0.19	0.07
500	VM Moderate	0.21	0.06
100	VM Severe	0.19	0.09
200	VM Severe	0.19	0.07
500	VM Severe	0.24	0.06
100	CN Moderate	0.58	0.08
200	CN Moderate	0.59	0.06
500	CN Moderate	0.59	0.05
100	CN Severe	0.92	0.07
200	CN Severe	0.90	0.07
500	CN Severe	0.91	0.06
100	Copula Moderate	0.20	0.06
200	Copula Moderate	0.19	0.06
500	Copula Moderate	0.18	0.06
100	Copula Severe	0.39	0.08
200	Copula Severe	0.37	0.06
500	Copula Severe	0.39	0.06

Table 3: Model rejection rates under each condition in Study 1

Note. VM = Vale and Maurelli method; CN = Contaminated normal; Copula = Multivariate Gumbel Copula; ML = Maximum likelihood estimation using the normal theory chi-square test of overall fit; MLM = Maximum likelihood estimation with robust corrections, using a scaled chi-square test of overall fit.

N	Condition	Empirical SD
100	Normal	0.18
200	Normal	0.11
500	Normal	0.07
100	VM moderate	0.27
200	VM moderate	0.16
500	VM moderate	0.10
100	VM severe	0.31
200	VM severe	0.18
500	VM severe	0.11
100	CN moderate	0.39
200	CN moderate	0.16
500	CN moderate	0.10
100	CN severe	0.88
200	CN severe	0.25
500	CN severe	0.12
100	Copula moderate	0.23
200	Copula moderate	0.12
500	Copula moderate	0.07
100	Copula severe	0.24
200	Copula severe	0.15
500	Copula severe	0.09

Table 4: Empirical standard deviations for first factor loading, Study 1

Note. VM = Vale and Maurelli method; CN = Contaminated normal; Copula = Multi-variate Gumbel Copula.

Ν	Condition	Bias
100	Normal	0.02
200	Normal	0.01
500	Normal	0.00
100	VM moderate	0.04
200	VM moderate	0.02
500	VM moderate	0.01
100	VM severe	0.05
200	VM severe	0.02
500	VM severe	0.01
100	CN severe	0.12
200	CN severe	0.04
500	CN severe	0.01
100	CN moderate	0.07
200	CN moderate	0.01
500	CN moderate	0.01
100	Copula moderate	0.04
200	Copula moderate	0.01
500	Copula moderate	0.00
100	Copula severe	0.04
200	Copula severe	0.02
500	Copula severe	0.01

Table 5: Raw bias for first factor loading, Study 1

Note. VM = Vale and Maurelli method; CN = Contaminated normal; Copula = Multi-variate Gumbel Copula.

Ν	Condition	Fixed Empirical SD
100	Normal	0.13
200	Normal	0.09
500	Normal	0.06
100	VM moderate	0.22
200	VM moderate	0.15
500	VM moderate	0.10
100	VM severe	0.28
200	VM severe	0.20
500	VM severe	0.13
100	CN moderate	0.18
200	CN moderate	0.11
500	CN moderate	0.08
100	CN severe	0.21
200	CN severe	0.14
500	CN severe	0.08
100	Copula moderate	0.14
200	Copula moderate	0.10
500	Copula moderate	0.07
100	Copula severe	0.18
200	Copula severe	0.13
500	Copula severe	0.08

Table 6: Empirical standard deviations for first error variance, Study 1

Note. VM = Vale and Maurelli method; CN = Contaminated normal; Copula = Multi-variate Gumbel Copula.

Ν	Condition	Bias
100	Normal	-0.01
200	Normal	-0.01
500	Normal	-0.01
100	VM moderate	-0.02
200	VM moderate	-0.02
500	VM moderate	0.00
100	VM severe	-0.04
200	VM severe	-0.01
500	VM severe	-0.01
100	CN moderate	-0.03
200	CN moderate	-0.01
500	CN moderate	-0.00
100	CN severe	-0.02
200	CN severe	-0.03
500	CN severe	0.00
100	Copula moderate	-0.02
200	Copula moderate	0.00
500	Copula moderate	0.00
100	Copula severe	-0.02
200	Copula severe	-0.01
500	Copula severe	0.00

Table 7: Raw bias for first first error variance, Study 1

Note. VM = Vale and Maurelli method; CN = Contaminated normal; Copula = Multi-variate Gumbel Copula.

N	Condition	Empirical SD
100	Normal	0.18
200	Normal	0.12
500	Normal	0.07
100	VM moderate	0.21
200	VM moderate	0.14
500	VM moderate	0.08
100	VM severe	0.21
200	VM severe	0.14
500	VM severe	0.08
100	CN moderate	0.24
200	CN moderate	0.16
500	CN moderate	0.10
100	CN severe	0.30
200	CN severe	0.20
500	CN severe	0.12
100	Copula moderate	0.18
200	Copula moderate	0.13
500	Copula moderate	0.08
100	Copula severe	0.20
200	Copula severe	0.13
500	Copula severe	0.08

Table 8: Empirical standard deviations for factor covariance, Study 1

Note. VM = Vale and Maurelli method; CN = Contaminated normal; Copula = Multi-variate Gumbel Copula.

Ν	Condition	Bias
100	Normal	0.00
200	Normal	0.01
500	Normal	0.00
100	VM moderate	-0.01
200	VM moderate	-0.01
500	VM moderate	0.00
100	VM severe	-0.01
200	VM severe	0.00
500	VM severe	-0.01
100	CN moderate	0.00
200	CN moderate	0.00
500	CN moderate	0.00
100	CN severe	0.00
200	CN severe	0.00
500	CN severe	0.00
100	Copula moderate	0.00
200	Copula moderate	0.00
500	Copula moderate	0.00
100	Copula severe	0.03
200	Copula severe	0.02
500	Copula severe	0.01

Table 9: Raw bias for factor covariance, Study 1

Note. VM = Vale and Maurelli method; CN = Contaminated normal; Copula = Multi-variate Gumbel Copula.

	Proportion of Valid 95% Cis							
_	WCI	LCI	R-WCI	R-LCI	BootSE	PC	BC	
Normal –	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00 -	
Copula Moderate	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00 -	
Copula Severe -	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	<mark>1.00</mark> 1.00 1.00	1.00 1.00 1.00 -	
VM Moderate	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	<mark>1.00</mark> 1.00 1.00	<mark>1.00</mark> 1.00 1.00 -	
VM Severe	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00 -	
CN Moderate	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	<mark>1.00</mark> 1.00 1.00	1.00 1.00 1.00 -	
CN Severe -	<mark>.98</mark> 1.00 1.00	.98 1.00 1.00	.98 1.00 1.00	.98 1.00 1.00	<mark>.98</mark> 1.00 1.00	<mark>.98</mark> 1.00 1.00	<mark>.98</mark> 1.00 1.00 -	
Normal –	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00 -	
Copula Moderate -	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

.98 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

.97 1.00 1.00

Sample Size

500

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

.98 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

.98 1.00 1.00

100 200 500 1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

.98 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

.98 1.00 1.00

100 200 500 1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

.98 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

.98 1.00 1.00

200 500

100

(Non-)Normality Condition

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

.98 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

.98 1.00 1.00

500

100 200

딍

Copula Severe

VM Moderate

VM Severe

CN Moderate

Copula Moderate

Copula Severe

VM Moderate

CN Moderate

VM Severe

CN Severe

CN Severe

Normal

1.00 1.00 1.00 1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

.98 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

.98 1.00 1.00

100 200 500

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

.98 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

1.00 1.00 1.00

.98 1.00 1.00

100 200 500

Figure 1: Proportion of valid confidence intevals for Study 1

Note. VM = Vale and Maurelli method; CN = Contaminated Normal; Copula = Multivariate Gumbel Copula; WCI = Waldbased confidence interval; LCI = Likelihood-based confidence interval; R-WCI = Robust wald-based confidence intervals; R-LCI = Robust likelihood-based confidence intervals; BootSE = Bootstrap standard errors; PC = Percentile bootstrap; BC = Bias-corrected bootstrap.

100 200 0.995

0.990

0.985 0.980 0.975

0.970 0.965

0.960

0.955

0.950

0.945

0.940

0.935

0.930

0.925

0.920

0.915

0.910

0.905

0.900

Median 95% CI width

	ĺ		WCI			LCI			R-WC			R-LCI		E	BootSE			PC			BC		1	23
	Normal -	.47	.33	.21	.49	.34	.21	.45	.33	.21	.48	.34	.21	.50	.34	.21	.50	.34	.21	.50	.34	.21		- 22
Сори	ıla Moderate –	.47	.33	.21	.50	.34	.22	.51	.38	.24	.55	.39	.25	.59	.39	.25	.58	.39	.25	.58	.40	.25	-	- 21
Co	pula Severe - B	.46	.33	.21	.49	.34	.21	.57	.43	.30	.63	.45	.31	.68	.46	.30	.66	.45	.30	.65	.46	.31	-	- 20
v	M Moderate	.45	.32	.21	.48	.33	.21	.62	.49	.34	.69	.52	.34	.72	.50	.34	.67	.50	.34	.69	.52	.35	-	- 19
	VM Severe	.42	.32	.21	.45	.33	.21	.64	.56	.40	.72	.60	.41	.73	.57	.40	.69	.56	.40	.71	.59	.41	-	- 18
С	N Moderate	.46	.33	.21	.50	.34	.21	.57	.44	.29	.64	.46	.30	.76	.47	.29	.68	.47	.30	.68	.48	.30	-	- 17
	CN Severe -	.46	.32	.21	.50	.34	.21	.72	.53	.36	.84	.57	.37	1.32	.62	.37	.90	.59	.37	.89	.60	.38	-	- 16
c	Normal -	.58	.42	.27	.67	.45	.28	.57	.41	.27	.65	.44	.28	.78	.46	.28	.73	.46	.28	.74	.46	.28		- 15
ditio Cobn	ıla Moderate -	.60	.42	.27	.69	.45	.27	.60	.43	.28	.70	.46	.29	1.01	.50	.29	.83	.50	.29	.84	.50	.29		- 13
00 Con	pula Severe - Di	.57	.41	.27	.67	.45	.28	.64	.47	.32	.77	.51	.33	1.19	.57	.34	.95	.56	.34	.96	.57	.34	-	- 12
ality <	M Moderate	.59	.42	.27	.70	.45	.28	.69	.52	.35	.85	.57	.36	1.11	.61	.37	.96	.60	.36	.95	.60	.36	-	- 11
lorm	VM Severe - b	.58	.42	.27	.66	.45	.28	.69	.54	.38	.86	.60	.40	1.04	.63	.39	.92	.62	.40	.93	.62	.40	-	- 10
۷(-u	N Moderate	.59	.41	.27	.68	.44	.28	.74	.53	.35	.92	.59	.37	2.28	.67	.38	1.18	.65	.37	1.16	.65	.38	-	- 9
Ž)	CN Severe -	.56	.42	.27	.67	.45	.28	.82	.65	.43	1.20	.77	.45	22.47	1.07	.47	1.75	.91	.47	1.69	.92	.47	-	- 8
	Normal –	.63	.45	.28	.69	.47	.29	.62	.44	.28	.67	.46	.29	.70	.47	.29	.70	.47	.29	.72	.48	.29	-	- 7
Сори	ıla Moderate - φ	.62	.45	.28	.69	.47	.29	.66	.47	.30	.72	.50	.31	.76	.50	.31	.76	.51	.31	.78	.51	.31		- 6
Co	pula Severe – Jul	.64	.45	.28	.70	.47	.29	.66	.47	.30	.73	.50	.31	.81	.53	.32	.80	.53	.32	.82	.53	.32		- 5
v	M Moderate	.60	.43	.28	.67	.46	.29	.58	.45	.31	.65	.48	.32	.70	.49	.32	.69	.49	.32	.74	.51	.33		- 4
	ں VM Severe – فَ	.57	.43	.27	.63	.45	.28	.54	.44	.31	.60	.46	.31	.63	.47	.32	.62	.47	.31	.69	.49	.32		- 3
С	N Moderate	.61	.45	.28	.69	.48	.29	.77	.58	.37	.89	.63	.38	.93	.65	.39	.94	.65	.39	.98	.67	.40	-	- 2
	CN Severe -	.62	.43	.28	.70	.46	.29	.92	.68	.45	1.13	.77	.47	1.18	.80	.49	1.19	.80	.49	1.23	.83	.50	-	- 1
		100	200	500	100	200	500	100	200	500	100	200	500	100	200	500	100	200	500	100	200	500		
											Sai	nple S	ize											

Note. VM = Vale and Maurelli method; CN = Contaminated Normal; Copula = Multivariate Gumbel Copula; WCI = Waldbased confidence interval; LCI = Likelihood-based confidence interval; R-WCI = Robust wald-based confidence intervals; R-LCI = Robust likelihood-based confidence intervals; BootSE = Bootstrap standard errors; PC = Percentile bootstrap; BC = Bias-corrected bootstrap.

Study 2

Table 10 presents a count of the number of cases that had valid results for overall model fit in each condition - based on either normal theory likelihood (ML), or that with robust corrections (MLM). Table 12 presents overall model rejection rates based only on valid replications.

Figure 3 presents the proportion of cases (rounded to 2 decimal places) under each cell of the design with a valid CI. Figure 4 presents median CI width. Figure 5 presents relative efficiency. Note that the robust likehood-based approach (R-LCI) is used as the benchmark for relative efficiency such that the median width for any given approach in any cell is divided by the median width for R-LCI in the same cell. Thus, values greater than 1 indicate larger intervals and are less efficient than R-LCI. Figure 6 presents the proportion of intervals with widths greater than 1.

Table 10: Number of cases under each condition in Study 2 where overall model estimation succeeded

N	Condition	ML	MLM
75	Normal	1000	1000
125	Normal	1000	1000
300	Normal	1000	1000
1000	Normal	1000	1000
75	VM	1000	1000
125	VM	1000	1000
300	VM	1000	1000
1000	VM	1000	1000
75	CN	1000	1000
125	CN	1000	1000
300	CN	1000	1000
1000	CN	1000	1000
75	NNDP1	1000	999
125	NNDP1	999	999
300	NNDP1	1000	1000
1000	NNDP1	1000	1000
75	NNDP2	1000	1000
125	NNDP2	1000	1000
300	NNDP2	1000	1000
1000	NNDP2	1000	1000

Note. VM = Vale and Maurelli method; CN = Contaminated normal; NNDP1 = Nonnormal with dependency condition 1; NNDP2 = Non-normal with dependency condition 2; ML = Maximum likelihood estimation; MLM = Maximum likelihood estimation with robust corrections.

N	NNType	ML	MLM
75	Normal	0.08	0.09
125	Normal	0.07	0.08
300	Normal	0.06	0.07
1000	Normal	0.05	0.06
75	VM	0.14	0.14
125	VM	0.11	0.10
300	VM	0.13	0.09
1000	VM	0.11	0.07
75	CN	0.81	0.10
125	CN	0.81	0.08
300	CN	0.79	0.07
1000	CN	0.81	0.06
75	NNDP1	0.57	0.11
125	NNDP1	0.61	0.07
300	NNDP1	0.66	0.05
1000	NNDP1	0.81	0.06
75	NNDP2	0.42	0.13
125	NNDP2	0.51	0.11
300	NNDP2	0.51	0.06
1000	NNDP2	0.63	0.05

Table 11: Model rejection rates under each condition in Study 2

Note. VM = Vale and Maurelli method; CN = Contaminated normal; NNDP1 = Nonnormal with dependency condition 1; NNDP2 = Non-normal with dependency condition 2; ML = Maximum likelihood estimation; MLM = Maximum likelihood estimation with robust corrections.

									Propor	tion of	Valid	95% CI	s										
	0.900	0.905	0.910	0.915	5 0.920	0.925	0.930	0.935	0.940	0.945	0.950	0.955	0.960	0.965	0.970	0.97	5 0.	980	0.98	5 0.9	3 90	0.995	
																						_	
			<u> </u>																_				
		1 00 1	Delta	1 00	1 00 1 0			R-D	elta	1 00	R-LC		1 00 4	BootSE	0 1 00	1 00		;	1 00	1 00	BC	0010	
	Normal - 6	1.001.	001.00	1.00	1.001.0			01.00	1.001.0		1.001	.00 1.00	1.001		01.00	1.00	1.001	1.00	1.00	1.00	1.001	.001.0	
]e	1.001.	001.00	1.00	1.00 1.0			01.00	1 00 1 0		1.001	.00 1.00	1.00		01.00	1.00	1.001		1.00	1.00	1.001	.001.0	μ
		1 00 1	001.00	1 00	1 00 1 0			0 1 00	1 00 1 0		1 00 1	00 1 00	1.001	1.001.0	01.00	1.00	1.001	1.00	1.00	1.00	1 00 1	001.0	
	NNDP2 -	1.00 1.	00 1.00	1.00	1.00 1.0	0 1.00 1.0	0 1.0	0 1.00	1.00 1.0	1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	00.1	1.00	1.00	1.00 1	.00 1.0	ĵõ⊦
	Normal -	1.001.	001.00	1.00	1.00 1.0	01.001.0	0 1.0	01.00	1.00 1.0	0 1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	1.00	1.00	1.00	1.001	.00 1.0	00
	VM - O	1.001.	001.00	1.00	1.00 1.0	01.001.0	0 1.0	01.00	1.00 1.0	0 1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	00.1	1.00	1.00	1.001	.00 1.0	50 -
		1.001.	00 1.00	1.00	1.00 1.0	0 1.00 1.0	0 1.0	01.00	1.00 1.0	0 1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	1.00 [·]	1.00	1.00	1.001	.00 1.0)0 -
	NNDP1 E	1.001.	00 1.00	1.00	1.00 1.0	01.001.0	0 1.0	01.00	1.001.0	1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.00	00.1	1.00	1.00	1.001	.00 1.0)0 -
	NNDP2 - 2	1.001.	001.00	1.00	1.00 1.0	01.001.0	0 1.0	01.00	1.00 1.0	<u>1.00 1.00 </u>	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	00.1	1.00	1.00	1.001	.00 1.0	00
	Normal - 99	1.001.	001.00	1.00	1.00 1.0	01.001.0	0 1.0	01.00	1.00 1.0	0 1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	00.1	1.00	1.00	1.001	.00 1.0	20 -
	VM - •	1.001.	001.00	1.00	1.001.0	01.001.0		01.00	1.001.0	1.00	1.001	.00 1.00	1.001	1.001.0	01.00	1.00	1.001	1.00	1.00	1.00	1.001	.001.0	
		1.001.	001.00	1.00	1.00 1.0			0 1.00	1 00 1 0		1.001	.00 1.00	1.00	1.001.0	01.00	1.00	1.001		1.00	1.00	1.001	.001.0	μ
	NNDP2 - 9	1 00 1	00 1 00	1 00	1 00 1 0	010010		0 1 00	1 00 1 0	1 00	1 00 1	00 1 00	1.001	0010	01.00	1.00	1 00 1	00	1 00	1.00	1 00 1	0010	
E	Normal - 🙃	1 00 1	00 1 00	1 00	1 00 1 0	010010	0 10	0 1 00	1 00 1 0	1 1 00	1 00 1	00 1 00	1 00 1	0010	0 1 00	1 00	1 00 1	00	1 00	1 00	1 00 1	0010	0
litic	VM - 0	1.001.	00 1.00	1.00	1.00 1.0	01.001.0	0 1.0	01.00	1.00 1.0	1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	1.00	1.00	1.00	1.001	.00 1.0	ĵõ⊦
buo	CN - G	1.001.	001.00	1.00	1.00 1.0	01.001.0	0 1.0	01.00	1.00 1.0	1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	00.1	1.00	1.00	1.001	.00 1.0	00
õ	NNDP1 - E	1.001.	00 1.00	1.00	1.00 1.0	01.001.0	0 1.0	01.00	1.001.0	0 1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	00.1	1.00	1.00	1.001	.00 1.0)0 -
lity	NNDP2 - P	1.001.	00 1.00	1.00	1.00 1.0	01.001.0	0 1.0	01.00	1.00 1.0	0 1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	00.1	1.00	1.00	1.001	.00 1.0	00
Ĕ	Normal - (r	1.001.	001.00	1.00	1.00 1.0	01.001.0	0 1.0	01.00	1.001.0	0 1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	00.1	1.00	1.00	1.001	.00 1.0)0 -
Ñ	v™ †e	1.001.	001.00	1.00	1.001.0	01.001.0	0 1.0	01.00	1.001.0	1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	00.1	1.00	1.00	1.001	.001.0	20 -
-		1.001.	00 1.00	1.00	1.00 1.0			0 1.00	1.001.00		1.001	.00 1.00	1.00		01.00	1.00	1.00		1.00	1.00	1.001	.00 1.0	
۶.	NNDP2 - P	1 00 1	001.00	1 00	1 00 1 0	010010		0 1 00	1 00 1 0		1 00 1	00 1 00	1.001	0010	01.00	1.00	1 00 1		1 00	1.00	1 00 1	0010	
\smile	Normal - 00	1.001	00 1 00	1.00	1 00 1 0	010010	10 10	0 1 00	1 00 1 0	1.00	1 00 1	00 1 00	1.001	1 00 1 0	01.00	1.00	1.001		1.00	1.00	1 00 1	0010	
	VM -0	1 00 1	00 1 00	1.00	1 00 1 0	010010	0 1.0	01.00	1 00 1 0	1.00	1.001	00 1 00	1.001	0010	01.00	1.00	1.001	00.1	1.00	1.00	1.001	0010	ñŏ –
		1.001.	00 1.00	1.00	1.00 1.0	01.001.0	0 1.0	01.00	1.00 1.0	5 1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	i.00 '	1.00	1.00	1.001	.00 1.0	50 -
	NNDP1 - E	1.001.	00 1.00	1.00	1.00 1.0	0 1.00 1.0	0 1.0	01.00	1.00 1.0	1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	.00 ⁻	1.00	1.00	1.001	.00 1.0)0 -
	NNDP2 - <u>a</u>	1.001.	00 1.00	1.00	1.00 1.0	01.001.0	0 1.0	01.00	1.00 1.0	0 1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	00.1	1.00	1.00	1.001	.00 1.0	00
	Normal - 8	1.001.	001.00	1.00	1.00 1.0	01.001.0	0 1.0	01.00	1.001.0	0 1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	00.1	1.00	1.00	1.001	.00 1.0	00
	VM - o	1.001.	001.00	1.00	1.00 1.0	01.001.0	0 1.0	01.00	1.00 1.0	0 1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	00.1	1.00	1.00	1.001	.00 1.0	20 -
		1.001.	001.00	1.00	1.001.0	01.001.0	10 1.0	01.00	1.001.0	1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	1.00	1.00	1.00	1.001	.001.0	
		1.001.	00 1 00	1.00	1 00 1 0			0 1 00	1 00 1 0		1.001	.00 1.00	1.00		01.00	1.00	1.001		1.00	1.00	1 00 1	.001.0	50 E
		1.001	00 1.00	1.00	1.00 1.0			0 1.00	1.00 1.0	$\frac{1.00}{1.00}$	1.001	00 1.00	1.00	1.00 1.0	01.00	1.00	1.001	1.00	1.00	1.00	1.001	001.0	50
		1 00 1	001.00	1 00	1 00 1 0	01.001.0		01.00	1 00 1 0		1 00 1	00 1 00	1 00 1		01.00	1 00	1 00 1		1 00	1.00	1 00 1	0010	
		1.001	00 1.00	1.00	1.001.0	01.001.0	010	01.00	1.00 1.0	5 1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	1.00	1.00	1.00	1.001	.00 1.0	5ŏ
		1.001.	00 1.00	1.00	1.00 1.0	0 1.00 1.0	0 1.0	01.00	1.00 1.0	1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	1.00	1.00	1.00	1.001	.00 1.0	bŏ⊦
	NNDP2 - <u>P</u>	1.001.	001.00	1.00	1.00 1.0	01.001.0	0 1.0	01.00	1.00 1.0	0 1.00	1.001	.00 1.00	1.001	1.00 1.0	01.00	1.00	1.001	00.1	1.00	1.00	1.001	.00 1.0)0년
		75 1	25 300	1000	75 12	5 300 100		125	300 1000) 75	125	300 1000	75	125 300	1000	75	125	300	1000	75	125	300 10	0
		75 1	20 000		.0 120			120	550 1000		- <u></u>	0:		.25 500	. 1000	10	.20	200		, 0	.20	555 100	
											sample	Size											

Figure 3: Proportion of valid confidence intervals, Study 2

													Medi	an 95	% CI	wid	th												
		0.2	0.4	0.	6 O.	8 1	.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	1 2	.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.	2 4	.4 4	1.6	4.8	5.0
	Γ		Del	lta			L	ci 🖢	_		R-D	elta			R-L	_CI			Boot	ISE			PC	;	-		ВС		
	Normal – 🜀	.28	.22	.14	.08	.29	.22	.14	.08	.27	.21	.14	.08	.28	.22	.14	.08	.30	.22	.14	.08	.30	.23	.14	.08	.30	.23	.14 .	.08
		.28	.22	.14	.08	.28	.22	.14	.08	.26	.21	.15	.08	.27	.21	.15	.08	.29	.22	.15	.08	.29	.22	.15	.08	.30	.23	.15 .	.08
ı		.20	.22	.14	.08	.29	.22	.14	.08	.36	.29	.20	.14	.37	.30	.20	.14	.40	.35	.23	.14	.45	.33	.23	.14	.40	.34	.23	.12
1	NNDP2 - <u>-</u>	.25	.20	.14	.08	.26	.20	.14	.08	.27	.23	.18	.11	.28	.24	.18	.11	.32	.26	.18	.11	.32	.26	.18	.11	.32	.26	.18 .	.11
	Normal - S	.44	.34	.22	.12	.43	.34	.22	.12	.42	.33	.22	.12	.41	.32	.22	.12	.45	.34	.22	.12	.45	.34	.22	.12	.45	.34	.22 .	.12
		.43	.33	.22	.12	.43	.33	.22	.12	.36	.29	.19	.11	.36	.29	.19	.11	.39	.30	.20	.11	.39	.30	.20	.11	.39	.30	.20 .	.11
I		.43	.33	.22	.12	.43	.33	.22	.12	.50	.40	.29	.18	.50	.40	.29	.18	.57	.44	.30	.18	.57	.44	.30	.18	.58	.44	.30	.18
1	NNDP2 - 1	.41	.32	.21	.12	.41	.32	.21	.12	.41	.34	.24	.15	.41	.34	.24	.15	.47	.37	.25	.15	.47	.37	.25	.15	.48	.37	.25 .	.15
	Normal - 9	.30	.23	.15	.08	.30	.24	.15	.08	.29	.23	.15	.08	.29	.23	.15	.08	.32	.24	.15	.08	.32	.24	.15	.08	.32	.24	.15 .	.08
		.29	.23	.15	.08	.30	.23	.15	.08	.23	.10	.12	.12	.23	.10	.12	.12	.25	.19	.12	.12	.25	.35	.13	.12	.23	.35	.22	.12
1		.29	.23	.15	.08	.30	.24	.15	.08	.38	.32	.23	.14	.39	.33	.23	.14	.47	.36	.24	.14	.47	.35	.24	.14	.48	.36	.24	.14
- 1		.27	.21	.14	.08	.27	.22	.14	.08	.28	.25	.17	.11	.29	.25	.18	.11	.34	.27	.18	.11	.33	.27	.18	.11	.34	.27	.18 .	.11
itior	Normal – 60	.21	.16	.11	.06	.22	.17	.11	.06	.20	.16	.11	.06	.21	.16	.11	.06	.24	.17	.11	.06	.24	.17	.11	.06	.24	.18	.11 .	.06
puq		.20	.16	.10	.06	.22	.17	Ξii	.06	.26	.21	.15	.00	.29	.22	.15	.09	.37	.26	.16	.09	.37	.26	.16	.00	.37	.26	.16	.09
Ŭ	NNDP1 - E	.21	.16	.11	.06	.22	.17	.11	.06	.26	.22	.16	.10	.29	.24	.17	.10	.38	.27	.17	.10	.37	.27	.17	.10	.38	.28	.17 .	.10
alit		.18	.15	.10	.06	.19	.15	.10	.06	.19	.17	.13	.08	.21	.18	.13	.08	.25	.19	.14	.08	.24	.19	.14	.08	.25	.19	.14 .	.08
orm		.41	.31	.20	.11	.41	.32	.20		.39	.31	.20	.12	.39	.31	.20	.12	.42	.32	.21	.12	.42	.32	21	.12	.42	.32	.21	12
N(-	CN - 4	.40	.31	.20	.11	.41	.31	.20	.11	.52	.42	.29	.16	.53	.42	.29	.16	.60	.45	.30	.16	.60	.45	.30	.17	.60	.46	.30	.17
Non		.40	.31	.20	.11	.41	.32	.21	.11	.48	.40	.28	.17	.48	.40	.28	.17	.56	.43	.29	.17	.56	.43	.29	.17	.56	.44	.29 .	.17
-	Normal - 0	.30	23	.20	.11	.39	23	.20	08	.30	.32	.23	08	.30	.32	.23	08	.43	.35	15	.14	.43	.35	15	.14	.44	.35	.24 .	08
	VM - 0	.29	.22	.15	.08	.29	.23	.15	.08	.21	.18	.12	.07	.22	.18	.12	.07	.24	.19	.12	.07	.24	.19	12	.07	.24	.19	.12	.07
		.29	.22	.15	.08	.30	.23	.15	.08	.37	.30	.21	.12	.38	.31	.21	.12	.46	.34	.21	.12	.46	.34	.21	.12	.47	.34	.22 .	.12
1	NNDP1 TE	.29	.23	.15	.08	.30	.23	.15	.08	.37	.31	.22	.14	.38	.31	.23	.14	.46	.35	.23	.14	.46	.34	19	.14	.47	.35	.23	.14
	Normal - 🔞	.45	.35	.23	.12	.45	.35	.23	.12	.43	.34	.23	.12	.43	.34	.23	.12	.46	.35	.23	.12	.46	.35	.23	.12	.46	.36	.23	.13
	VM - o	.45	.35	.23	.12	.45	.35	.23	.12	.38	.31	.21	.12	.38	.31	.21	.12	.41	.32	.21	.12	.41	.33	.21	.12	.42	.33	.21 .	.12
		.45	.35	.23	.12	.46	.35	.23	.13	.58	.47	.32	.18	.58	.46	.32	.18	.66	.50	.33	.18	.66	.50	.33	.18	.66	.50	.33 .	.18
,		.43	.33	.23	.12	.40	.33	.23	.12	.43	.42	.25	.15	.43	.42	.25	.15	.00	.38	.26	.15	.50	.39	.26	.15	.50	.40	.26	.15
	Normal - 🖳	.37	.29	.19	.10	.37	.29	.19	.10	.36	.28	.18	.10	.36	.28	.18	.10	.38	.29	.19	.10	.38	.29	.19	.10	.39	.29	.19	.10
		.37	.29	.19	.10	.37	.29	.19	.10	.35	.28	.19	.11	.35	.28	.19	.11	.38	.30	.19	.11	.38	.30	.19	.11	.38	.30	.20 .	.11
I		.37	.29	.19	.10	.37	.29	.19	.10	.48	.38	.26	.15	.48	.39	.26	.15	.56	.42	.27	.15	.55	.42	27	.15	.56	.43	.27	16
, I	NNDP2 - 5	.34	.27	.18	.10	.35	.27	.18	.10	.35	.29	.21	.13	.35	.30	.21	.13	.40	.32	.22	.14	.40	.32	.22	.14	.41	.32	.22	.14
		75	125	300	1000	75	125	300	1000	75	125	300	1000	75	125	300	1000	75	125	300	1000	75	125	300	1000	75	125	300 1	1000

Figure 4: Median interval width for confidence intervals, Study 2

									Rel	ative B	Efficie	ency											
	0.0	0.5		1.0	1.5	2.0		2.5	3.0	1	3.5	4.	0	4.5	5.	0	5.5		6.0		6.5		7.0
		1		_																			
			1					1	1 1		1	1 1		1		1				1	1		
		D	elta		LC			R-De	elta		R-L(CI		BootS	Ē		PC				BC		
N	lormal – ဂြွ	1.02 1.02	21.011	.00	1.04 1.03	1.01 1.00	.99 .	99 '	1.001.00	1.00	1.001	.00 1.00	1.08	1.041.	021.00	1.08	1.051	.021.0	1 1	.101	.051.	.021.0	1-
	VM -0	1.04 1.02	2.96.	.94	1.07 1.03	.97 .94	.98 .	99	.99 1.00	1.00	1.001	.00 1.00	1.10	1.05 1.	01 1.00	1.10	1.051	.01 1.0	1 1	.121	.061.	.02 1.0	1-
	CN - 0	.75 .72	.69 .	.69	.77 .74	.70 .69	.95 .	97	.99 1.00	1.00	1.001	.00 1.00	1.23	1.11 1.	03 1.01	1.21	1.101	.04 1.0	1 1	.23 1	.121.	.04 1.0	1 -
N	NDP1 - E	.74 .70	.63 .	.57	.76 .71	.64 .57	.96 .	97	.99 1.00	1.00	1.001	.00 1.00	1.22	1.111.	031.00	1.19	1.101	.02 1.0	0 1	.211	.121.	031.0	1
N	NDP2 - H	.89 .85	.76 .	.68	.92 .87	.77 .68	.97 .	98	.99 1.00	1.00	1.001	.00 1.00	1.13	1.091.	031.01	1.13	1.091	.03 1.0	1 2	.151	.091.	.02 1.0	0
N	lormal – မြို	1.05 1.04	1.021	.00	1.05 1.04	1.02 1.00	1.011	.00	1.00 1.00	1.00	1.001	.00 1.00	1.08	<mark>1.04</mark> 1.	021.00	1.08	1.04 1	.02 1.0	1 1	.08 1	.051.	.02 1.0	1는
	VM - o	1.20 1.17	1.131	.10	1.191.17	1.131.10	1.001	.00	1.00 1.00	1.00	1.001	.00 1.00	1.08	1.051.	021.00	1.09	1.051	.02 1.0	1 1	.091	.051.	021.0	1
		.78 .75	.71 .	.69	.79 .76	.71 .69	1.011	.00 -	1.00 1.00	1.00	1.001	.00 1.00	1.15	1.081.	031.01	1.15	1.081	.04 1.0	1 1	.161	.081.	04 1.0	21
N		.86 .83	./6 .	68	.86 .84	./6 .68	1.001	.00	1.001.00	1.00	1.001	.001.00	1.15	1.101.	04 1.01	1.14	1.101	.05 1.0		.161	.111.	051.0	11
IN		1.01 .96	.89 .	.81	1.01 .96	.89 .81	1.001	.00	1.00 1.00	1.00	1.00	.00 1.00	1.14	1.091.	04 1.01	1.15	1.091	.05 1.0	12 1	.161	.101.	051.0	2
N	lormal - 99	1.021.01	1.011	.00	1.04 1.02	1.01 1.00	.99 .	99 -	1.001.00	1.00	1.001	.00 1.00	1.08	1.04 1.	011.00	1.09	1.04 1	.021.0	1 1	.101	.04 1.	.021.0	11
	VM 19	1.30 1.26	70	.18	1.33 1.28	1.23 1.18	.99 .	99	1.00 1.00	1.00	1.001	.001.00	1.10	1.051.	021.00	1.11	1.051	.021.0		.111	.051.	021.0	10
N		./0 ./2	.70 .	50	.79 .74	.70 .68	.96 .	98	.99 1.00	1.00	1.001		1.23	1.091.	03 1.01	1.22	1.091	.031.0		21 1	101	031.0	łΕ
N		91 85	.05 .	71	94 86	82 71	.97 .	97	QQ 1 00	1.00	1.001		1.20	1.091.	03 1.00	1 15	1.001	0510		171	.101.	051.0	ΥĽ
		.31 .03	.02 .	00	1 04 1 00	1 01 1 00	.57 .	07	00 1 00	1.00	1.001		1.10	1.001.	00 1.00	1.10	1.06.1	0210		1/1	.031.	0210	0
ĭio⊓		1 07 1 05	.99 1	97	1 1 4 1 00	1.01 1.00	.94 .	97 07	00 1 00	1.00	1.001		1.13	1.061	021.00	1.13	1.001	.03 1.0		131	.00 1.	0210	ĭΕ
pu		71 71	68	68	77 74	70 68	.30 .	94	98 99	1.00	1 00 1		1 30	1 15 1	04 1 01	1 28	1.031	0410		291	171	05 1 0	2
δN		72 68	64	59	77 72	66 59	.03 .	94	97 99	1 00	1 00 1		1.31	1 14 1	03100	1 28	1 13 1	0310		311	151	04 1 0	ō-
.≩ N	NDP2 -	.85 .82	.74	66	.91 .86	.76 .67	.92	94	.97 .99	1.00	1.001	.00 1.00	1.19	1.08 1	02 .99	1.17	1.07 1	.03 1.0	0 1	.201	.091.	.02 .99	ĭ⊢
nal v		1 04 1 02	21 01 1	00	1 05 1 03	1 01 1 00	1 00 1	00 -	1 00 1 00	1 00	1 00 1	00 1 00	1.07	1 04 1	02101	1.07	1 04 1	0210	1 1	081	051	0210	1
orn	VM - 4	1.031.02	.98	94	1.03 1.02	.98 .94	1.001	.00.	1.00 1.00	1.00	1.001	.00 1.00	1.07	1.04 1	01 1.01	1.07	1.04 1	.011.0	i li	.07 1	.05 1	021.0	i-
Ž.		.76 .74	.70	69	.77 .75	.71 .69	1.001	.00	1.00 1.00	1.00	1.001	.00 1.00	1.15	1.08 1	03 1.01	1.13	1.08 1	.04 1.0	i i	.151	.091.	.04 1.0	2-
έN		.83 .79	.73 .	66	.84 .79	.73 .66	1.001	.00	1.001.00	1.00	1.001	.00 1.00	1.16	1.081.	021.01	1.15	1.08 1	.03 1.0	1 1	.161	.101.	031.0	1
ΖN	NDP2 - 💾	1.01 .94	.85 .	.80	1.01 .94	.86 .80	1.001	.00	1.00 1.00	1.00	1.001	.00 1.00	1.13	1.091.	031.02	1.13	1.091	.03 1.0	2 1	.161	.101.	.03 1.0	2
N	lormal - 😥	1.01 1.02	21.011	.00	1.04 1.03	1.01 1.00	.99 .	99	.99 1.00	1.00	1.001	.00 1.00	1.08	1.05 1.	021.00	1.09	1.051	.02 1.0	0 1	.101	.061.	031.0	0-
	VM - o	1.32 1.26	51.221	.17	1.35 1.28	1.23 1.17	.99 .	99	.99 1.00	1.00	1.001	.00 1.00	1.11	1.05 1.	02 1.00	1.11	1.061	.02 1.0	1 1	.121	.061.	.02 1.0	1
		.74 .72	.70 .	.69	.77 .73	.71 .69	.96 .	98	.99 1.00	1.00	1.001	.00 1.00	1.21	1.101.	03 1.01	1.20	1.101	.03 1.0	1 1	.211	.111.	.04 1.0	1는
N	NDP1 E	.75 .74	.65 .	.60	.78 .75	.66 .60	.97 .	99	.99 1.00	1.00	1.001	.00 1.00	1.21	1.111.	021.00	1.19	1.091	.02 1.0	1	.221	.111.	.031.0	11
N	NDP2 - 1	.91 .85	.77 .	.68	.93 .86	.78 .68	.97 .	98	.99 1.00	1.00	1.001	.00 1.00	1.14	1.091.	04 1.00	1.14	1.091	.04 1.0	1 1	.171	.091.	04 1.0	
N	lormal - 8	1.06 1.03	31.011	.00	1.06 1.03	1.01 1.00	1.011	.01	1.00 1.00	1.00	1.001	.00 1.00	1.07	1.04 1.	021.00	1.07	1.041	.01 1.0	0 1	.081	.041.	.01 1.0	11
		1.191.13	31.101	.08	1.181.13	1.101.08	1.001	.00	1.001.00	1.00	1.001	.00 1.00	1.08	1.04 1.	011.00	1.09	1.051	.01 1.0		.091	.051.	.021.0	11
		.79 .76	./1 .	.68	./9 ./6	./1 .68	1.011	.01	1.001.00	1.00	1.001	.001.00	1.15	1.091.	031.01	1.14	1.081	.04 1.0		.151	.081.	041.0	11
IN N		.00 .04	.// .	02	1 02 07	.// ./	1.011	.01		1.00	1.00 1		1.10	1.091.	04 1.01	1.10	1.091	.04 1.0	2 1	161	101.	04 1.0	ΪE
IN N		1.03 .90	.91.	00	1.02 .97	1 01 1 00	1.001	.01	1.00 1.00	1.00	1.001		1.13	1.001.	04 1.02	1.10	1.051	00 1 0		00 1	05 1	001.0	4
N		1.031.03	07	.00	1.04 1.03	07 02	1.001	.00		1.00	1.001		1.07	1.041.	011.00	1.07		.021.0		.08 1	.05 1.	021.0	łΕ
		76 74	.97 .	60	78 75	71 69	1.00 I aa	.00 aa ·	1 00 1 00	1.00	1.001		1.00	1.041.	03 1 00	1 15	1.041	021.0		171	101	0410	łΕ
N		79 77	.70 .	65	81 78	71 65	.98	99 -	1 00 1 00	1 00	1 00 1		1 16	1 09 1	04 1 01	1 14	1 09 1	0410		151	101	0410	iL
N	NDP2 -	.99 .92	.84	74	1.00 .93	.84 .74	.99	99 ·	1.00 1.00	1.00	1.001	.00 1.00	1.15	1.08 1	04 1.01	1.16	1.091	.05 1.0	2 1	161	.091	.04 1.0	i-
					1 1			T			1			1			1	TT	- 1 •	T	T	TT	-
		75 125	300 1	000	/5 125	300 1000	75	125	300 1000	75	125	300 1000	75	125 3	00 1000	75	125	300 100	0	/5 1	125 3	.00 1000	IJ
										S	Sample	Size											

Figure 5: Relative efficiency of median confidence intervals, Study 2

		0	00	0.04	0.06		. 10	0.10	0.14	0.16	Pro	porti	on o	f 95%	Cls	with	widt	h > 1	0.22		24 0	26 0	20	0.40	0.42	0.44	0.46	0.4	
			.02	0.04	0.08	1.08	.10	0.12	0.14	0.10	0.10	0.2	20 0	.22 0	1	0.20	0.20	0.30	0.32	. 0.2	04 U.	36 U.	.30	1	0.42	0.44	0.46	0.40	5 0.5
												- 14 -					1		 D	-						ı			
	Normal -	<u>ି</u> .0	00.00	Deita	0.000	.000	.000	.000	.000	.000	.000	eita .000	.000	.000	.000	.000	.000	.000	.000	1 <u>5E</u> .000	.000	.000	ч .000.	.000	.000	.000	.000	.000	.000
	VM -	0.0	00.00	00.00	0.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000
	NNDP1 -	0.). 00 0. 00	00.00C	0.000 0.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.016	.000	.000	.000	.006	.000	.000	.000	.006	.010	.000 . .002	000
	NNDP2 -	0. <u>Ē</u>	00.00	00.00	0.000	.000	.000	.000	.000	.004	.000	.001	.000	.005	.000	.001	.000	.006	.000	.001	.000	.003	.000	.001	.000	.009	.000	.001	.000
	Normal - VM -	0. [32	00.00	00.000 00.000		000.	.000	.000	.000	000.	.000	.000	.000	.000	.000	000.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000 .	000
	CN -	0.5	00.00	00.00	0.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.000	.000	.000	.014	.000	.000	.000	.008	.000	.000	.000	.010	.000	.000	000
	NNDP1 -	0.13	00.00	00.00		000.	.000	.000	.000	.018	.001	.001	.000	.012	.001	.002	.000	.046	.009	.002	.000	.036	.007	.001	.000	.039	.008	.001	000
	Normal -	0.0	00.00	00.00	0.000	.000	.000	.000	.000	.000	.000	.000	.000	.009	.000	.000	.000	.023	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000 -
	VM -	0.0	00.00	00.00	0.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	CN - NNDP1 -	0.0	00.0	00.00 00.00	0.000	000	.000	.000	.000	.002	.000	.000	.000	.002	.000	.000	000	.015	.001	.000	.000	.007	.000	.000	.000	.006	.000	.000.	000
	NNDP2 -	0. <u>te</u>	00.00	00.00	0.000	.000	.000	.000	.000	.005	.004	.000	.000	.007	.004	.000	.000	.012	.008	.000	.000	.006	.008	.000	.000	.012	.008	.001	.000
tion	Normal -	0. [8]	00.00	00.000	0.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000
pudi	CN -	0. 0 0. 0	00.00	00.00 00.00	0.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000 .	000
Ŭ	NNDP1 -	0. g	02.0	00.00	0.000	.001	.000	.000	.000	.006	.000	.000	.000	.004	.000	.001	.000	.054	.007	.001	.000	.017	.001	.001	.000	.023	.001	.001	000
nalit	Normal -	0 10		100.00	0.000	000	000	000	000	000	000	000	000	000	000	000	000	000	0002	000	000	000	000	000	000	000	000	000.	000
Vorn	VM -	0.0	00.00	00.00	0.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000
(-u	CN -		00.00	00.000 00.000		000.	.000	.000	.000	.002	.000	.000	.000	.001	.000	.000	.000	.014	.000	.000	.000	.007	.000	.000	.000	.007	.000	.000.	000
۶ Ľ	NNDP2 -	0. <u>ਵ</u>	00.00	00.000	0.000	.000	.000	.000	.000	.006	.004	.001	.000	.005	.004	.000	.000	.015	.005	.001	.000	.012	.006	.001	.000	.011	.007	.001	.000
	Normal -	0. [8]	00.00	00.00	0.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000
	CN -	일.0). 00 0. 00	00.00 00.00	0.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000. .000	.000
	NNDP1 -	E.0	00.00	00.00	0.000	.001	.000	.000	.000	.006	.004	.000	.000	.008	.004	.000	.000	.035	.008	.001	.001	.021	.008	.000	.000	.029	.009	.000	000
	NNDP2 -		00.0	<u>100.00</u>	0.000	000	000	000	.000	.004	.004	000	.000	.004	0002	000	.000	.009	.004	000	.000	.009	003	000	000	.011	005	000.	000
	VM -	0. 0	00.00	00.00	0.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000 .	000
	CN -	0.15	00.00	00.000	0.000	.000	.000	.000	.000	.008	.000	.000	.000	.002	.000	.000	.000	.026	.000	.000	.000	.014	.000	.000	.000	.015	.000	.000	000
	NNDP2 -	0. g	00.00	00.00 00.00	0.000	.000	.000	.000	.000	.020	.005	.000	.000	.010	.002	.000	.000	.044	.010	.004	.000	.032	.005	.000	.000	.022	.007	.000	000
	Normal -	0. 25	00.00	00.00	0.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	VM - CN -	0.0	00.00 0 00	00.00 00.00	00.000	000.	.000	.000	.000	.000	.000	.000	.000	.000	000.	000	000.	.000	.000	.000	.000	.000	000.	.000	000	.000	.000	.000.	000
	NNDP1 -		00.00	00.000	0.000	.000	.000	.000	.000	.009	.002	.003	.000	.006	.001	.002	.000	.035	.006	.003	.000	.025	.002	.002	.000	.023	.007	.002	000
	NNDP2 -	-(븨).0	00.00	00.00	0.000	1.000	.000	.000	.000	.006	.003	.000	.000	.006	.001	.000	.000	.013	.004	.000	.000	.010	.002	.000	.000	.012	.002	.000 /	000
		7	5	125 30	0 1000	75	125	300	1000	75	125	300	1000	75	125	300	1000	75	125	300	1000	75	125	300	1000	75	125	300	1000
														5	Sample	e Size)												

Figure 6: Proportion of confidence intervals with widths > 1, Study 2

Study 3

Note that there were no overall model estimation problems in Study 3. Overall model rejection rates in Table 12 are collapsed across across indirect effect path combinations. Operationalized in the same way as in Study 1, we also present median interval width (Figures 7 and 8), relative efficiency (Figures 9 and 10), and the proportion of cases with outlying interval widths (Figures 11 and 12) for each cell of the design.

Table 12: Model rejection rates under each data generation condition in Study 3

Ν	Condition	ML	MLM
100	Normal	0.09	0.12
200	Normal	0.07	0.08
500	Normal	0.05	0.06
100	VM	0.42	0.15
200	VM	0.47	0.10
500	VM	0.55	0.07
100	CN	0.99	0.14
200	CN	0.99	0.08
500	CN	0.99	0.06
100	Copula	0.67	0.12
200	Copula	0.67	0.08
500	Copula	0.67	0.06
100	Likert (4-cat)	0.14	0.12
200	Likert (4-cat)	0.11	0.08
500	Likert (4-cat)	0.09	0.06
100	Likert (6-cat)	0.13	0.12
200	Likert (6-cat)	0.10	0.08
500	Likert (6-cat)	0.09	0.06

Note. VM = Vale and Maurelli method; CN = Contaminated normal; Copula = Multivariate Gumbel Copula; Likert (4-cat) = descretized data into 4 categories; Likert (6-cat) = descretized data into 6 categories; ML = Maximum likelihood estimation using the normal theory chi-square test of overall fit; MLM = Maximum likelihood estimation with robust corrections, using a scaled chi-square test of overall fit.

				100							200							500				ור		1.00
Normal -	.12	.16	.15	.27	.23	.47	.32	.05	.09	.09	.17	.15	.29	.21	.02	.05	.05	.10	.09	.18	.13			
Copula –	.16	.22	.21	.34	.29	.58	.39	.08	.12	.11	.21	.18	.36	.25	.03	.06	.06	.12	.10	.22	.15	-	-	0.95
∨м –	11. ن	.18	.16	.31	.24	.53	.34	.05	.09	.09	.17	.15	.31	.21	.02	.05	.05	.10	.09	.18	.13	-		
CN -	^m .25	.30	.29	.46	.40	.76	.52	.12	.16	.16	.27	.23	.46	.33	.04	.08	.08	.15	.13	.27	.19	-		n 9n
Likert (4-cat)	.14	.19	.17	.30	.26	.54	.36	.06	.10	.10	.18	.16	.32	.23	.02	.05	.05	.10	.09	.19	.13	-		0.50
Likert (6-cat)	.13	.17	.17	.29	.25	.51	.34	.06	.09	.09	.18	.15	.31	.22	.02	.05	.05	.10	.09	.18	.13			
Normal -	.11	.15	.14	.27	.23	.46	.32	.05	.09	.08	.16	.15	.29	.21	.02	.05	.05	.10	.09	.18	.13	-	-	0.85
Copula -	.15	.21	.19	.34	.28	.58	.39	.07	.11	.11	.21	.18	.36	.26	.03	.06	.06	.12	.10	.22	.15	-		
VM -	ပ္ဆ .10	.16	.15	.29	.24	.52	.34	.05	.09	.09	.17	.15	.30	.21	.02	.05	.05	.10	.09	.18	.13	-	-	0.80
CN -	.23	.28	.27	.43	.38	.73	.51	.11	.16	.15	.27	.23	.46	.33	.04	.08	.07	.15	.13	.27	.19	-		
Likert (4-cat)	.13	.17	.16	.29	.25	.53	.35	.06	.09	.09	.18	.16	.32	.23	.02	.05	.05	.10	.09	.19	.13			0.75
Likert (6-cat)	.12	.16	.16	.28	.24	.50	.34	.05	.09	.09	.18	.15	.31	.22	.02	.05	.05	.10	.09	.18	.13	-		0.75
Normal -	.10	.14	.13	.25	.22	.43	.30	.05	.09	.08	.16	.14	.28	.21	.02	.05	.05	.10	.09	.18	.13	-		
Copula -	.14	.18	.17	.30	.26	.51	.35	.07	.11	.10	.20	.17	.35	.24	.03	.06	.06	.12	.10	.22	.15	-	-	0.70
	.09	.14	.13	.20	.21	.43	.30	.05	.00	.00	.10	.14	.20	.20	.02	.05	.05	.10	.09	.10	.12	Ľ		
Likert (4-cat)	11	.24	.24	26	.00	.01	.40	.10	.15	.14	.25	.22	30	.01	.04	.00	.07	10	.13	.20	13		-	0.65
Likert (6-cat)	11	15	15	26	.20	45	.00	.00	.03	.03	17	15	30	.22	.02	.05	.05	10	.03	18	13			
Normal -		13	12	.20	20	.40	28	.00	.00	.00	16	1/	.00	20	.02	.00	.00	10	.00	17	13			0.60
Copula -	.09	17	16	.23	.20	.40	.20	.05	10	.00	10	.14	.21	.20	.02	.05	.05	.10	.00	.17	15			0.60
		13	13	.20	20	40	29	.00	08	.10	15	14	27	20	.03	.00	.05	10	.10	17	12			
E CN -	2 18	21	21	34	30	.40	41	10	14	13	23	21	40	30	.02	07	.00	14	13	25	19	_	-	0.55
.O Likert (4-cat)	.10	.14	.13	.23	.22	.41	.31	.05	.08	.08	.16	.14	.29	.21	.02	.05	.05	.10	.09	.18	.13	-		
Eikert (6-cat)	.10	.13	.14	.23	.21	.41	.30	.05	.08	.08	.16	.14	.28	.21	.02	.05	.05	.10	.09	.18	.13	-	_	0.50
S Normal	.06	.11	.10	.21	.19	.38	.27	.03	.07	.07	.15	.13	.27	.20	.01	.04	.04	.09	.08	.17	.13	1		
E Copula −	.09	.14	.13	.26	.22	.45	.32	.04	.09	.09	.18	.16	.32	.23	.02	.05	.05	.11	.10	.21	.15	-		
- MA al	00. lef	.11	.10	.22	.18	.38	.28	.03	.07	.07	.15	.13	.26	.19	.01	.04	.04	.09	.08	.17	.12	-		0.45
CN -	.13	.17	.17	.31	.27	.51	.39	.07	.12	.11	.22	.19	.38	.29	.03	.07	.06	.14	.12	.25	.18	-		
Likert (4-cat)	L.07	.12	.11	.22	.20	.39	.29	.04	.07	.07	.15	.14	.28	.20	.01	.05	.05	.10	.09	.18	.13	-	-	0.40
Likert (6-cat)	.07	.11	.12	.22	.19	.40	.29	.03	.07	.07	.15	.14	.28	.20	.01	.05	.04	.10	.09	.17	.13	-		
Normal -	.10	.14	.14	.26	.23	.44	.31	.05	.09	.08	.16	.15	.29	.21	.02	.05	.05	.10	.09	.18	.13	-	_	0.35
Copula -	.11	.16	.15	.26	.23	.44	.32	.06	.09	.09	.17	.15	.29	.22	.02	.05	.05	.10	.09	.18	.13	-		
VM -	<u>.10</u>	.15	.14	.26	.22	.44	.32	.05	.08	.08	.16	.14	.29	.21	.02	.05	.05	.10	.09	.18	.13	-		
CN -	13	.16	.16	.27	.23	.43	.31	.06	.10	.09	.17	.15	.29	.21	.02	.05	.05	.10	.09	.18	.13	-	-	0.30
Likert (4-cat)	.12	.16	.16	.26	.24	.48	.34	.06	.09	.09	.17	.15	.31	.22	.02	.05	.05	.10	.09	.18	.13	-		
Likert (6-cat)	.11	.15	.16	.26	.23	.47	.32	.05	.09	.09	.17	.15	.30	.21	.02	.05	.05	.10	.09	.18	.13	-	-	0.25
Normal -	.10	.13	.13	.24	.21	.40	.29	.05	.08	.08	.16	.14	.28	.21	.02	.05	.05	.10	.08	.17	.13	-		
Copula -	.10	.14	.14	.24	.21	.41	.30	.05	.08	.08	.16	.14	.28	.21	.02	.05	.05	.10	.09	.17	.13	-		0 20
VM T	09	.13	.13	.24	.21	.41	.30	.05	.08	.08	.15	.14	.27	.20	.02	.05	.05	.10	.09	.17	.13	-		0.20
Likert (4 eet)	- 12	.14	.14	.25	.21	.40	.29	.06	.09	.09	.10	.15	.28	.20	.02	.05	.05	.10	.09	.17	.13			
Likert (4-cat)	10	.14	.14	.23	.22	.43	.31 21	.05	.09	.00	.10	.15	.29	.21	.02	.05	.05	.10	.09	.10	.13		-	0.15
	.10	. 14	. 14	.24	.21	.42	.31	.05	.00	.00	.10	. 14	.29	.21	.02	.05	.05	.10	.09	.10	.13	-		
Normai –	.07	.11	.11	.22	.20	.39	.28	.03	.07	.07	.15	.14	.27	.20	.01	.04	.04	.09	.08	.17	.13		-	0.10
	00. 07	.13	.12	.23	.20	.39	.29	.04	.00	.00	.15	.14	.27	.20	.02	.05	.04	.09	.00 80	.17	.13			
см]	10. Jo	13	13	23	20	.38	28	.05	.07	.07	16	.13	28	20	.01	.04	.04	10	.00	17	13			0.05
Likert (4-cat)	07	12	12	22	20	41	30	.00	.08	.00	15	14	28	21	01	.05	05	10	.09	18	13			0.00
Likert (6-cat)	.07	.11	.12	.22	.20	.40	.29	.03	.07	.07	.16	.14	.28	.20	.01	.05	.04	.10	.09	.18	.13	-		
· / L							6		1	-		1									-			
	(b)	1 ^N	St. V	STN -	V.	STN -	p ¹¹ ,0	NPN -	STN -	DI.L .	STN -	b"."	Nº -	V",o	DIN .	STN -	Still .	Nº -	St. F	STN -	d'',			
	1 1	v j	. <i>*</i>				ં જં	~ *!		. 4		1	, all	` ÷	~ <i>"</i>		` #							

Figure 7: Median interval width for confidence intervals in Study 3, ab = 0

Indirect Effect Path Combination

			1			100				1					200			1	1			- 1		500				_ _		1	1.00
Normal		19	28	48	25	32	49	34	39	52	11	18	30	16	21	31	22	26	33	06	10	18	10	13	19	13	16	20	-		
Copula	_	.24	.36	.58	.32	.40	.59	.40	.46	.61	.13	.22	.36	.19	.25	.37	.26	.30	.39	.08	.13	.21	.11	.15	.22	.15	.18	.24	-	- (0.95
VM	0	.22	.34	.57	.32	.42	.63	.40	.50	.69	.13	.21	.35	.19	.27	.40	.26	.33	.44	.08	.13	.20	.12	.16	.24	.16	.21	.27	-		
CN	-m	.34	.48	.75	.41	.54	.79	.54	.61	.82	.18	.28	.46	.25	.33	.47	.34	.39	.50	.10	.16	.27	.15	.19	.28	.20	.23	.30	-		
Likert (4-cat)	-	.22	.33	.56	.30	.39	.61	.39	.46	.65	.12	.20	.34	.18	.24	.36	.24	.29	.40	.07	.12	.19	.10	.14	.21	.15	.17	.23	-	- 0	J.90
Likert (6-cat)	-	.21	.30	.51	.28	.36	.56	.36	.44	.59	.12	.19	.32	.17	.23	.34	.23	.27	.36	.07	.11	.19	.10	.14	.20	.14	.17	.22	-		
Normal	_	.18	.27	.47	.24	.31	.48	.33	.38	.50	.10	.17	.29	.16	.21	.30	.22	.25	.33	.06	.10	.18	.10	.13	.19	.13	.16	.20	-	- c	0.85
Copula	_	.23	.35	.57	.31	.39	.59	.40	.45	.60	.13	.21	.36	.19	.25	.37	.26	.30	.39	.08	.13	.21	.11	.15	.22	.15	.18	.24	-		
VM	-0	.20	.32	.55	.29	.39	.60	.38	.48	.66	.12	.20	.35	.19	.26	.39	.25	.32	.44	.07	.12	.20	.11	.16	.24	.16	.21	.27	-		0 80
CN	ā	.31	.44	.71	.39	.50	.76	.52	.58	.78	.17	.27	.45	.24	.31	.46	.34	.38	.49	.10	.16	.27	.14	.19	.27	.20	.23	.30	-		5.00
Likert (4-cat)	Likert (4-cat) .01 .41 .10 .10 .11																														
Likert (6-cat)	Likert (6-cat) .19 .29 .50 .26 .34 .54 .36 .42 .57 .11 .19 .22 .34 .23 .27 .36 .06 .11 .19 .10 .13 .20 .14 .17 .22 .26 .34 .35 .46 .10 .17 .29 .16 .20 .29 .21 .24 .32 .06 .10 .17 .10 .12 .18 .13 .15 .20 .21 .31 .51 .28 .44 .51 .36 .40 .53 .12 .20 .35 .18 .23 .35 .24 .28 .36 .07 .13 .21 .11 .14 .22 .15 .18 .23 .25 .36 .24 .31 .41 .07 .12 .20 .18 .23 .25 .18 .23 .26 .14 .17 .20 .15 .18 .23 .26 .41 .17 .20 .18 .23 .20 .11 .18 .23 .27															-	- c	0.75													
Normal	Image: Normal - Liker (4-cal) .51 .44 .71 .58 .50 .76 .52 .56 .76 .77 .27 .31 .46 .38 .38 .49 .10 .16 .27 .14 .19 .27 .20 .21 .21 .11 .19 .33 .17 .23 .35 .24 .83 .90 .07 .11 .19 .01 .14 .21 .15 .17 .23 .23 .27 .36 .66 .11 .19 .01 .14 .21 .14 .17 .22 .21 .14 .17 .20 .31 .51 .44 .21 .57 .44 .21 .51 .44 .21 .57 .28 .24 .27 .36 .64 .53 .12 .20 .25 .36 .24 .31 .44 .41 .21 .51 .85 .25 .36 .24 .31 .41 .07 .12 .20 .11 .14 .22 .15 .18 .23 .51 .16 .26															-															
Copula	VM Q 20 32 55 29 39 60 38 48 66 11 20 35 19 26 39 25 32 44 10 16 24 16 21 27 20 23 24 23 24 23 24 28 39 07 11 16 24 16 21 27 20 23 30 27 20 23 30 27 20 23 30 27 20 23 30 27 20 23 30 27 20 23 30 27 20 23 30 27 20 23 30 27 20 23 30 27 20 23 30 27 20 23 30 27 20 23 30 27 20 23 30 27 20 23 30 20 11 19 20 11 11 11 11 11 11 11 11 <th11< th=""> 11 11 1</th11<>															-	- (0 70													
VM	Likert (6-cat) 19 29 50 26 34 54 36 42 57 11 19 32 17 22 34 23 27 36 06 11 19 10 13 20 14 17 22 - Normal - 17 26 43 23 29 44 31 35 46 10 17 29 16 20 29 21 24 32 06 10 17 10 12 18 13 15 20 14 17 22 - 16 20 29 21 24 32 06 10 17 10 12 18 13 15 20 35 18 23 35 24 28 36 07 13 21 11 14 22 15 18 23 - 16 20 29 21 24 31 41 10 12 18 13 15 20 26 44 14 14 </td <td>- </td> <td></td> <td></td>															-															
CN	-1-2-	.27	.38	.61	.34	.43	.65	.46	.50	.65	.16	.26	.42	.23	.29	.43	.32	.36	.46	.09	.15	.26	.14	.18	.27	.20	.23	.29	-		
Likert (4-cat)	-	.18	.28	.47	.25	.33	.51	.35	.40	.54	.11	.18	.32	.17	.22	.33	.23	.27	.37	.06	.11	.19	.10	.13	.20	.14	.17	.23	-	- c	J.65
D Likert (6-cat)	-	.17	.26	.44	.24	.31	.48	.33	.38	.51	.11	.18	.30	.16	.21	.32	.22	.26	.34	.06	.11	.19	.10	.13	.20	.14	.16	.22	-		
O Normal		.15	.24	.40	.22	.28	.42	.30	.34	.44	.10	.16	.28	.15	.19	.29	.21	.24	.31	.06	.10	.17	.09	.12	.18	.13	.15	.20	-	- (0.60
De Copula	-	.19	.29	.47	.27	.33	.48	.34	.38	.51	.12	.20	.33	.17	.23	.34	.24	.28	.36	.07	.12	.21	.11	.14	.22	.15	.17	.23	-		
D VM	-19	.17	.27	.43	.26	.34	.48	.33	.41	.54	.11	.19	.31	.18	.24	.35	.24	.30	.40	.07	.12	.19	.11	.16	.23	.16	.20	.26	-		
ло да	4	.24	.34	.55	.31	.40	.58	.42	.47	.59	.15	.24	.40	.22	.28	.41	.31	.34	.44	.09	.15	.25	.14	.18	.26	.19	.22	.29	-	- 0	J.55
Likert (4-cat)	-	.17	.25	.43	.24	.31	.47	.33	.38	.50	.11	.17	.30	.16	.21	.32	.22	.26	.36	.06	.11	.19	.10	.13	.20	.14	.17	.22	-		
Likert (6-cat)	-	.16	.25	.41	.23	.29	.44	.32	.37	.48	.11	.17	.29	.16	.21	.31	.22	.25	.33	.06	.11	.18	.10	.13	.19	.14	.16	.21	-	- c	0.50
O Normal	-	.14	.23	.39	.21	.27	.41	.29	.33	.44	.09	.16	.27	.15	.19	.28	.21	.24	.31	.06	.10	.17	.09	.12	.18	.13	.15	.20	-		
.≩ Copula		.17	.27	.45	.25	.31	.47	.33	.37	.50	.11	.19	.32	.17	.23	.33	.23	.28	.35	.07	.12	.20	.11	.14	.22	.15	.17	.23	-		
MV Ja	븝	.15	.25	.42	.24	.32	.46	.32	.40	.52	.11	.18	.30	.17	.24	.34	.23	.30	.39	.07	.12	.19	.11	.16	.23	.16	.20	.26	-	- 0	J.45
LO CN	- Ģ	.20	.31	.51	.29	.38	.56	.40	.45	.58	.14	.23	.39	.21	.27	.40	.30	.34	.44	.09	.15	.25	.13	.18	.26	.19	.22	.29	-		
Likert (4-cat)	-	.15	.24	.41	.23	.30	.46	.32	.37	.49	.10	.17	.29	.16	.21	.31	.22	.26	.35	.06	.11	.18	.10	.13	.20	.14	.17	.22	-	- 0	0.40
Likert (6-cat)	-	.14	.23	.40	.22	.29	.43	.31	.36	.48	.10	.17	.28	.15	.20	.31	.21	.25	.33	.06	.11	.18	.10	.13	.19	.14	.16	.21	-		
Normal		.17	.27	.45	.23	.29	.46	.32	.36	.47	.10	.17	.29	.16	.20	.30	.22	.25	.32	.06	.10	.18	.10	.12	.19	.13	.15	.20	-		0.25
Copula	M C <thc< th=""> C <thc< th=""> <thc< th=""></thc<></thc<></thc<>															-		5.55													
VM	-5	.17	.26	.44	.24	.30	.45	.32	.36	.48	.11	.17	.29	.16	.20	.31	.22	.25	.33	.06	.10	.18	.10	.12	.18	.14	.15	.20	-		
CN	14	.18	.28	.44	.24	.31	.46	.32	.37	.47	.11	.17	.29	.16	.20	.31	.22	.25	.33	.06	.10	.18	.10	.13	.18	.13	.15	.20	-	- 0	0.30
Likert (4-cat)	-	.19	.28	.47	.26	.33	.50	.35	.40	.53	.11	.18	.31	.17	.22	.33	.23	.27	.36	.06	.11	.19	.10	.13	.20	.14	.17	.22	-		
Likert (6-cat)		.18	.27	.46	.25	.31	.48	.34	.38	.52	.11	.18	.30	.16	.21	.31	.23	.26	.34	.06	.11	.18	.10	.13	.19	.14	.16	.21	-	- (0.25
Normal	-	.16	.25	.42	.22	.28	.43	.31	.34	.45	.10	.17	.28	.16	.20	.29	.21	.24	.31	.06	.10	.17	.09	.12	.18	.13	.15	.20	-		
Copula	-	.17	.26	.41	.24	.30	.43	.31	.35	.46	.10	.17	.28	.15	.20	.29	.21	.25	.32	.06	.10	.17	.10	.12	.18	.13	.15	.20	-		
VM	- <u></u>	.16	.25	.40	.23	.29	.43	.30	.35	.45	.10	.17	.28	.15	.20	.30	.21	.25	.32	.06	.10	.17	.09	.12	.18	.13	.15	.20	-	- 0	J.20
CN	_≥	.16	.25	.40	.23	.29	.43	.30	.35	.44	.10	.17	.28	.15	.20	.30	.22	.24	.32	.06	.10	.17	.09	.12	.18	.13	.15	.20	-		
Likert (4-cat)	-	.17	.26	.43	.24	.31	.46	.33	.38	.49	.11	.17	.30	.16	.21	.31	.22	.26	.35	.06	.11	.18	.10	.13	.20	.14	.16	.22	-	- c	0.15
Likert (6-cat)		.16	.25	.42	.23	.29	.45	.32	.36	.48	.11	.17	.29	.16	.21	.30	.22	.25	.33	.06	.11	.18	.10	.13	.19	.14	.16	.21	-		
Normal	-	.14	.24	.40	.21	.27	.42	.30	.34	.45	.10	.16	.27	.15	.20	.29	.21	.24	.31	.06	.10	.17	.09	.12	.18	.13	.15	.20	-		
Copula	-	.15	.25	.40	.23	.29	.42	.31	.34	.45	.10	.16	.28	.15	.20	.29	.21	.25	.32	.06	.10	.17	.09	.12	.18	.13	.15	.20	-	- 0	J.10
VM	-ta	.14	.23	.39	.22	.28	.42	.30	.34	.45	.10	.16	.27	.15	.20	.29	.21	.24	.32	.06	.10	.17	.09	.12	.18	.13	.15	.20	-		
CN	ď	.15	.24	.39	.22	.28	.42	.30	.34	.43	.10	.17	.27	.15	.20	.29	.21	.24	.31	.06	.10	.17	.09	.12	.18	.13	.15	.20	-	- (0.05
Likert (4-cat)	-	.15	.24	.41	.22	.30	.45	.32	.37	.48	.10	.17	.29	.16	.21	.31	.22	.26	.35	.06	.11	.18	.10	.13	.20	.14	.16	.22	-		
Likert (6-cat)		.15	.24	.40	.22	.29	.43	.31	.36	.48	.10	.17	.28	.15	.20	.30	.21	.25	.33	.06	.11	.18	.10	.13	.19	.14	.16	.21	- L		
		12	2	2				,	, <u>0</u>	0	2	2	2	Å			,		,	,?	12	2	A	, A		, <u>0</u>	, <u>0</u>				
	<i>,</i> 1	Nº A	× 0	ý ",	Nº A	× ,0	D 2	D'A	0 0	ý ,	Nº A	0 0	ý "?	D A	¢ _ 0	N 2	D'A	× ,0	У	Nº A	¢ 6	2	D'A	0.0	° 2	0 A	0.0	0			
	4	8	ő	ő	Ť.	ő	ŝ.	8	8	<i>*</i> .	6	8	ő	8	ő.	ő	8	8	8	8	ő	8	8	8	ŕ	8	ŕ				
												Inc	direct	Effect	Path	Com	binatio	on													

Figure 8: Median interval width for confidence intervals in Study 3, $ab \neq 0$

		Г				100							200							500				1	_ 2	2.5
	Normal -	-1	1.14	1.12	1.11	1.09	1.06	1.10	1.06	1.08	1.04	1.04	1.02	1.01	1.04	1.03	1.05	1.00	.99	1.01	1.01	1.01	1.01			_
	Copula ·	+	1.16	1.18	1.18	1.13	1.12	1.13	1.11	1.08	1.07	1.07	1.04	1.05	1.05	1.05	1.04	1.00	1.01	1.01	1.01	1.01	1.02	-	- 2	2.4
	VM ·	ြပ္ဆု	1.21	1.26	1.23	1.22	1.17	1.24	1.12	1.12	1.11	1.10	1.10	1.06	1.10	1.06	1.07	1.04	1.03	1.05	1.03	1.05	1.03	-	- 2	23
	CN ·	- ''''	1.23	1.28	1.24	1.21	1.19	1.24	1.16	1.12	1.07	1.08	1.08	1.05	1.08	1.05	1.05	1.02	1.02	1.01	1.00	1.03	1.02	-		
	Likert (4-cat)		1.23	1.22	1.19	1.15	1.13	1.20	1.09	1.11	1.07	1.08	1.04	1.03	1.06	1.04	1.05	1.00	1.00	1.01	1.01	1.02	1.01		- 2	2.2
	Likeri (o-cai)	\mathbb{H}	1.20	1.15	1.15	1.11	1.09	1.14	1.09	1.00	1.07	1.04	1.04	1.03	1.04	1.03	1.05	1.01	1.00	1.01	1.01	1.02	1.01			
	Normal ·		1.05	1.04	1.04	1.08	1.04	1.09	1.06	1.01	.99	.99	1.01	1.01	1.03	1.02	.97	.98	.98	1.00	1.00	1.01	1.01		- 2	2.1
	VM ·		1 10	1 14	1 14	1 17	1 13	1.13	1 11	1.01	1.05	1.03	1.04	1.04	1 09	1.05	.99	1 02	1.00	1.01	1.01	1.01	1.02	_		
	CN ·	ᆸᄙ	1.16	1.17	1.16	1.14	1.13	1.19	1.13	1.04	1.03	1.02	1.06	1.03	1.06	1.05	.98	.98	.99	1.01	1.00	1.03	1.02	-	- 2	2.0
	Likert (4-cat)	+	1.12	1.11	1.10	1.10	1.08	1.16	1.07	1.01	1.02	1.01	1.03	1.03	1.05	1.04	.97	.98	.99	1.01	1.01	1.02	1.01	-	- 1	1.9
	Likert (6-cat)	Ш	1.09	1.07	1.07	1.09	1.05	1.12	1.08	1.01	1.01	1.00	1.03	1.02	1.04	1.03	.96	.99	.98	1.01	1.01	1.02	1.01			
	Normal -	11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	- 1	1.8
	Copula ·	1_	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
]빗	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		- 1	1.7
	Likert (4-cat)		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
~	Likert (6-cat)	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-	- 1	
thod	Normal ·		.91	.92	.92	.93	.94	.93	.95	.93	.93	.94	.95	.96	.96	.98	.94	.96	.96	.98	.98	.98	.99	-	- 1	1.5
Met	Copula ·	+	.90	.91	.92	.91	.92	.92	.95	.92	.93	.93	.94	.96	.94	.97	.93	.95	.95	.97	.98	.98	.99	-		
pd	VM ·	-S	.94	.94	.96	.94	.96	.93	.97	.94	.95	.96	.98	.98	.97	.99	.95	.97	.98	.99	1.00	.99	1.00	-	- 1	1.4
па	CN ·	- œ'	.88	.90	.89	.90	.90	.89	.91	.92	.91	.92	.93	.93	.93	.95	.93	.95	.94	.96	.96	.97	.98	-		
ditio	Likert (4-cat)	1	.92	.92	.91	.90	.92	.90	.93	.92	.93	.93	.94	.95	.95	.97	.94	.95	.96	.97	.98	.98	.99		- 1	1.3
ouc	Likeri (o-cai)	Н	.92	.91	.93	.91	.93	.92	.95	.92	.93	.93	.95	.90	.95	.97	.93	.90	.90	.90	.90	.90	.99	-		1 2
S ≥	Normal ·		.64	.78	.//	.87 85	.88 88	.90	.92	.65 64	.85	.85	.92	.93	.94	.96	.07 66	.91	.91	.90	.97	.97	.98			Z
nalii	VM ·	la	.03	78	79	.05	.00	.00	.91	.04	.01	.03	.09	.92	.92	.95	.00	.00	.05	.93	.95	.90	.90		- 1	1.1
orn	CN ·	ļĕ	.64	.73	.70	.82	.81	.83	.86	.66	.78	.79	.87	.87	.89	.92	.65	.87	.86	.93	.94	.95	.96	-		
N(-	Likert (4-cat)	- _	.62	.76	.77	.84	.85	.86	.89	.64	.81	.83	.90	.91	.92	.94	.66	.89	.90	.95	.96	.96	.98		- 1	1.0
Nor	Likert (6-cat)	╘	.64	.75	.78	.84	.86	.88	.91	.64	.83	.83	.91	.92	.93	.95	.66	.91	.90	.96	.96	.97	.98			
Ξ	Normal ·	+	1.04	1.02	1.04	1.05	1.04	1.03	1.03	1.02	1.02	1.02	1.00	1.02	1.02	1.01	1.01	1.01	1.01	1.00	1.01	1.01	1.01		- c).9
	Copula ·	11	.82	.86	.86	.86	.88	.86	.90	.80	.83	.84	.83	.86	.83	.89	.77	.80	.84	.82	.85	.82	.86			
	VM ·	길	1.10	1.04	1.07	1.03	1.06	1.03	1.04	1.07	1.02	1.04	1.02	1.02	1.03	1.04	1.03	1.01	1.02	1.01	1.02	1.00	1.02		ſ	1.0
	Likert (4-cat)		.04	.07	.07	./1	1 02	1.05	1.03	.02 1.02	.04	1 01	.00	.00	.00	.00	.59	1 01	.04	.00	.07	.00	.00		- c	J.7
	Likert (6-cat)	-	1.06	1.05	1.05	1.03	1.02	1.03	1.03	1.02	1.01	1.01	1.01	1.02	1.01	1.02	1.01	1.00	1.00	1.00	1.01	1.00	1.00	-		
	Normal	H	.95	.93	.94	.96	.98	.95	.98	.95	.95	.95	.96	.98	.98	.98	.94	.96	.97	.98	.99	.99	.99	-	- c).6
	Copula ·	-	.75	.79	.79	.80	.82	.79	.86	.74	.77	.79	.79	.83	.79	.86	.72	.77	.80	.80	.84	.80	.85	-		
	VM ·	- <u>o</u>	1.01	.94	.98	.94	1.00	.95	.99	1.00	.95	.98	.97	.99	.98	1.01	.97	.96	.97	.98	1.00	.99	1.01	-	- c).5
	CN ·	- ≥	.58	.61	.61	.66	.63	.65	.65	.58	.60	.61	.65	.66	.66	.66	.55	.63	.62	.66	.65	.67	.67	-		ہ د
	Likert (4-cat)	11	.94	.92	.94	.91	.93	.94	.96	.94	.94	.94	.95	.96	.95	.98	.94	.95	.96	.97	.99	.97	.99	-).4
	Likert (6-cat)	14	.96	.93	.95	.93	.95	.94	.97	.94	.94	.93	.95	.97	.96	.98	.94	.96	.96	.98	.99	.98	.99		- c).3
	Normal ·		.66	.79	.79	.90	.91	.91	.94	.65	.87	.86	.92	.94	.96	.96	.66	.92	.92	.97	.97	.98	.99			
			.37 71	.09	.00	.70	.//	.//	.03	.00	./ 1	.73	.70	.00	.70	.04	.00 88	.73	.//	.79	.02 00	.00	1.00		- c).2
	CN -	텡	48	.01	.03	.00	60	63	62	48	.00	.00	63	63	.50	65	45	60	60	65	65	.50	67			
	Likert (4-cat)	-1-1	.64	.77	.80	.83	.86	.89	.92	.65	.83	.85	.91	.92	.93	.95	.67	.90	.90	.95	.97	.96	.98	\vdash	- c).1
	Likert (6-cat)	-	.66	.77	.80	.86	.88	.89	.93	.66	.84	.83	.91	.94	.94	.96	.66	.91	.91	.96	.97	.97	.98	╞		<u>م</u>
			<i>2</i>	\$ 	2	0		0	,o	[®]	<i>©</i>	2	[©]	.>	<i>©</i>	, o	2	0	2	0	.>	\$,e	_	(<i>.</i> .U
		J.	2, Ď. Š	, vi	, ⁰ , , ,	* ⁰	, bir	, v	Ý.	,0 ^{,0} , [,] 2	, Y.	, DI	×. Ď	, bill ife	, ¹	Ф	ن ز ر ر	, ^V	pr.	То́	, ^{bi} , e	NO IO	Nº.			

Figure 9: Relative efficiency of median confidence intevals for Study 3, ab = 0

Indirect Effect Path Combination



Figure 10: Relative efficiency of median confidence intevals for Study 3, $ab \neq 0$

Figure 11: Proportion of interval	wider than 5	for Study 3, $ab = 0$
-----------------------------------	--------------	-----------------------

			1		100		1					200					- 1		500			1			0.50
	Normal -	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		0.49
	Copula -	.000	.000	.000	.001	.001	.001	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		0.40
	0	.000	.000	.000	.001	.000	.004	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		0.46
		.000	.001	.001	.003	.000	.004	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000.	.000.	.000	.000.	.000.	.000			
	Likert (6-cat)	000	000	000	000	000	0002	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	_	-	0.44
	Normal -	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000			
	Copula -	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	_		0.42
	ں– ™`	.000	.000	.000	.001	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		0 40
		.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		0.10
	Likert (4-cat)	000.	.000	.000	.000.	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000.	.000	.000		-	0.38
	Likert (6-cat)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000			
	Normal –	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000.	.000	.000	.000	.000	.000			0.36
		000	0002	000	001	000	003	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	_		0.24
	си – Д	.004	.003	.000	.002	.005	.004	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		0.54
	Likert (4-cat)	.001	.001	.000	.000	.000	.002	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		0.32
g	Likert (6-cat)	.000	.001	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		
etho	Normal -	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-	-	0.30
Ň	Copula -	.000	.000	.000	.000.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		
anc	, F	000.	.000	.000	.000	.000	.000	.000	.000	.000.	.000	.000	.000	.000	.000	.000	.000.	.000.	.000	.000	.000	.000			0.28
G	Likert (4-cat)	000	000.	000	000	000	000	000	000	000.	000.	000	000.	000	000	000	000.	000.	000	000.	000.	000			0.26
diti	Likert (6-cat)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		0.20
Cor	Normal -	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000			0.24
lity	Copula - m	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		
ma	vw ⊣∰	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000.	-	-	0.22
Nor		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		
(-L	Likert (4-cat)	000.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000.	.000	.000	.000	.000			0.20
NC NC	Likert (6-cat)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000			0.18
	Normal –	000.	000.	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000.	000.	.000	.000	000.	000.			0.10
		000	000.	000	000	000	.000	000	000	000.	000.	000	000.	000	000	000	000.	000.	000	000	000.	000			0.16
		.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	_		
	Likert (4-cat) -	.000	.001	.000	.000	.001	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-	-	0.14
	Likert (6-cat)	.000	.000	.001	.001	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		
	Normal –	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		0.12
	Copula -	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		0 10
	v™ ⊣S	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000.	.000	.000	.000	.000	-		0.10
		000	000.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000.	000.	.000	.000	.000	000.		-	0.08
	Likert (6-cat)	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000			
	Normal	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000		-	0.06
	Copula -	000	000	000	000	000	000	000	000	000	.000	000	.000	000	000	.000	000	000	000	000	000	000	$ \mid $		
	<u>a</u> – wv	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-	F	0.04
	си – 🖱	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-		0.02
	Likert (4-cat) -	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	\vdash	Γ	0.02
	Likert (6-cat)	000.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	Γl		
		0 ¹⁰	OTO	21.2	o lio	A	o lo	, io	offo	offo	21.2	NIP.	A	DIN O		N ^I O	offo	11.2	DID .	A	offo				
	ń	i ^{0, č} 1, ?	· ",	· *	·	· .	·		,0, [°] , [°] ,2	, jo		*******	· "). 	`` <i>`</i> *	, , , ,	·		*`´_ <i>i</i> io	, ⁶	·	Ň			

Indirect Effect Path Combination



							100									200									500						0.50
	Normal -		000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	_	
	Copula -	_	000	000	001	000	001	001	000	002	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	_	- 0.48
	VM ·	0	.000	.001	.001	.000	.002	.004	.000	.002	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000	.000	-	
	CN -	_m	.000	.003	.009	.000	.000	.011	.001	.002	.008	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000	.000	-	- 0.46
L	Likert (4-cat)	-	.000	.000	.000	.000	.000	.001	.000	.000	.003	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000	.000	-	
L	Likert (6-cat)	-	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000.	.000	-	- 0.44
	Normal ·	_	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-	0.40
	Copula -	-	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000	.000	-	- 0.42
	VM ·	-0	.000	.000	.000	.000	.000	.002	.000	.001	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000	.000	-	- 0.40
	CN ·	ā	.000	.000	.005	.000	.000	.005	.000	.000	.003	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000.	.000	-	0.40
L	Likert (4-cat)	-	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000	.000	-	- 0.38
L	Likert (6-cat)	-	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000	.000	-	0.50
	Normal -	_	.000	.000	.000	.000	.001	.001	.001	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-	- 0.36
	Copula ·	-	.000	.001	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000.	.000	-	
	VM ·	-0	.001	.000	.001	.002	.001	.004	.002	.002	.001	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000.	.000	-	- 0.34
	CN -	-1-	.000	.003	.005	.002	.001	.005	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000.	.000	-	
L	Likert (4-cat)	-	.001	.000	.002	.000	.000	.001	.000	.000	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-	- 0.32
ل ص	Likert (6-cat)	-	.000	.000	.000	.002	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000.	.000	-	
ę	Normal -		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-	- 0.30
Met	Copula ·	-	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000	.000	-	
p	VM ·	-12	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000	.000	-	- 0.28
ar	CN ·		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000	.000	-	
	Likert (4-cat)		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000	.000	-	- 0.26
ιgi	Likert (6-cat)	-	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-	
õ	Normal ·		000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000		- 0.24
₹	Copula ·	_	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000		
iali	VM ·	sta	000	000	000	000	000	000	000	001	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000		- 0.22
h	CN ·	ļĂ	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	_	
Ž,	Likert (4-cat)	Ľ	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	_	- 0.20
έ.	Likert (6-cat)	_	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000		
ŝ	Normal -		000	001	000	001	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000		- 0.18
	Copula -			001	0000	000	000	000	000	000	000	000	000	000	000	0000	0000	000	000	0000	000	0000	0000	0000	000	0000	0000	0000	0000		
	VM -		000	000	000	000	000	001	001	000	000	000	000	000	000	0000	0000	000	000	0000	000	0000	0000	000	000	0000	0000	0000	0000		- 0.16
	CN -	2	000	001	000	000	000	001	000	000	000	000	000	000	000	0000	0000	000	000	0000	000	000	0000	000	000	000	000	000	000		
	ikert (4-cat)		000	000	000	000	000	001	000	000	001	000	000	000	000	000	000	000	000	000	000	0000	000	000	000	000	0000	000	000		- 0.14
	Likert (6-cat)	_	000	000	001	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	0000	000	000	000	000	000	000	000		
-	Normal -	-	.000	000	000	.000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	.000	000	000	000	000	000	000	000	000		- 0.12
	Conulo		000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000.	000	000.	.000	000	.000	000	000.	000.	.000	000	000	000.	000		
	VM -]		.000	.000	.000	.000	000.	000	.000	000	.000	000	000.	000.	000.	000	000.	000.	000	.000	000	000.	000.	.000	000	000	000.	000		- 0.10
	CN -	ž		000	.000	000	000	000	000	.000	000	.000	000	000	000	000	0000	000.	000.	000	.000	0000	000	000	000	0000	0000	000.	0000		
	Likort (4 cot)			000.	.000	.000	.000	000.	000	.000	000	.000	000	000.	000.	000.	000	000.	000.	000	.000	000	000.	000.	.000	000	000	000.	000		- 0.08
	Likert (6 cat)			000	.000	000	000	000	000	.000	000	.000	000	000	000	000	0000	000	000	000	.000	0000	000	000	000	0000	0000	000.	0000		
	Liken (0-cal)	-	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000	.000		- 0.06
	Normal ·		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		
	Copula ·		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		- 0.04
	VM ·	Ē	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000	.000		
	CN ·	ᅃ	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000	.000		- 0.02
	Likert (4-cat)		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	000	.000	.000	.000		
L	Likert (6-cat)		1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	ГЦ	
			12	12	12	A	Å	A	10		10	12	12	12	A	1	A	10	0	10	12	12	12	A	A	A	10	10	10		
		2	, ×	× "ø	č "?	× ">	× "9	× "2	, A	× "0	`?	. "A	، ۱	، بر	× ">	, e	2	× "A	·	ັ _2	. "A	, e	2	×		<i>"</i> ?·	, A		×		
		ő	ø	Ø	ø	ø	ø	ø	ø	ø	ó	ø	ø	ø	ø	ø	ø	ø	ø	8	Ø.	ø	ø	ø	ø	ø	ø	ø			
													In	direct	Effect	Path	Comb	oinatio	on												

Note. VM = Vale and Maurelli method; CN = Contaminated Normal; Copula = Multivariate Gumbel Copula; Likert (4-cat) = descritized into 4-category data; Likert (6-cat) = descritized into 6-category data; R- = Robust (prefix added to methods); Delta = Delta method-based confidence interval; MC = Monte Carlo method-based confidence intervals; LCI = Likelihood-based confidence interval; PC = Percentile bootstrap; BC = Biascorrected bootstrap.