

# Multiple Methods for Multiple Reporters of Child Maltreatment

## Results from the Lehigh Study

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## 1 Background

The Lehigh Study presents a unique opportunity. Data are collected on experiences of abusive discipline as reported by *administrative* reports, two *parental* reports at two different time points, and two *self* reports at two different time points. However, in the absence of a gold standard measure of abusive discipline, appropriately aggregating these multiple reports across multiple time points represents an analytic challenge.

In the manuscript below, we employ multiple strategies to estimate the relationship of these multiple reports from multiple reporters at multiple time points to a mental health outcome. We compare and contrast the advantages and disadvantages of these different methods, and conclude the manuscript with suggestions on optimal methodological approaches to confront the methodological challenges that are posed by having multiple reports from multiple reporters at multiple time points.

## 2 Basic Conceptual Model

We begin with a basic conceptual model of the reports and time points in the data, without at this point suggesting any associational or causal relationships.

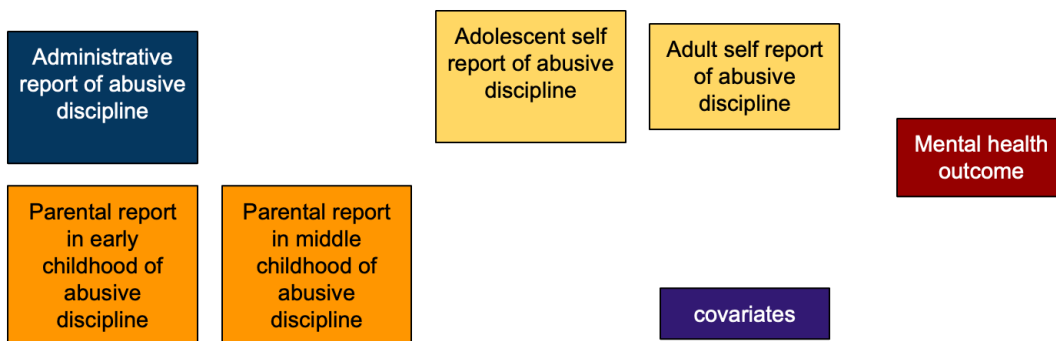


Figure 1: conceptual model

## 3 Variable Abbreviations

For parsimony, we use the following conventions for variable names.

Table 1: Variables and Variable Labels

Variable	Label
administrative	administrative report
PR1	parental report in early childhood
PR2	parental report in middle childhood
SR1	adolescent self report
SR2	adult self report
covariates	covariates (multiple variables)
outcome	mental health outcome

## 4 Methods

### 4.1 OLS (or Logistic) Regression

#### 4.1.a Diagram

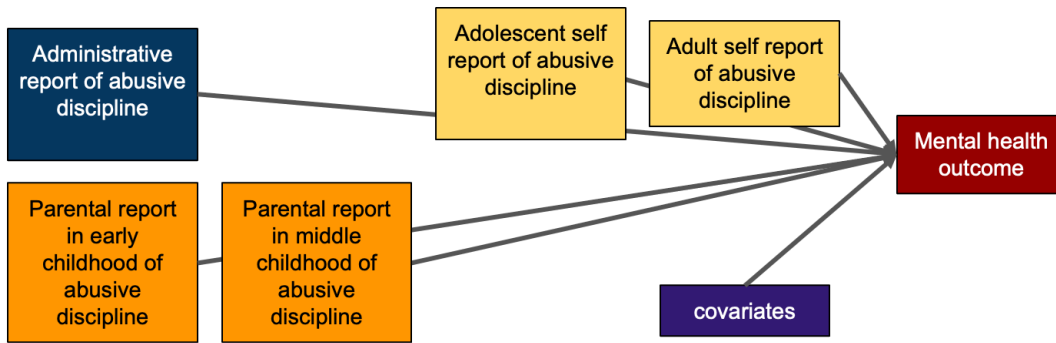


Figure 2: OLS

#### 4.1.b Equation

$$\text{outcome} = \beta_0 + \beta \text{ P1} + \beta \text{ P2} + \beta \text{ SR1} + \beta \text{ SR2} + \beta \text{ administrative} + \Sigma \beta \text{ covariates} + \epsilon_1$$

#### 4.1.c Syntax

regress outcome P1 P2 SR1 SR2 administrative covariates

## 4.2 Summing Across Reporters

### 4.2.a Diagram

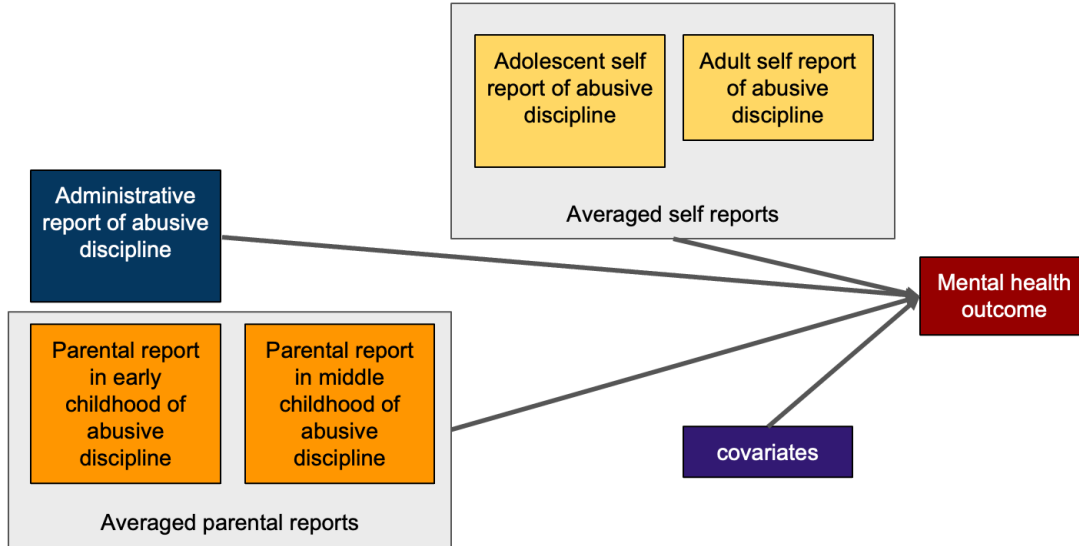


Figure 3: summing across reporters

### 4.2.b Equation

First, we average parental reports:

$$P = \frac{P1 + P2}{2} \quad (2)$$

Then, we average self reports:

$$SR = \frac{SR1 + SR2}{2} \quad (3)$$

Lastly, we estimate an OLS model in which averaged parental and self reports are variables in the model.

$$\text{outcome} = \beta_0 + \beta P + \beta SR + \beta \text{administrative} + \Sigma \beta \text{covariates} + e_i \quad (4)$$

### 4.2.c Syntax

```
regress outcome P SR administrative covariates
```

## 4.3 Path Model

### 4.3.a Diagram

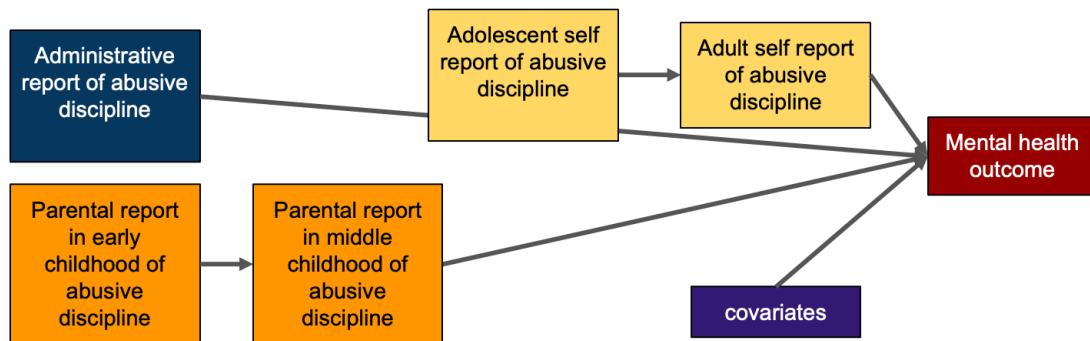


Figure 4: path model

#### 4.3.b Equation

#### 4.3.c Syntax

### 4.4 Latent Construct(s)

#### 4.4.a Diagram

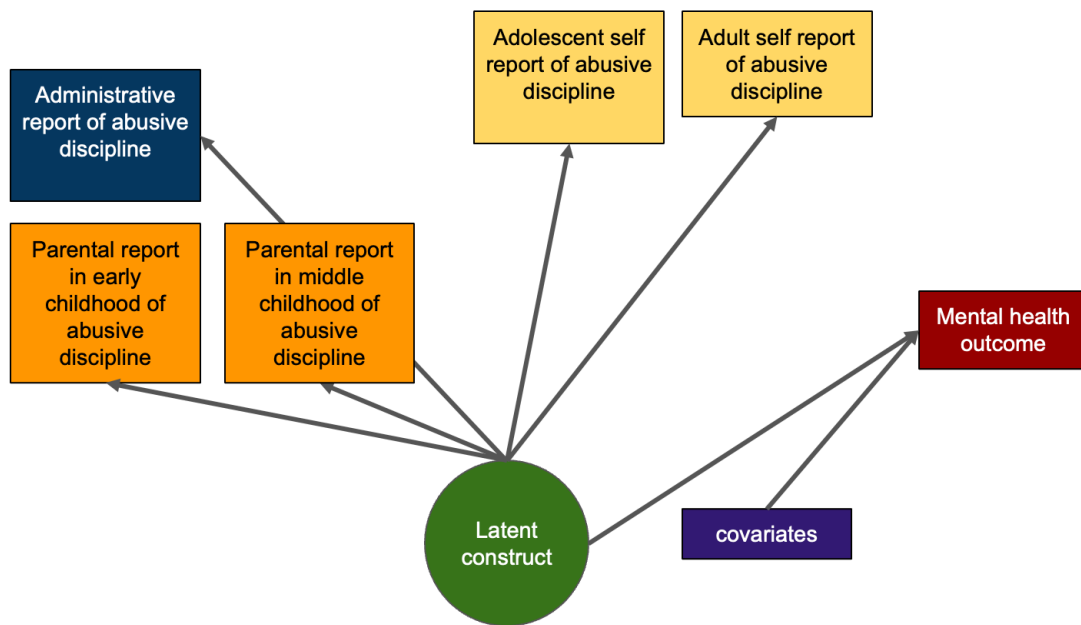


Figure 5: latent construct

#### 4.4.b Equation

#### 4.4.c Syntax

### 4.5 Latent Profile Analysis (Person Centered Approach)

#### 4.5.a Diagram

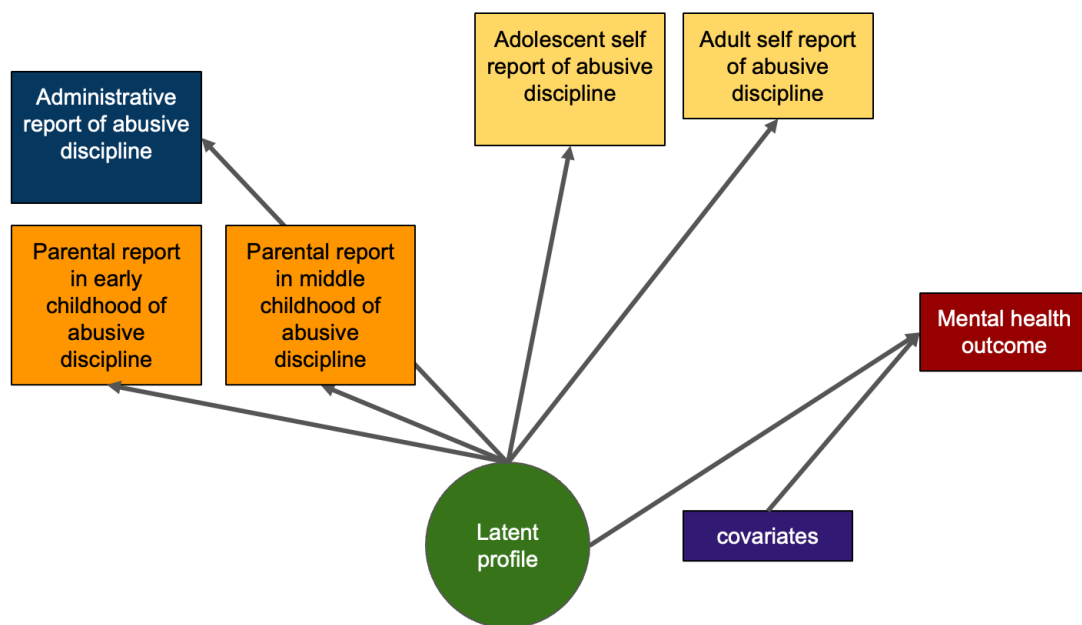


Figure 6: latent profile

#### 4.5.b Equation

#### 4.5.c Syntax

### 4.6 Network Analysis

#### 4.6.a Diagram

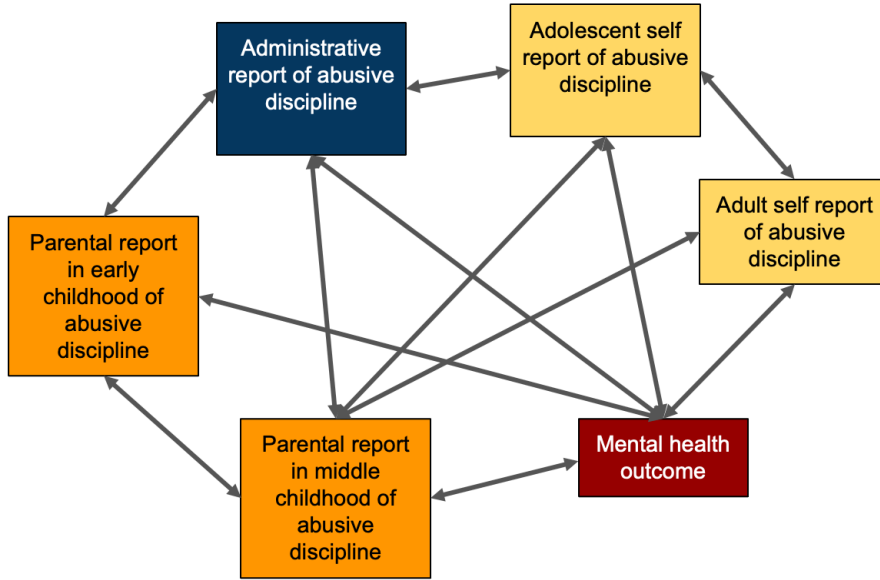


Figure 7: network model

#### 4.6.b Equation

$$\begin{array}{ccccccc}
 & P1 & P2 & SR1 & SR2 & administrative & outcome \\
 P1 & 1 & r_{P1, P2} & r_{P1, SR1} & r_{P1, SR2} & r_{P1, administrative} & r_{P1, outcome} \\
 P2 & & 1 & r_{P2, SR1} & r_{P2, SR2} & r_{P2, administrative} & r_{P2, outcome} \\
 SR1 & & & 1 & r_{SR1, SR2} & r_{SR1, administrative} & r_{SR1, outcome} \\
 SR2 & & & & 1 & r_{SR2, administrative} & r_{SR2, outcome} \\
 administrative & & & & & 1 & r_{administrative, outcome} \\
 outcome & & & & & & 1
 \end{array} \quad (5)$$

#### 4.6.c Syntax

corr P1 P2 SR1 SR2 administrative outcome

#### 4.7 Multilevel Modeling

#### 4.8 Classification and Regression Tree (CART) (Machine Learning)

#### 4.9 Random Forest (Machine Learning)