



# Univariate Meta-Analysis vs. Meta-Analytic Structural Equation Modeling

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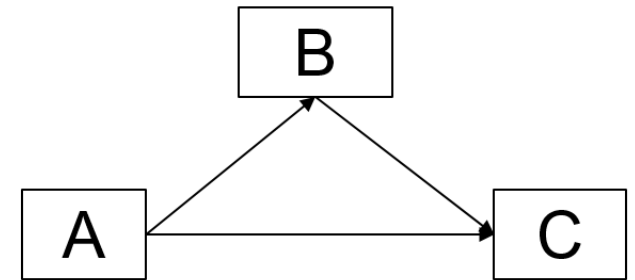
Veroni Eichelsheim, Netherlands Institute for the Study of Crime and Law Enforcement (NSCR)

# Meta-Analysis

- Integrate research findings → summary effect size (Glass, 1976)
- Univariate meta-analysis
  - 1 association between 2 variables
- Meta-Analytic Structural Equation Modeling (MASEM)
  - Combination of meta-analysis and SEM (Viswesvaran & Ones, 1995)

# SEM

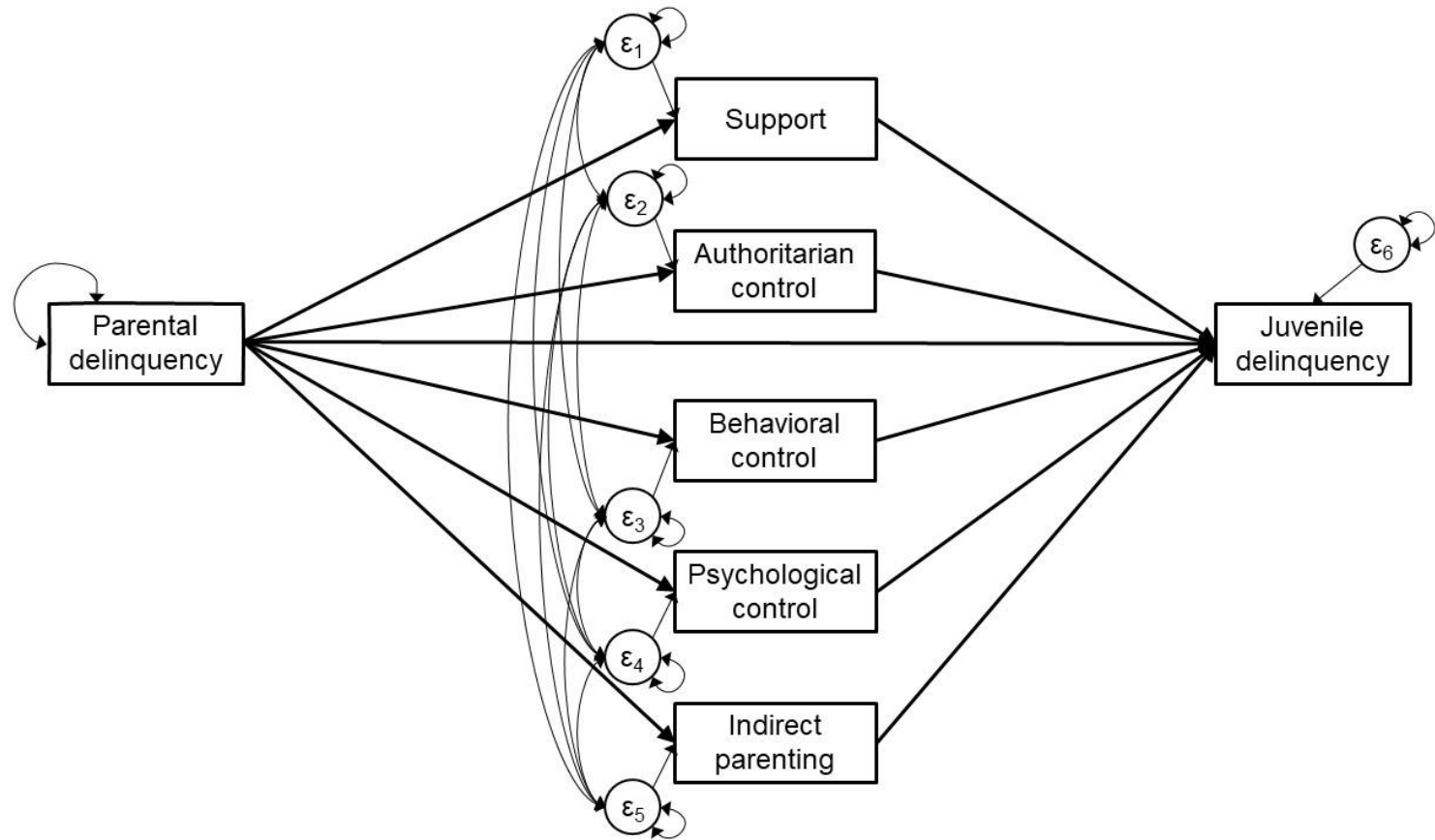
- Investigates set of variables at once
- Model based on theory
- Model fit
- Regression coefficients
- Controlling for other variables in the model
  
- MASEM
  - Answers questions that univariate meta-analysis cannot answer
  - Primary studies don't need to include all associations
  - Can answer RQ's that were not explored before



# Research Question

- Differences between univariate meta-analysis and MASEM
- Advantages and disadvantages of both methods

# Application



# Project

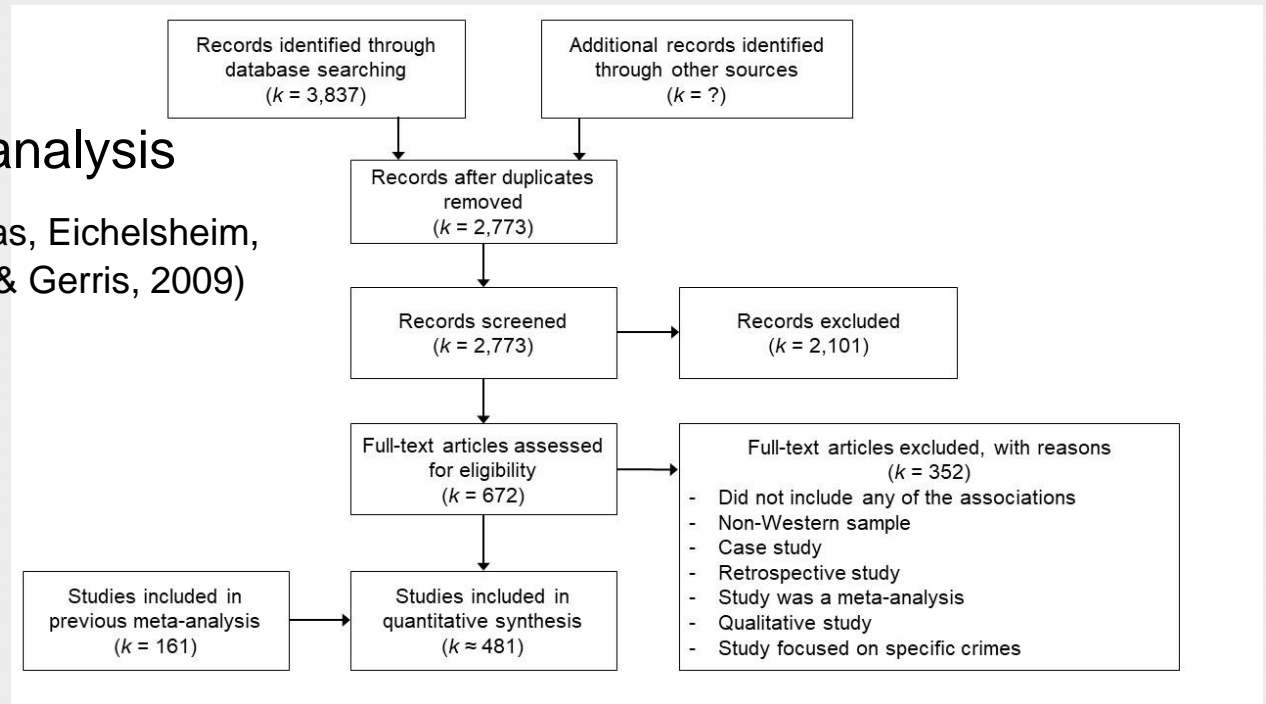
## ■ Former meta-analysis

$k = 161$  (Hoeve, Dubas, Eichelsheim, Van Der Laan, Smeenk, & Gerris, 2009)

Subset:

■  $k = 88$

■  $N = 154,176$



# Methods

- Univariate meta-analysis
  - Summary effect sizes (pooled correlation)
  - R package metafor
  - Random effects model
- MASEM: Two Stage SEM approach (Cheung, 2014)
  - R package metaSEM
  - Random effects model

# Methods

## ■ MASEM

- Step 1: Pooled correlation matrix
- Step 2: Fit hypothesized model to matrix

[[18]]

	ParDel	support	authoritarian	behavioral	psychological	indirect	JuvDel
ParDel	NA	NA	NA	NA	NA	NA	NA
support	NA	NA	NA	NA	NA	NA	NA
authoritarian	NA	NA	NA	NA	NA	NA	NA
behavioral	NA	NA	NA	1.00	NA	0.450	-0.060
psychological	NA	NA	NA	NA	NA	NA	NA
indirect	NA	NA	NA	0.45	NA	1.000	-0.286
JuvDel	NA	NA	NA	-0.06	NA	-0.286	1.000

[[19]]

	ParDel	support	authoritarian	behavioral	psychological	indirect	JuvDel
ParDel	NA	NA	NA	NA	NA	NA	NA
support	NA	NA	NA	NA	NA	NA	NA
authoritarian	NA	NA	1.00	NA	NA	NA	0.33
behavioral	NA	NA	NA	NA	NA	NA	NA
psychological	NA	NA	NA	NA	NA	NA	NA
indirect	NA	NA	NA	NA	NA	NA	NA
JuvDel	NA	NA	0.33	NA	NA	NA	1.00

[[20]]

	ParDel	support	authoritarian	behavioral	psychological	indirect	JuvDel
ParDel	NA	NA	NA	NA	NA	NA	NA
support	NA	1.000	-0.218	NA	NA	0.499	-0.250
authoritarian	NA	-0.218	1.000	NA	NA	-0.184	0.172
behavioral	NA	NA	NA	NA	NA	NA	NA
psychological	NA	NA	NA	NA	NA	NA	NA
indirect	NA	0.499	-0.184	NA	NA	1.000	-0.154
JuvDel	NA	-0.250	0.172	NA	NA	-0.154	1.000

[[21]]

	ParDel	support	authoritarian	behavioral	psychological	indirect	JuvDel
ParDel	NA	NA	NA	NA	NA	NA	NA
support	NA	1.00	NA	-0.03	NA	NA	-0.09
authoritarian	NA	NA	NA	NA	NA	NA	NA
behavioral	NA	-0.03	NA	1.00	NA	NA	0.03
psychological	NA	NA	NA	NA	NA	NA	NA
indirect	NA	NA	NA	NA	NA	NA	NA
JuvDel	NA	-0.09	NA	0.03	NA	NA	1.00



# Methods

## ■ MASEM

- **Step 1: Pooled correlation matrix**
- **Step 2: Fit hypothesized model to matrix**

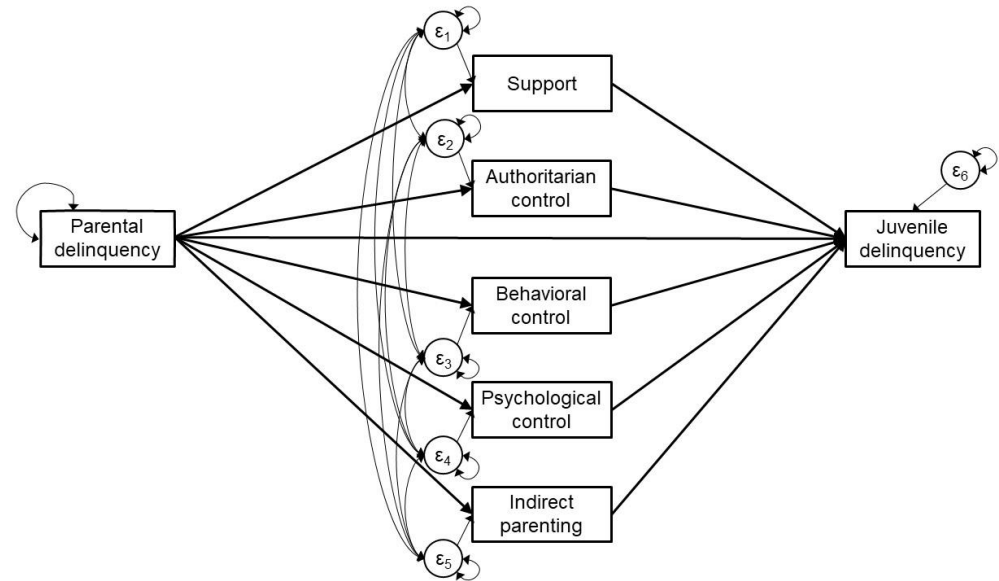
	1	2	3	4	5	6
1. Parental delinquency						
2. Support	-0.021					
3. Authoritarian control	0.075*	-0.166*				
4. Behavioral control	-0.030	0.202*	-0.036			
5. Psychological control	0.042	-0.187	0.265*	-0.246		
6. Indirect parenting	-0.072*	0.325*	-0.178*	0.298*	-0.150*	
7. Juvenile delinquency	0.190*	-0.147*	0.150*	-0.160*	0.080*	-0.180*

*Note.* \* $p < .05$ .

# Methods

## ■ MASEM

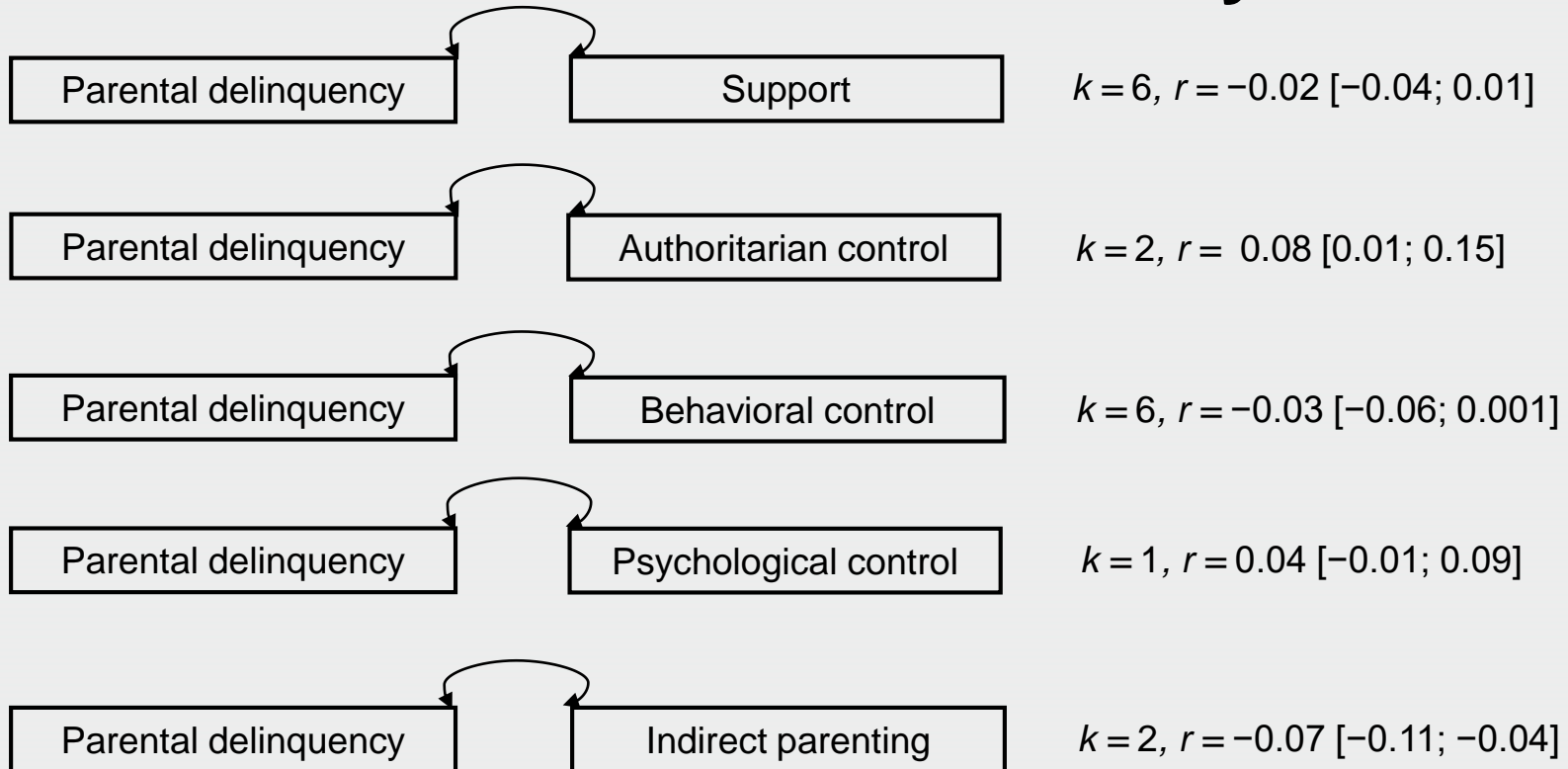
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- **Step 2: Fit hypothesized model to matrix**



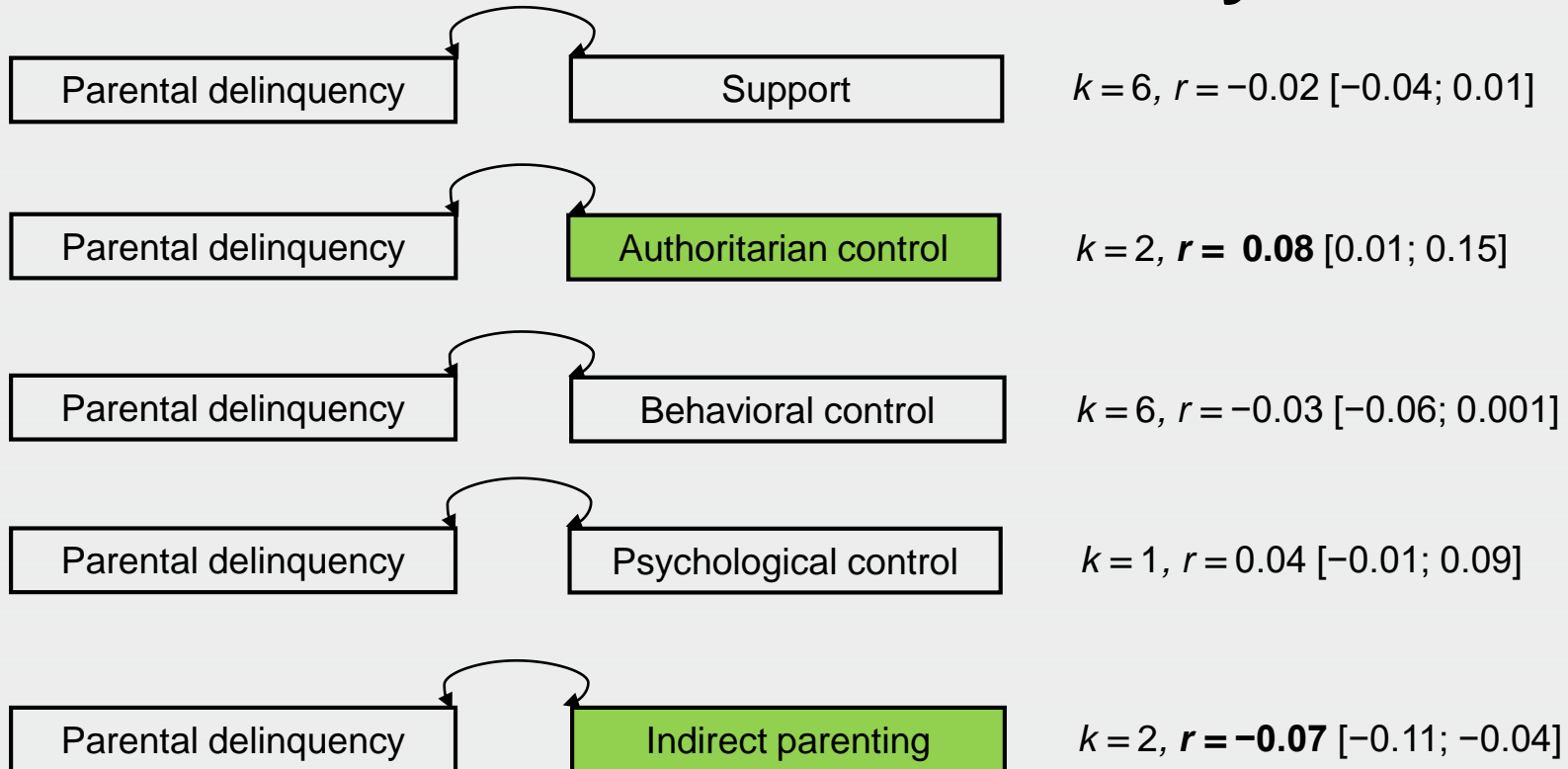
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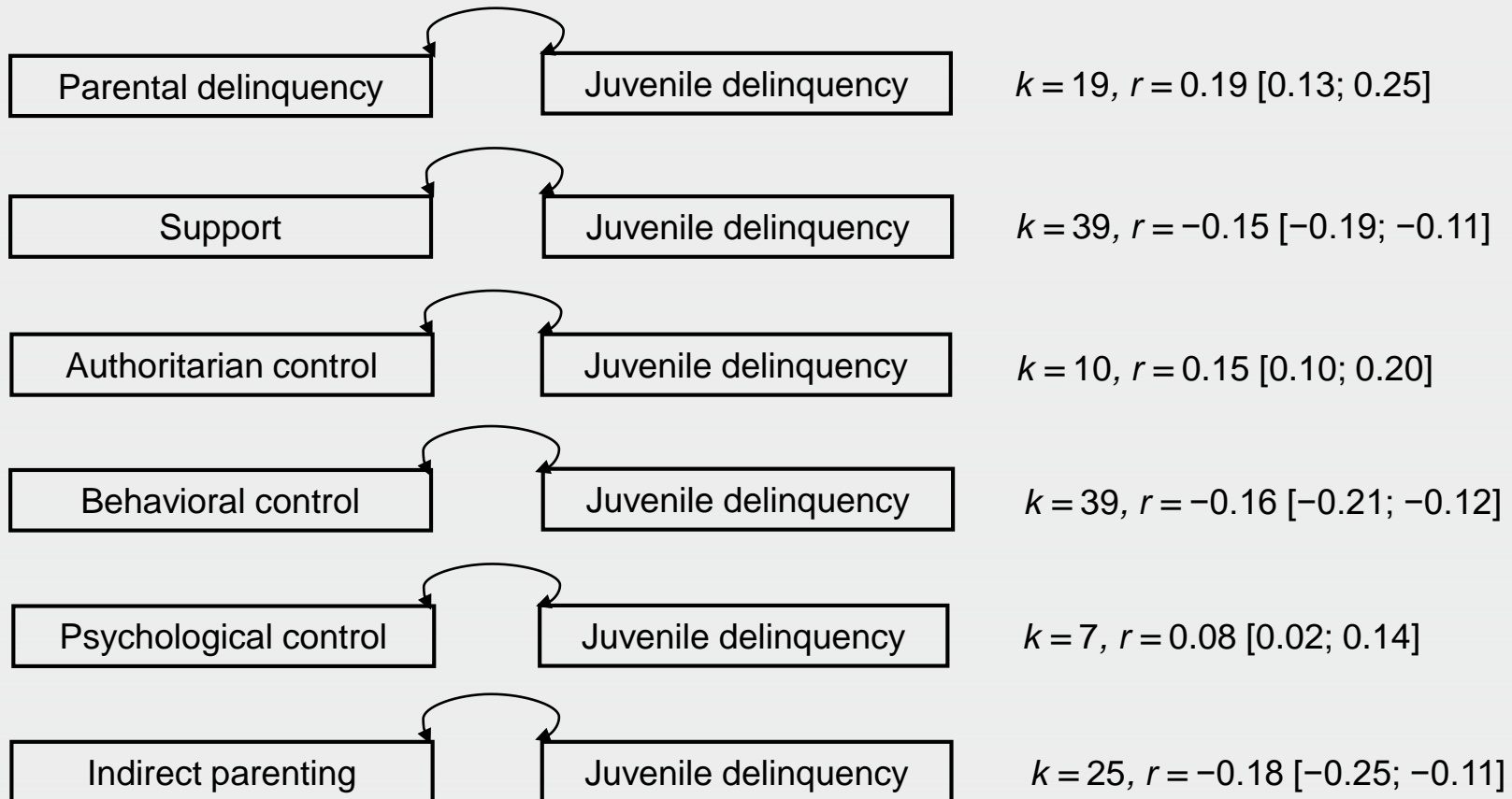
# Results – Univariate Meta-Analysis



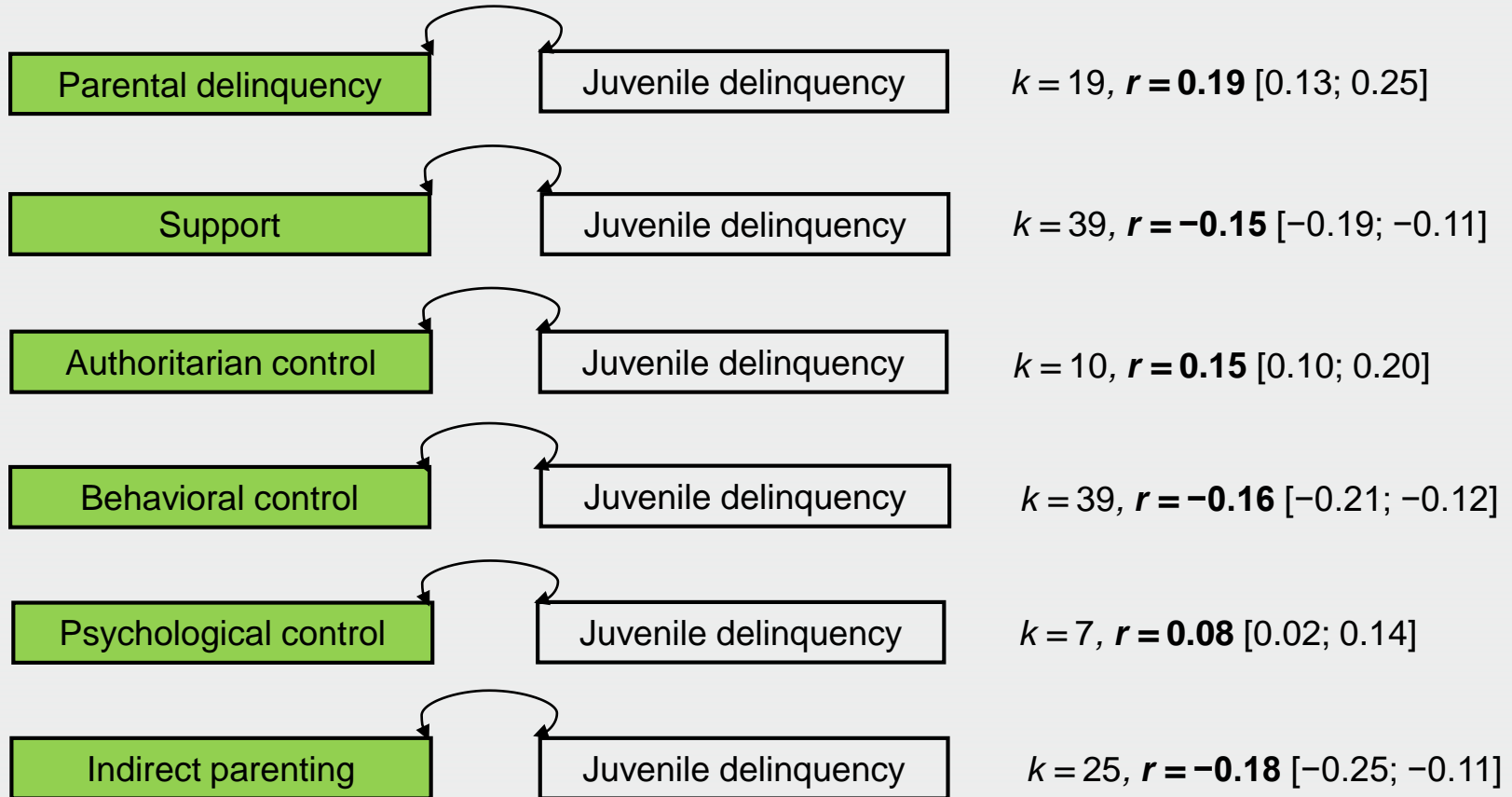
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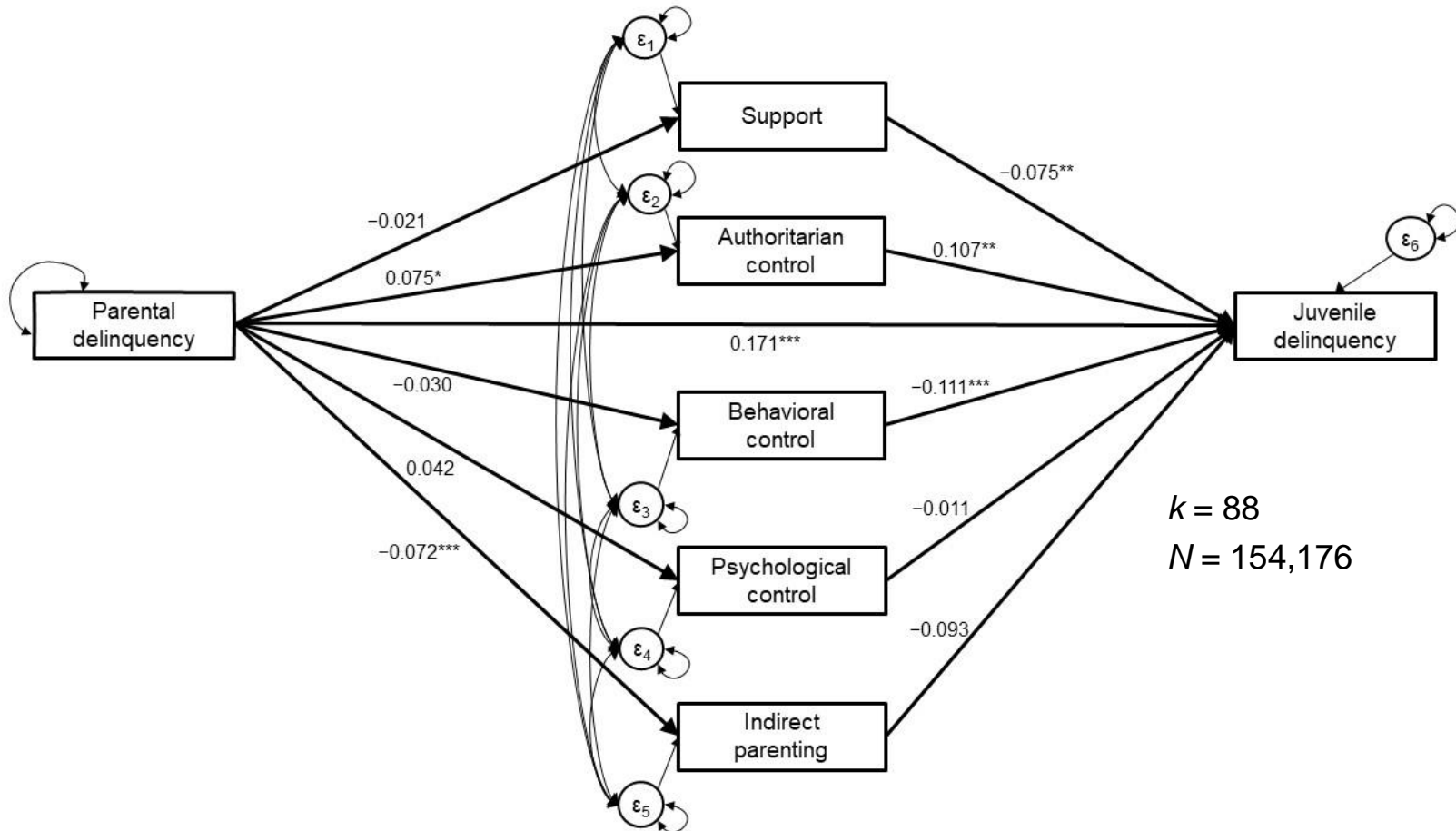
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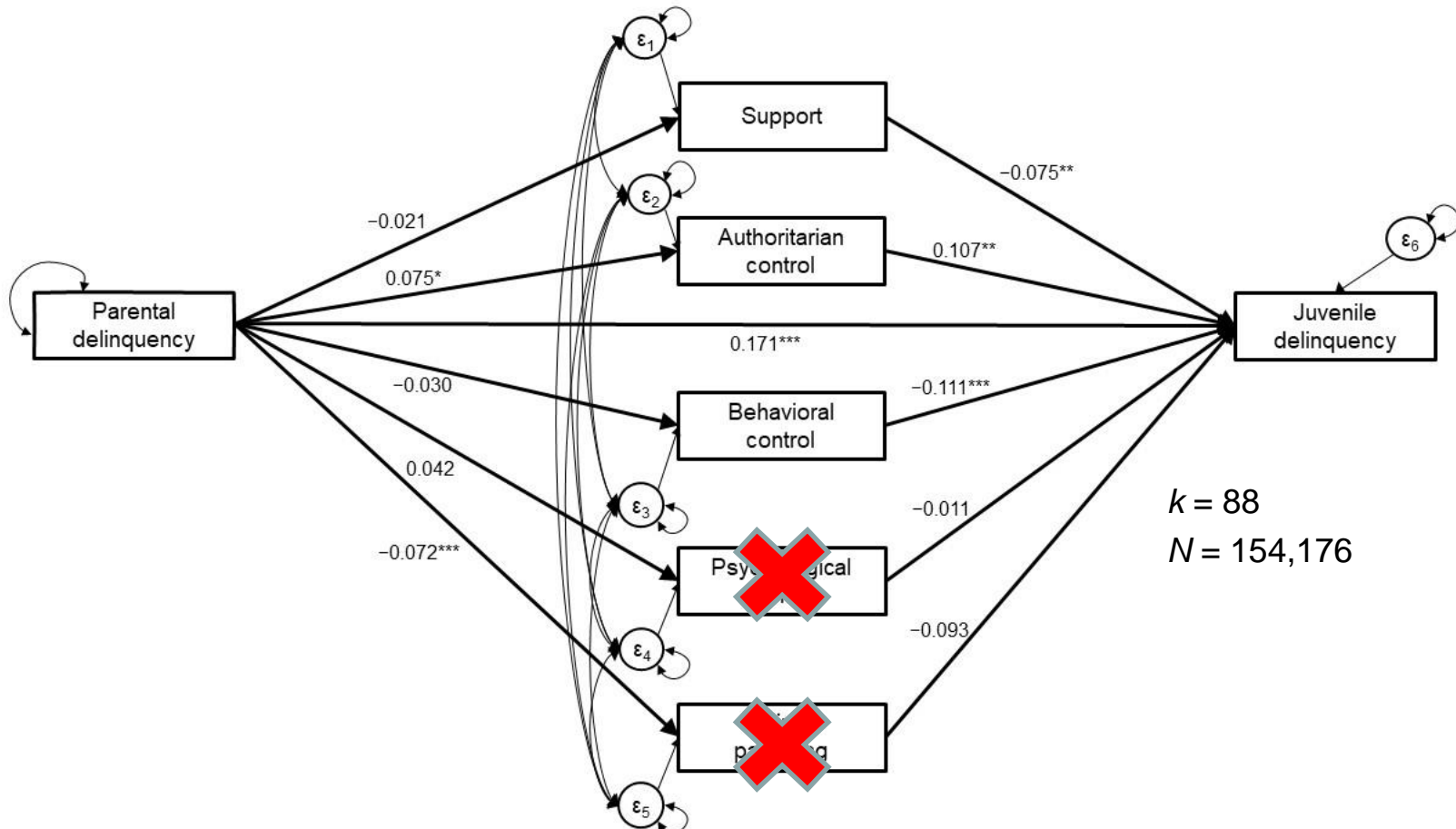
# Results – Univariate Meta-Analysis



# Results – MASEM

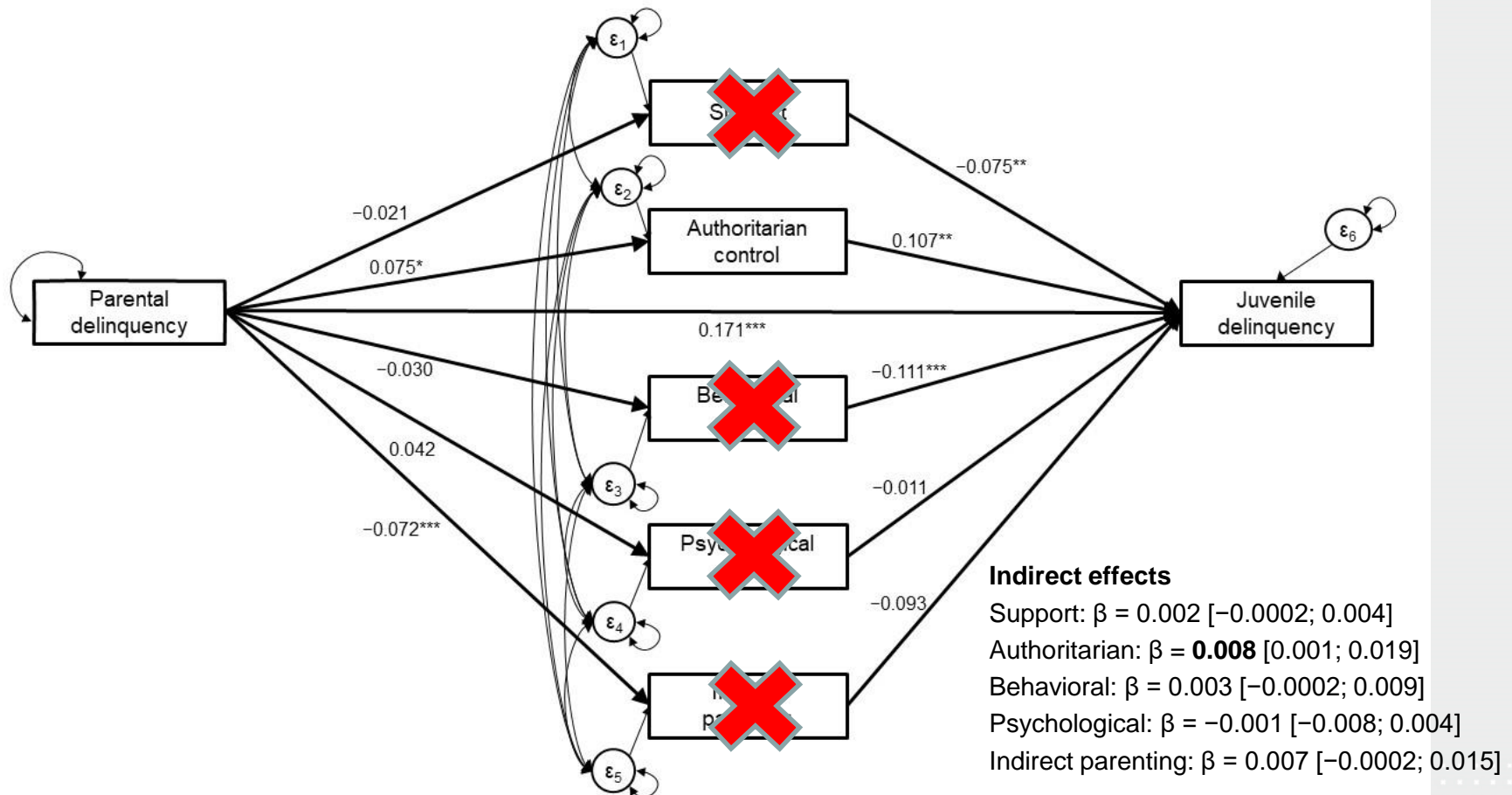


# Results – MASEM

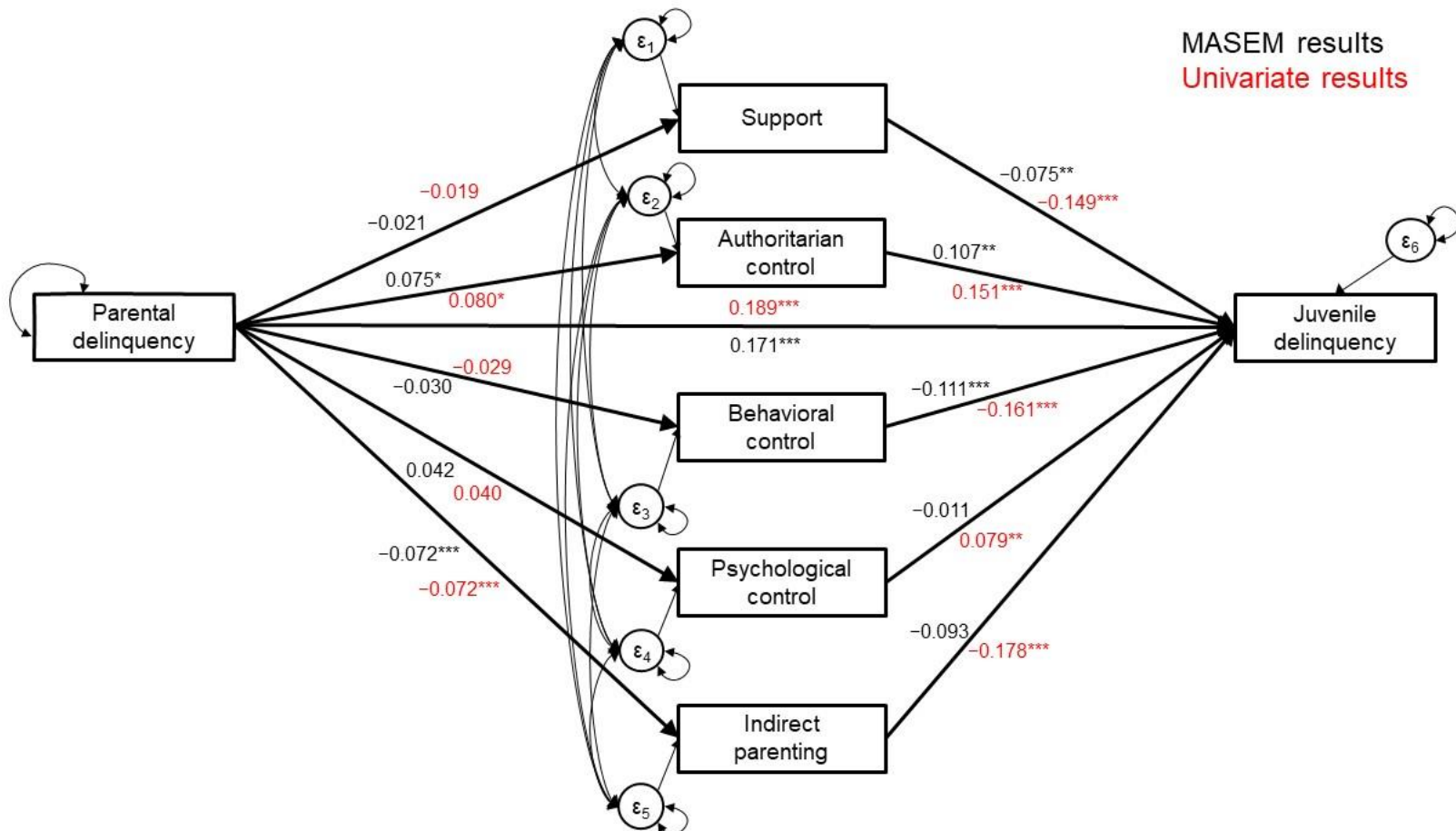




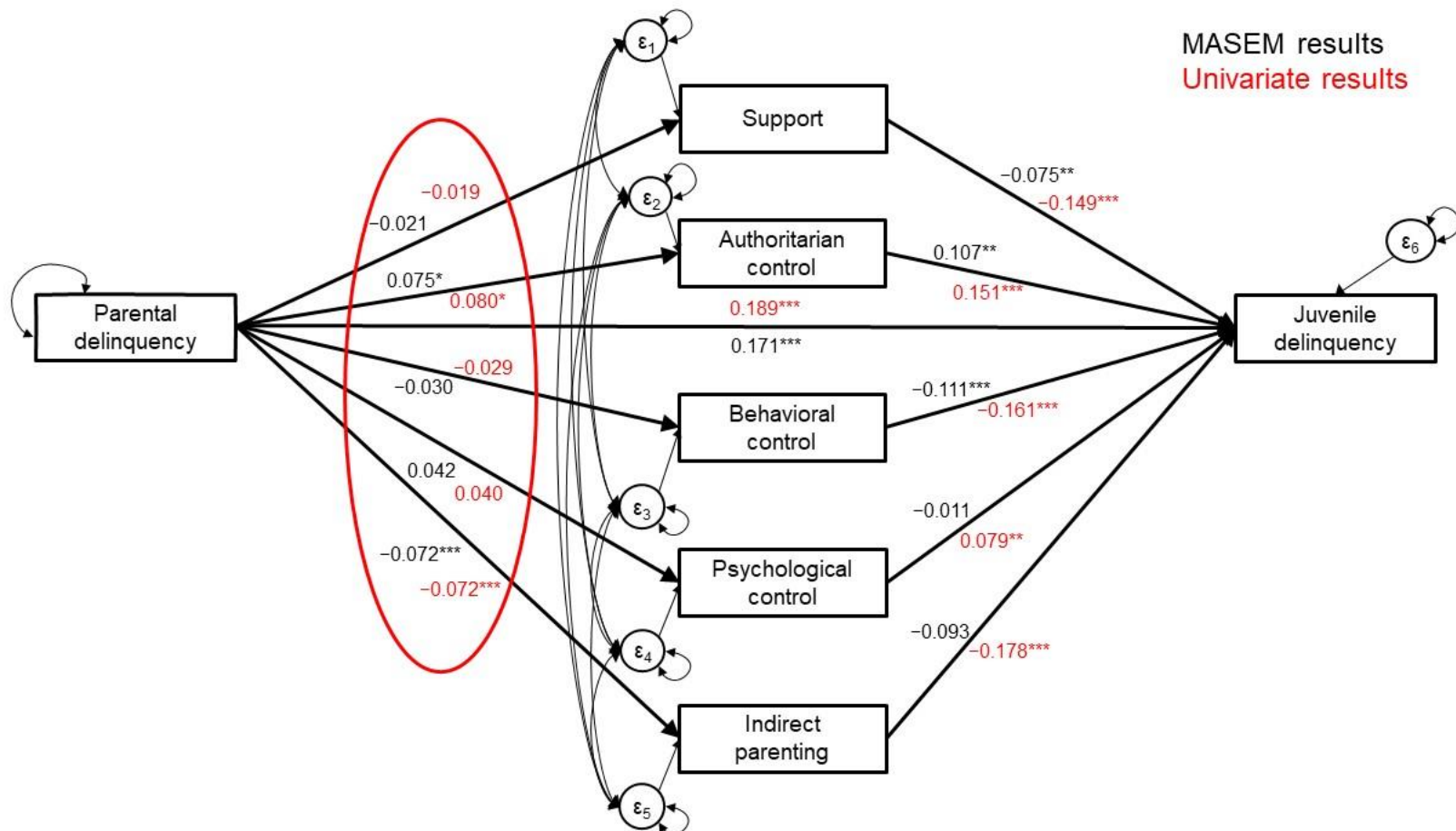
# Results – MASEM



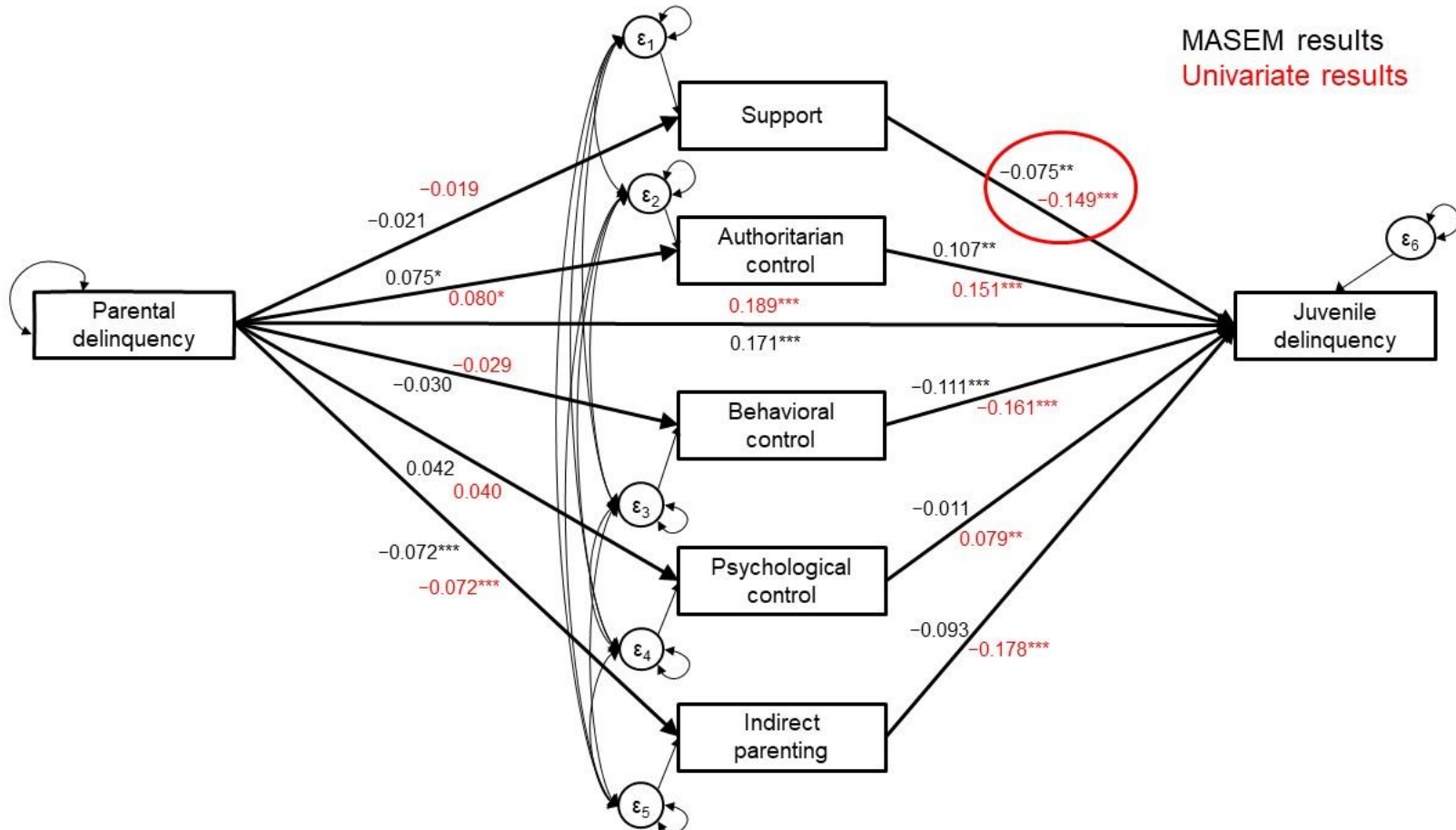
# Results – Compared



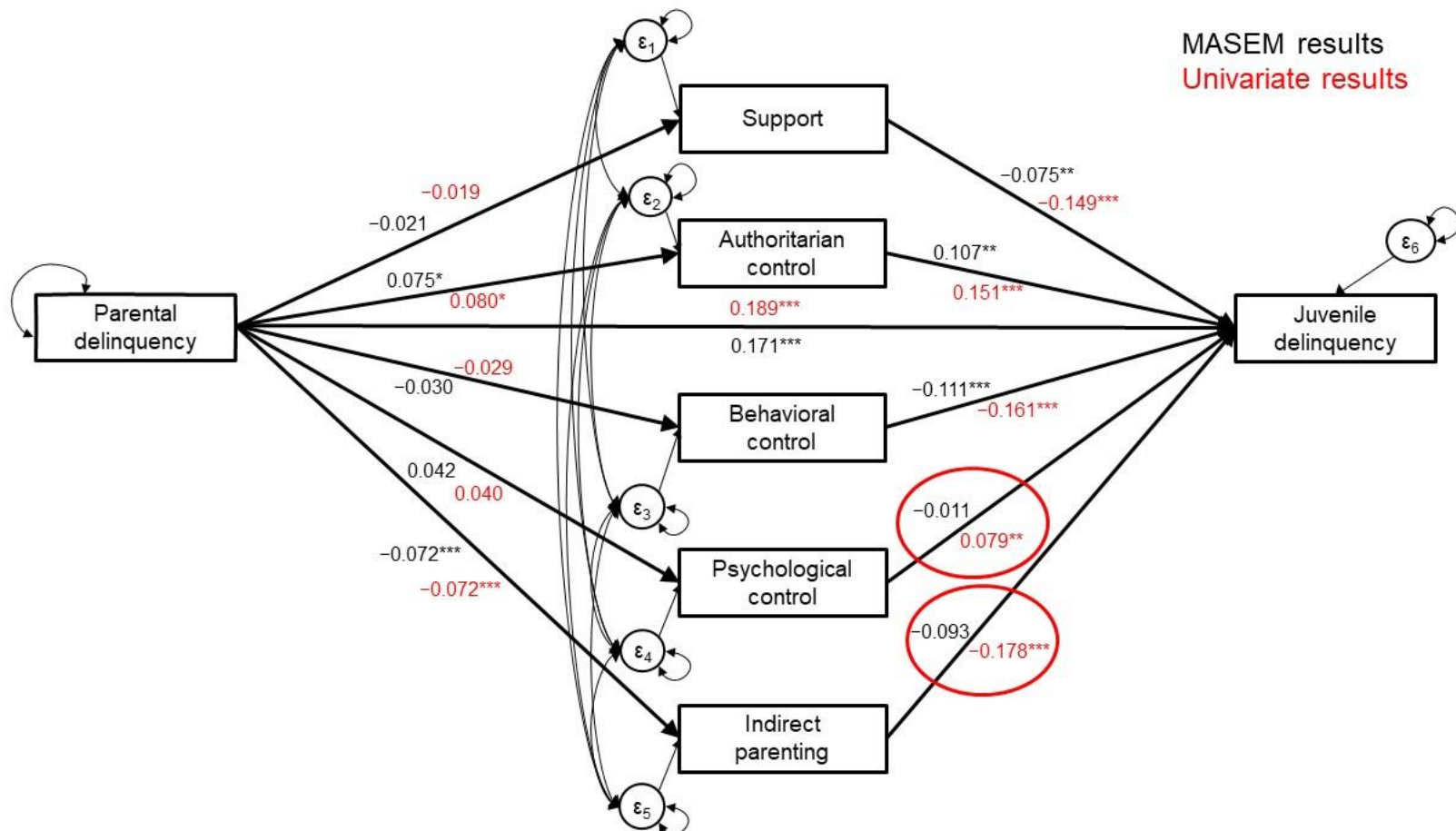
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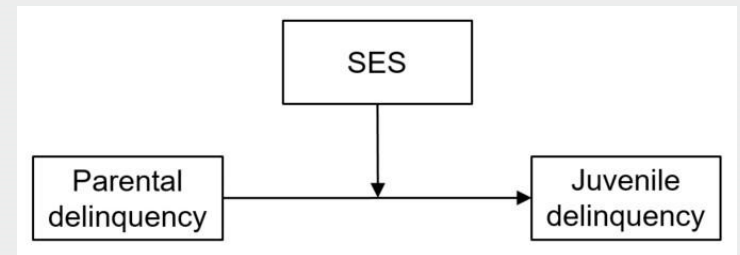
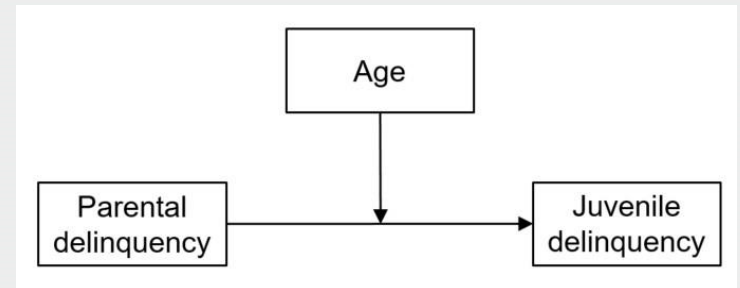


# Results – Compared



# Moderator Analysis

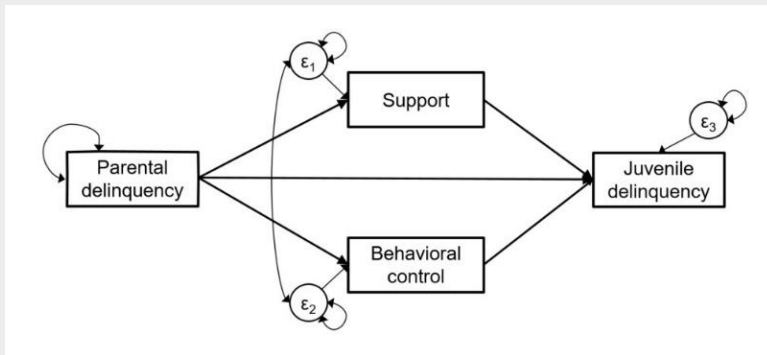
- Univariate meta-analysis
  - All kinds of moderator variables



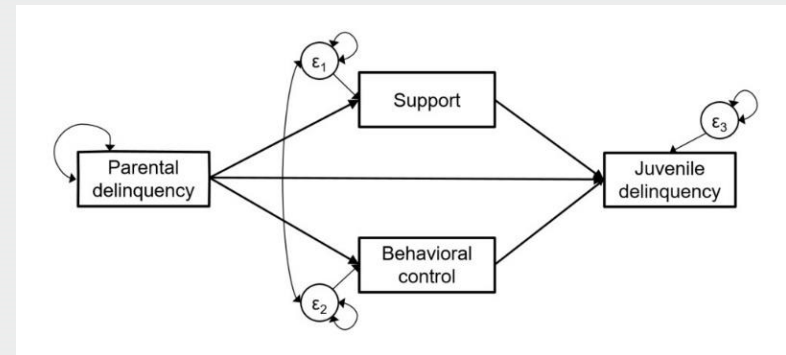
# Moderator Analysis

## ■ MASEM

- Subgroup analysis (Jak & Cheung, in press) → compare groups of studies
- Continuous moderator variable → create subgroups
- Loss of information



Group 1



Group 2

# Moderator Analysis

- Continuous: Age
  - Univariate: significant effect on some associations
  - MASEM: no significant effects
  
- Categorical: SES
  - Univariate: no significant effects
  - MASEM: no significant effects



# Conclusion

- Different methods → different effect sizes → different conclusions

MASEM	Univariate Meta-Analysis
Set of variables in hypothesized model	2 variables – 1 association
Multiple regression coefficients	Bivariate correlations
Can control for other variables	Cannot control for other variables
Can estimate indirect / mediation effects	Only bivariate relationships
Can answer RQ's that were not explored before	Only summary effect size of associations that were examined before
Multivariate analysis	Univariate analysis
Moderator analysis with only categorical variables	Moderator analysis with all kinds of variables
Rather one moderator at a time	Several moderators at once

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