Family Life, Activity, Sun, Health, and Eating (FLASHE) Study Webinar:
An Introduction to Dyadic Data Analysis

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Session Logistics

- Closed captioning is provided at: captionedtext.com. The confirmation number for this session is: 2857016.

Today's speakers

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University of Delaware

Session Logistics

- Questions are encouraged. You may submit your questions at any time during the presentation. Type your question in the chat feature and submit to the presenter.

The FLASHE Study

Overview

FLASHE Facts … in a flash!

- One-time, cross-sectional survey

- U.S. Panel

- Web-based

- Two modules: diet-focused and physical activity-focused

- Dyads of parent/primary caregiver and their adolescent child (12-17 years)

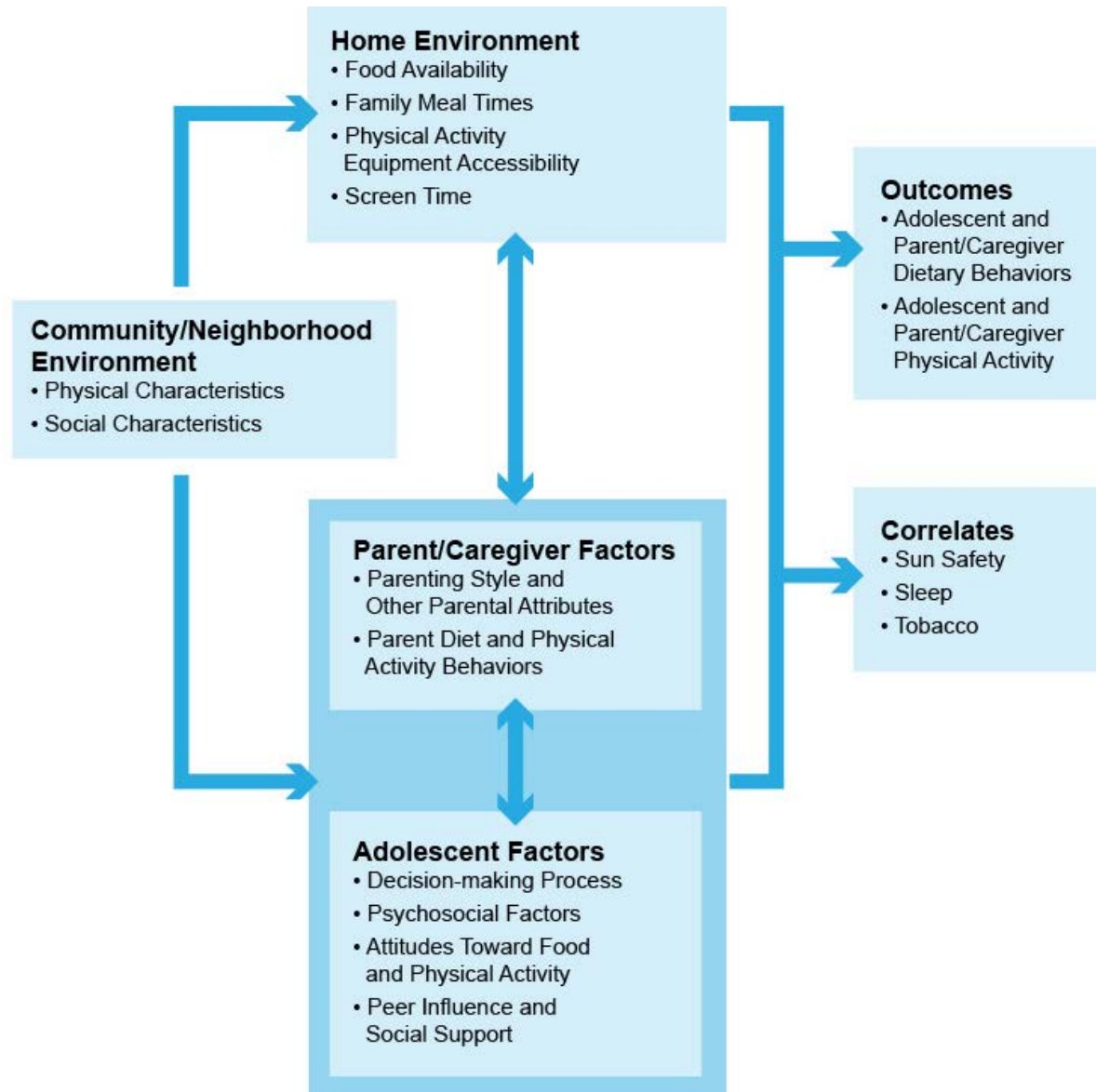- Data collected between April-October 2014
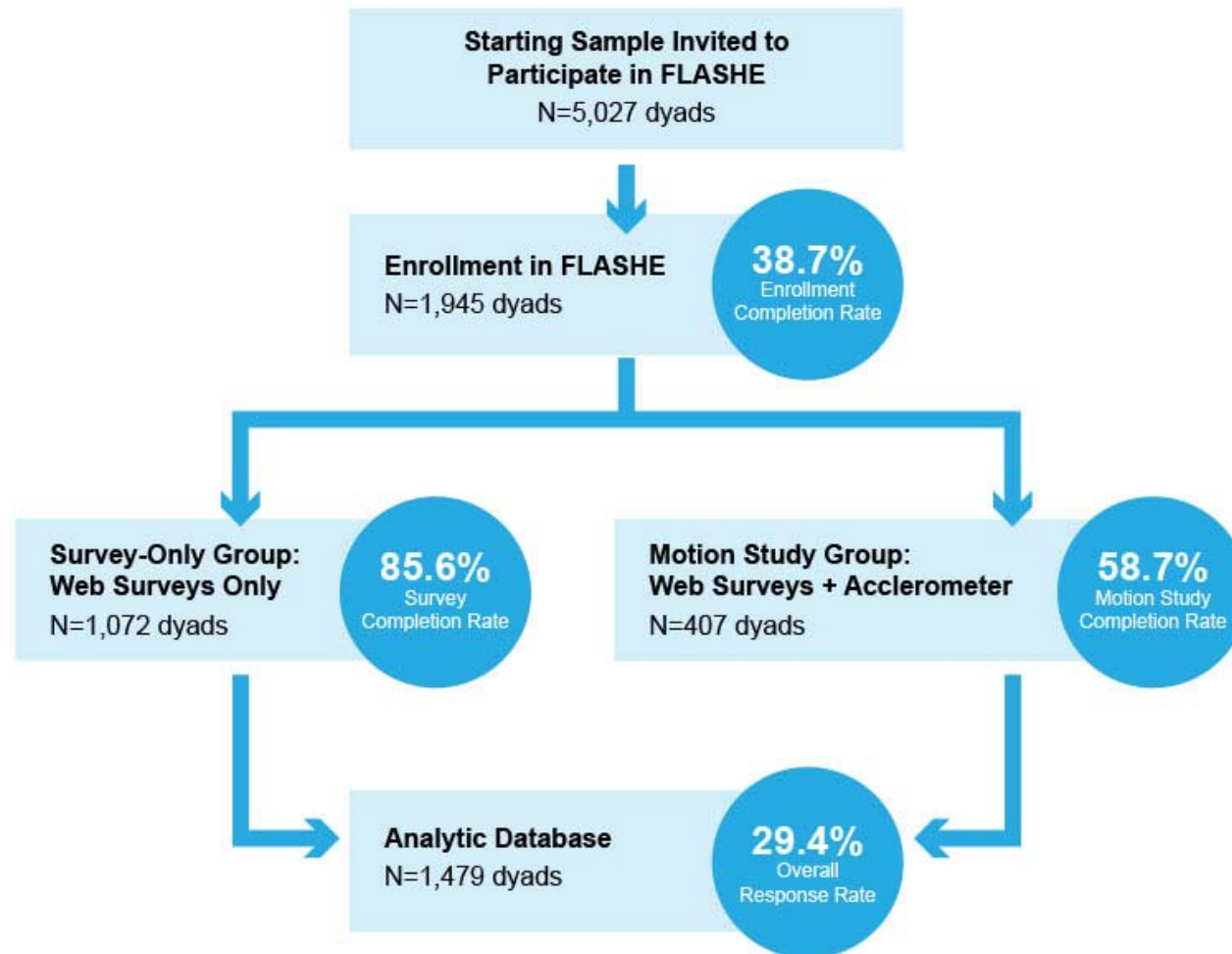
FLASHE website

- Address: http://cancercontrol.cancer.gov/brp/hbrb/flashe.html

FLASHE conceptual model

FLASHE flowchart

Starting Sample Invited to Participate in FLASHE
N=5,027 dyads

Enrollment in FLASHE
N=1,945 dyads

38.7% Enrollment Completion Rate

Survey-Only Group: Web Surveys Only
N=1,072 dyads

85.6% Survey Completion Rate

Motion Study Group: Web Surveys + Acclerometer
N=407 dyads

58.7% Motion Study Completion Rate

Analytic Database
N=1,479 dyads

29.4% Overall Response Rate

Webinar Outline

- What are Dyadic Data?

- FLASHE Dyadic Variables

- Dyadic Covariation in FLASHE Variables

- Explaining Dyadic Covariation: The Actor-Partner Interdependence Model

- Resources

- Q&A

Dyadic Data and Example FLASHE Variables

Dyadic Design

- A dyadic design is one where the investigator samples pairs of people from a population. Each person in the dyad provides information on the same variables.

- The results can allow you to draw conclusions about a population of dyads.

Two Types of Dyads

1. Indistinguishable dyads: gay/lesbian couples, friends, identical twins.

2. Distinguishable dyads: heterosexual couples; a parent and a child; an older and younger sibling. FLASHE dyads are distinguishable.

Dyadic Variables in FLASHE

- In FLASHE, dyads of one parent and one teen separately provided information on their own health-relevant variables.

- We will use two of these variables: Parent and teen reports of their
  - Fruit and vegetable consumption
  - Self-efficacy for fruit and vegetable consumption

Issues in Dyadic Data Analysis

- The observations of the parent and the teen in each dyad are likely to show non-independence.

- Doesn't this mean there is a problem if we were to use regression or ANOVA to analyze the data?

- Yes, more complex models are needed.

- But dyadic data are valuable *precisely because scores from dyad members are usually related*.

- Proper dyadic data analysis will allow us to understand *how much and why this may be the case*.

What processes lead to covariation between dyad members?

- **Common influences:** Parents and teens share the same local culture, geography, and economy. These can lead parents and teens to be similar on health-relevant variables, such as diet.

- **Within-dyad influences:** Dyad members can affect one another's thoughts, feelings, and behaviors. For example, parents and teens can have similar diets because parents often cook family meals.

Specific Research Questions

- Do parents and teens covary in their fruit and vegetable consumption?

- Does the parent's efficacy influence the teen's consumption?

- Does the teen's efficacy influence the parent's consumption?

- Do these effects explain why the parent and teen are similar in their consumption?

How Do You Measure Covariation in Dyadic Data?

- We will use a Pearson correlation, denoted r. This is an index of linear covariation that ranges from -1 to 1.

- If r is positive, then when one dyad member scores high, the other tends to as well.

- If r is 0, then knowing the score of one dyad member tells you nothing about the score of the other.

- If r is negative, then when one dyad member scores high, the other dyad member tends to score low.

FLASHE Measures of FV Consumption

- During the past 7 days how many times did you eat
  - FRUIT like apples, bananas, melon, etc.?
  - a GREEN SALAD, with or without other vegetables?
  - any OTHER KIND OF POTATOES that aren't fried like baked, boiled, mashed or potatoes used in soups and stews?
  - other NON-FRIED VEGETABLES like carrots, broccoli, collards, green beans, corn, etc.?
- The response options were: None (1), 1-3/wk (2), 4-6/wk (3), 1/day (4), 2/day (5), 3/day (6)
- An index was created by summing scores on the 4 variables and putting the result on a 0-10 scale (Cohen, Cohen, Aiken & West, 1999)

Efficacy for FV

Parents and teens answered this question:

I feel confident in my ability to eat fruits and vegetables every day.

1 ○ Strongly disagree
2 ○ Somewhat disagree
3 ○ Neither disagree nor agree
4 ○ Somewhat agree
5 ○ Strongly agree

Efficacy (EFF) was rescaled such that 0 was the lowest possible score and 10 was the highest (Cohen, Cohen, Aiken & West, 1999)
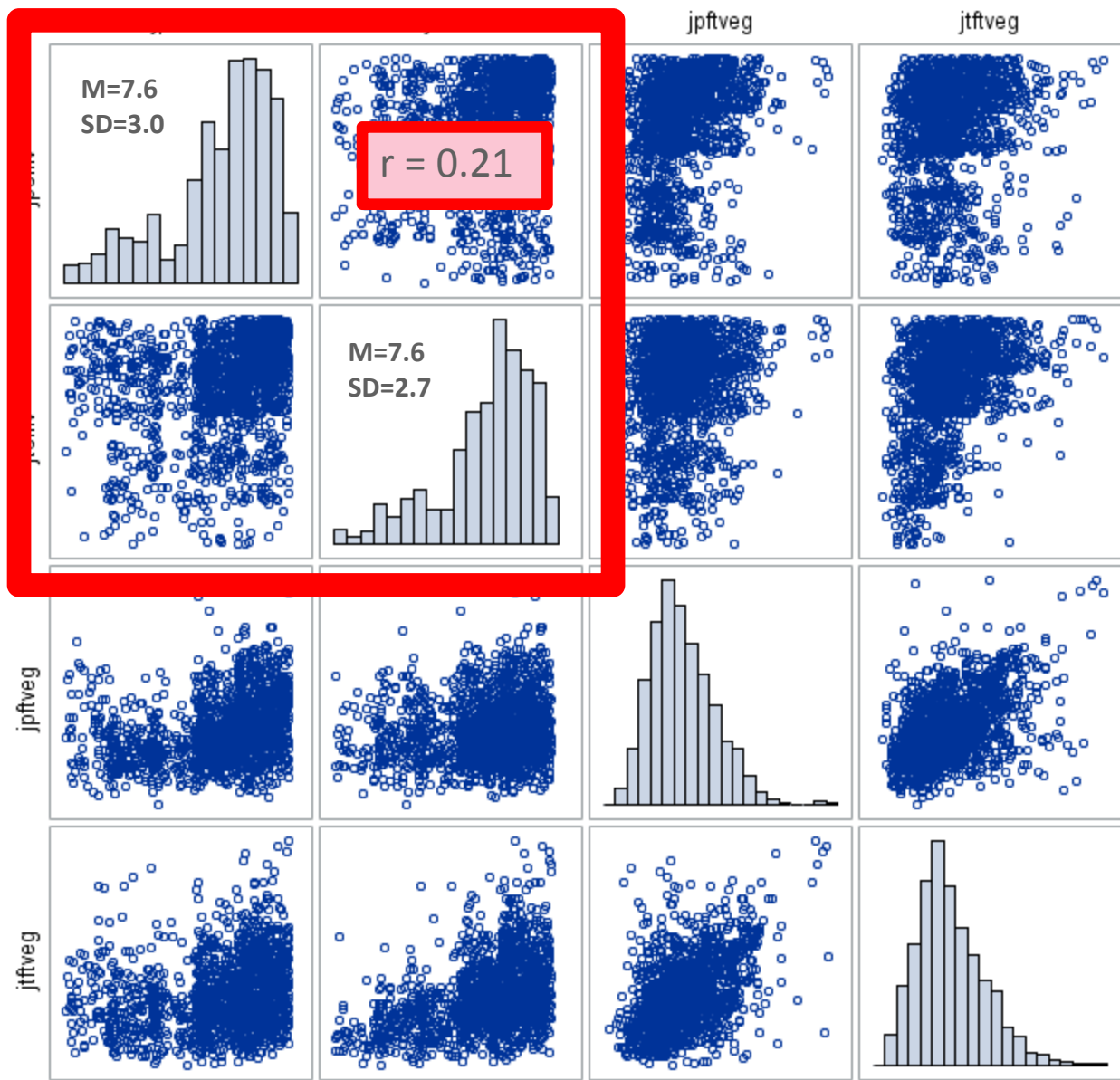
Scatter Plot Matrix
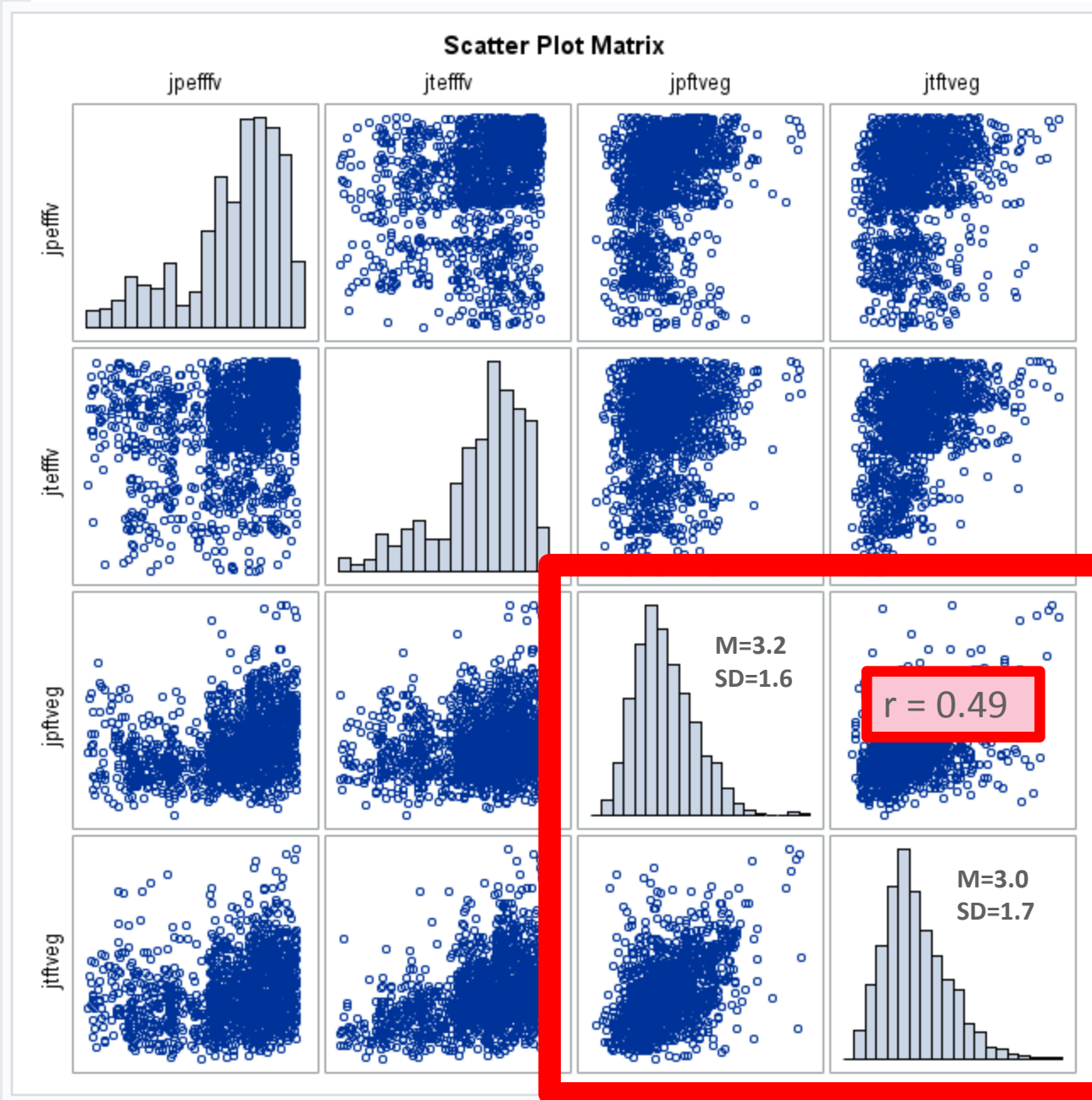
EFF_parent

EFF_teen

FV_parent

FV_teen

M=7.6 SD=3.0

r = 0.21

M=7.6 SD=2.7

jpftveg

jtftveg

jpftveg

jtftveg

N=1486 dyads

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Scatter Plot Matrix

N=1486 dyads

EFF$_{parent}$ · EFF$_{teen}$ · FV$_{parent}$ · FV$_{teen}$

jpefffv · jtefffv · jpftveg · jtftveg

M=3.2 SD=1.6

M=3.0 SD=1.7

r = 0.49

Kenny's Actor-Partner Interdependence Model (APIM)

Dyadic Correlation of Teen and Parent FV
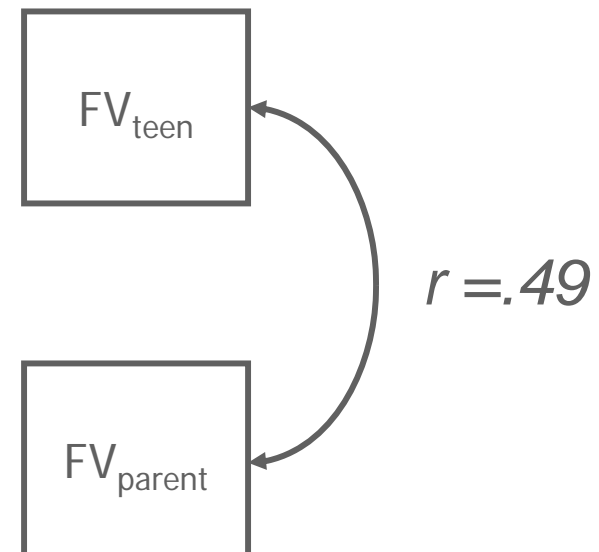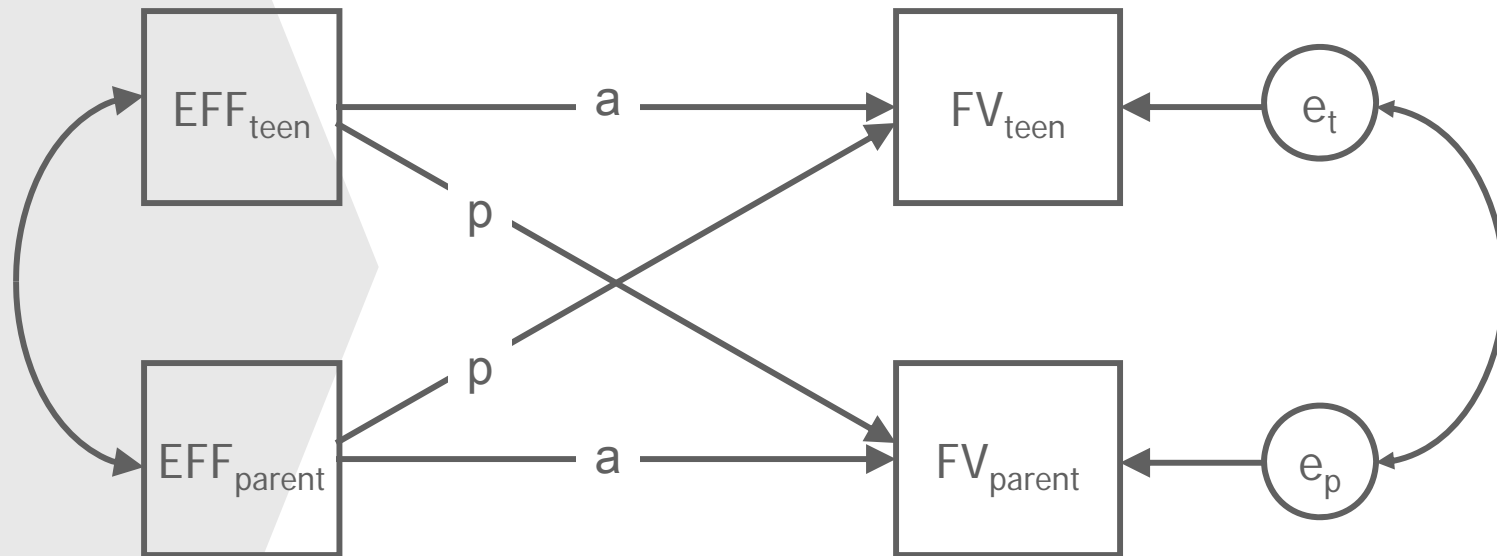
$$FV_{teen}$$

$$r = .49$$

$$FV_{parent}$$
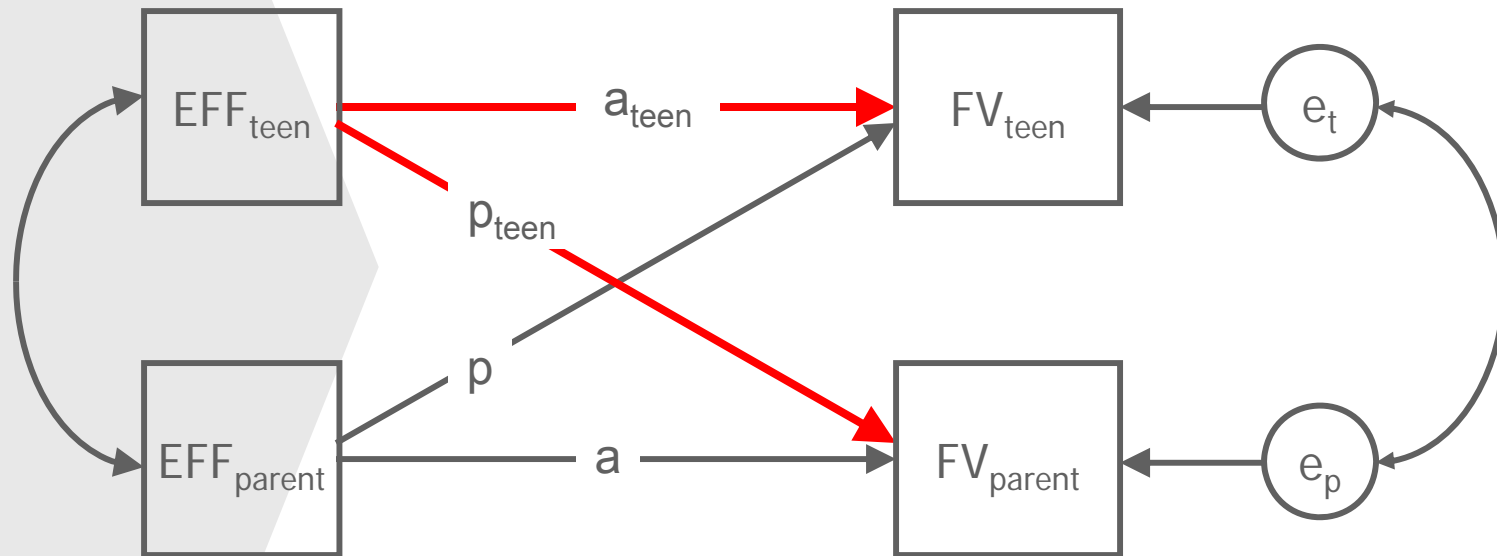
Actor-Partner Interdependence Model

a = Actor effect   p = Partner effect
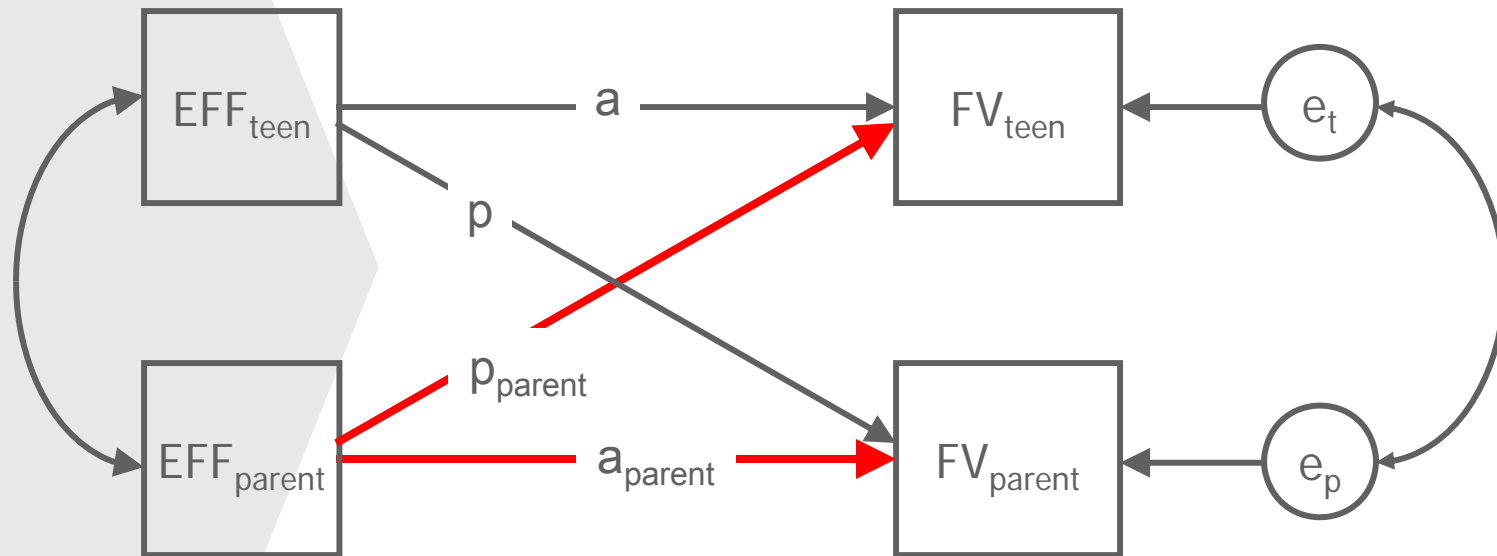
Actor-Partner Interdependence Model

a = Actor effect   p = Partner effect

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a = Actor effect   p = Partner effect
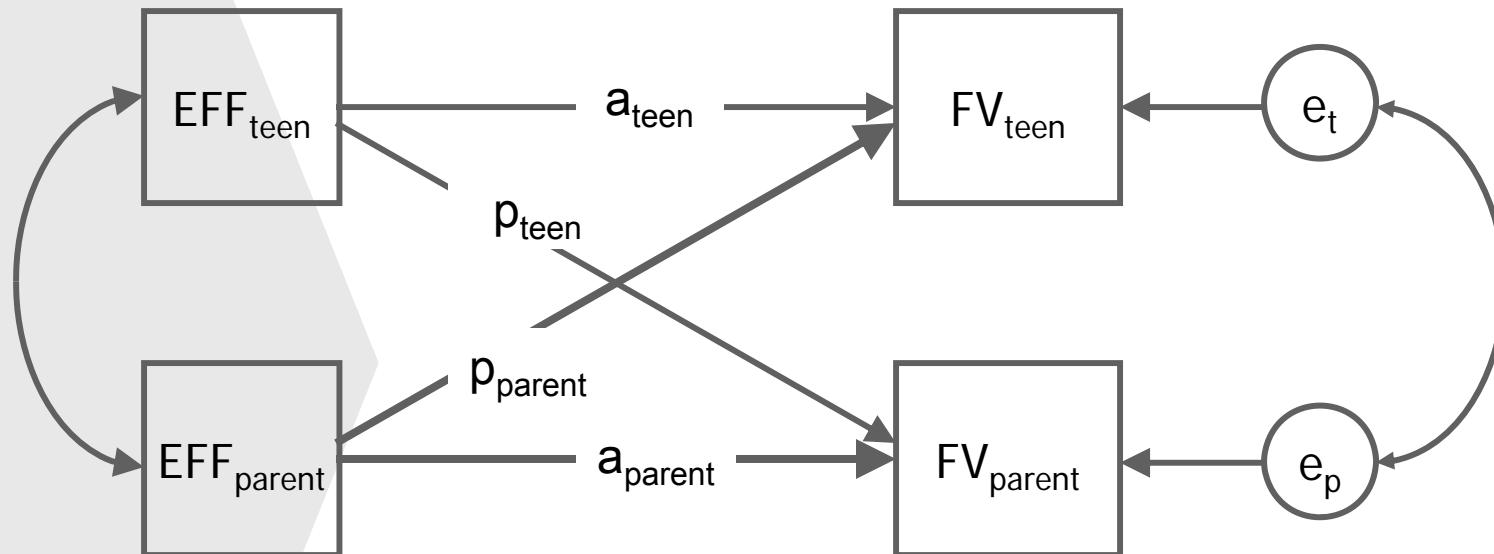
APIM in Equation Form

$$FV_{teen} = a_{teen}(EFF_{teen}) + p_{parent}(EFF_{parent}) + e_{teen}$$

$$FV_{parent} = a_{parent}(EFF_{parent}) + p_{teen}(EFF_{teen}) + e_{parent}$$
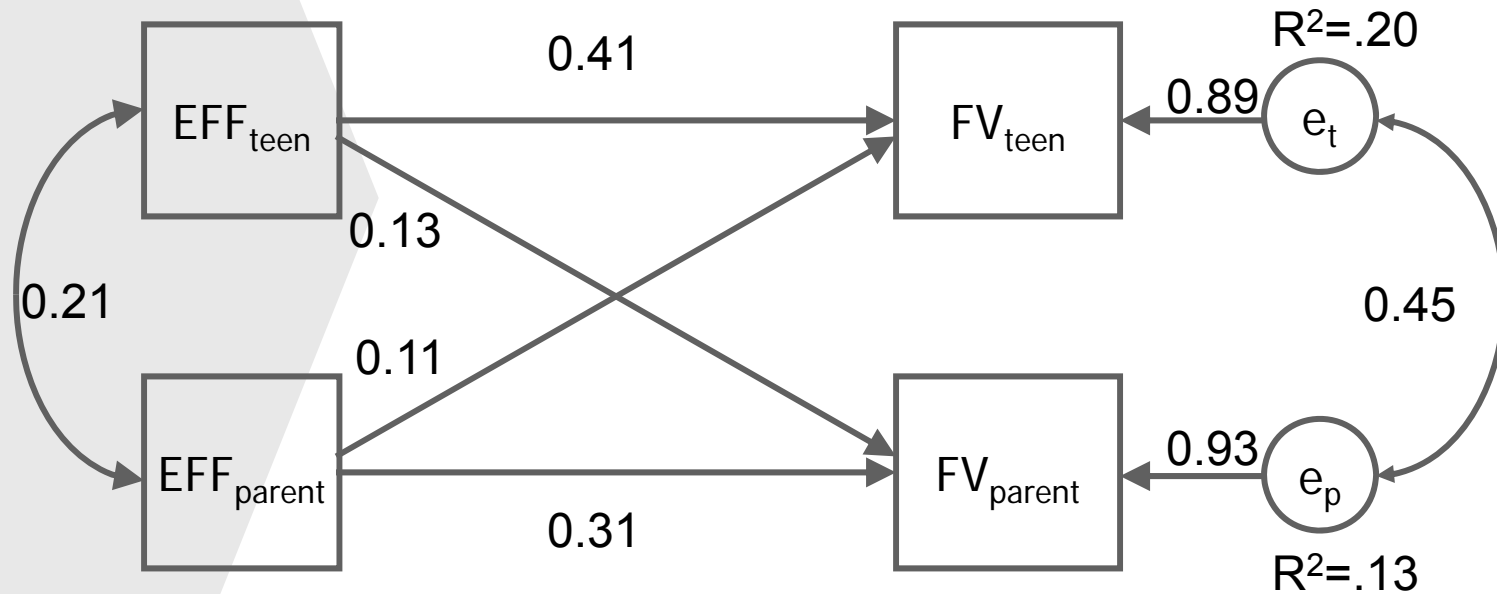
Kenny, Kashy, & Cook, 2006, p. 178

Software for Estimating an APIM

- SEM path modeling (e.g., Mplus, LISREL, Amos, SAS PROC CALIS; lavaan in R)

- Multilevel modeling approach (e.g., SAS PROC MIXED; HLM; SPSS MIXED; lme4 in R)
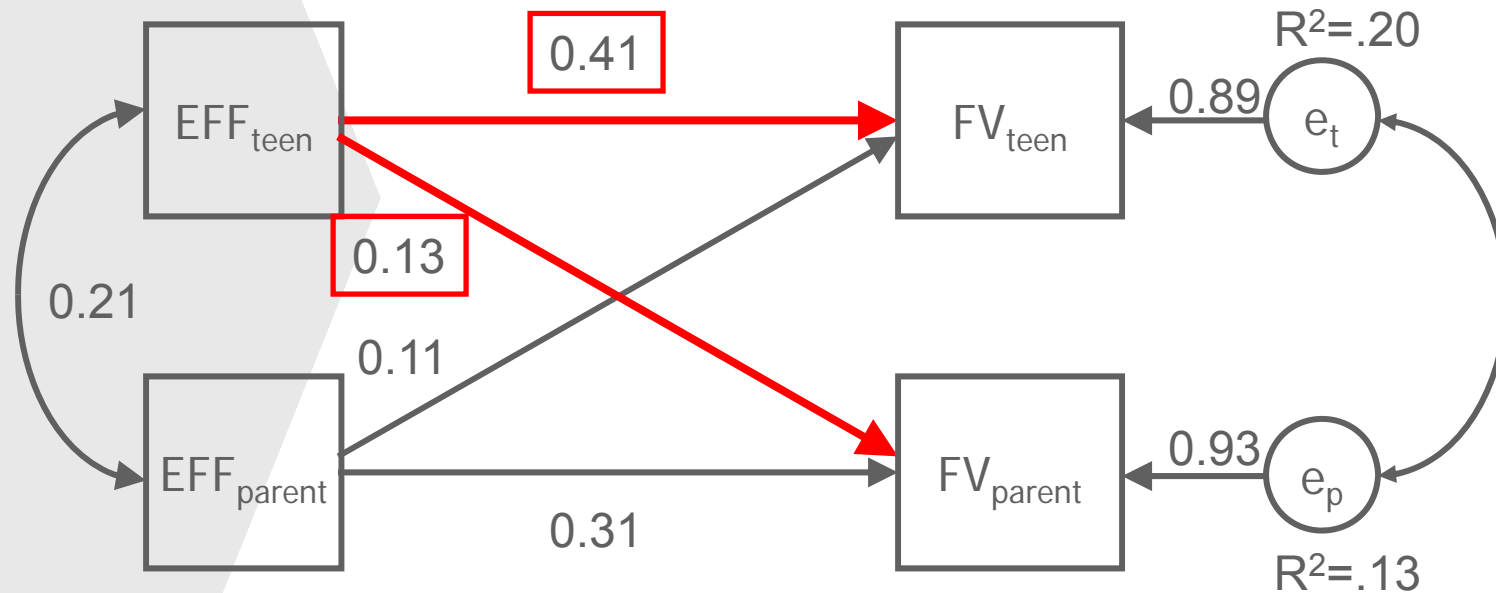
Dyadic Correlation of Teen and Parent FV

FV_{teen}

$r = .49$
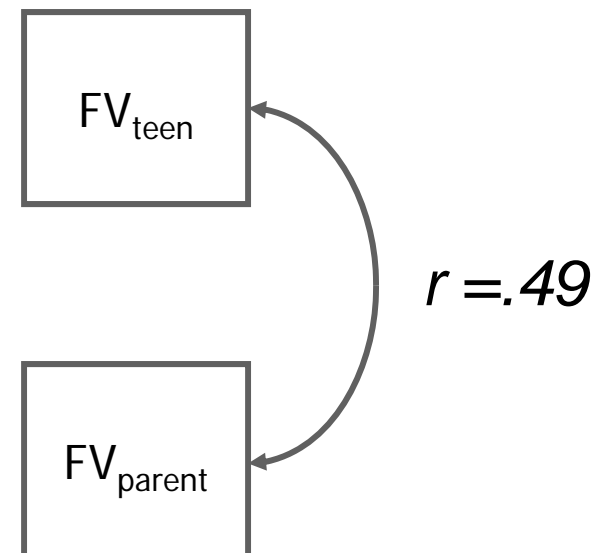
FV_{parent}

Mplus Demonstration Example (Standardized Estimates)

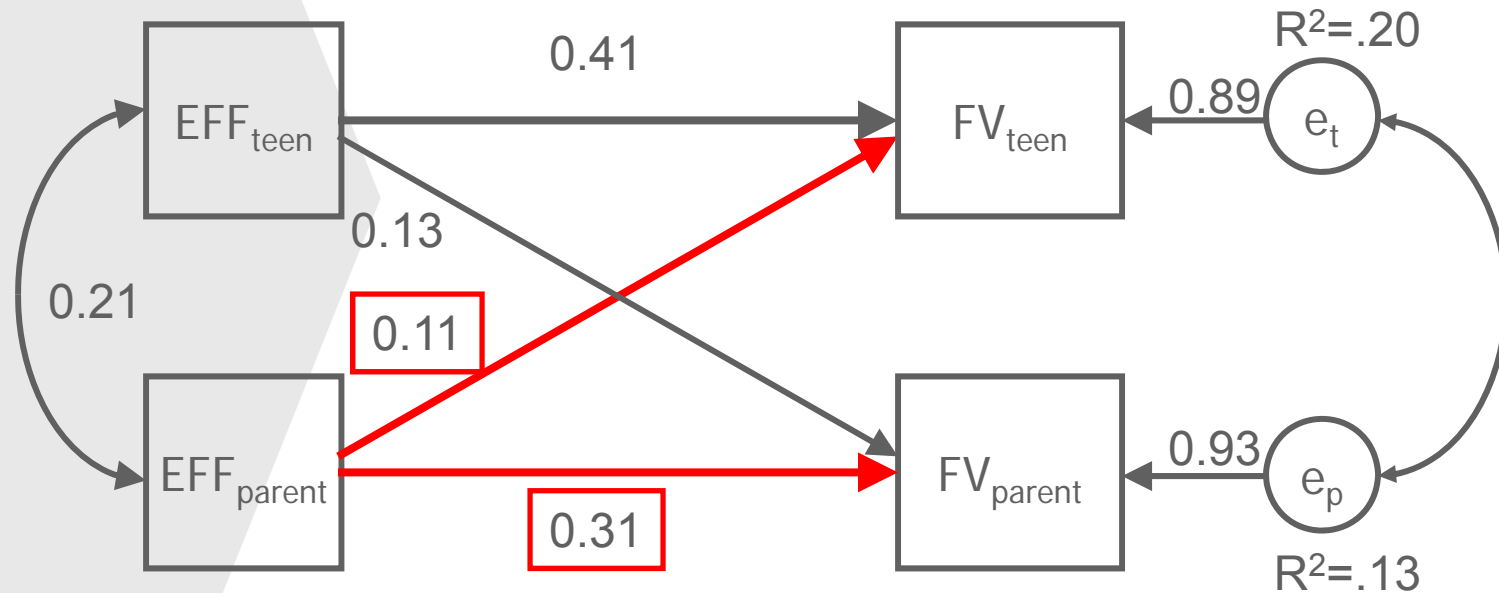# Path Tracing: Teen-effect Driven (Standardized Estimates)

Teen-effect driven: 0.41*0.13 = 0.053

Path Tracing: Parent-effect Driven (Standardized Estimates)

FLASHE
Family Life, Activity, Sun, Health, and Eating Study

$R^2 = .20$

0.41

EFF_{teen} → FV_{teen}

0.89 e_t

0.13

0.21

0.11

EFF_{parent} → FV_{parent}

0.93 e_p

0.31

$R^2 = .13$

Parent-effect driven: 0.31*0.11 = 0.034

Path Tracing: Actor-effect Driven (Standardized Estimates)
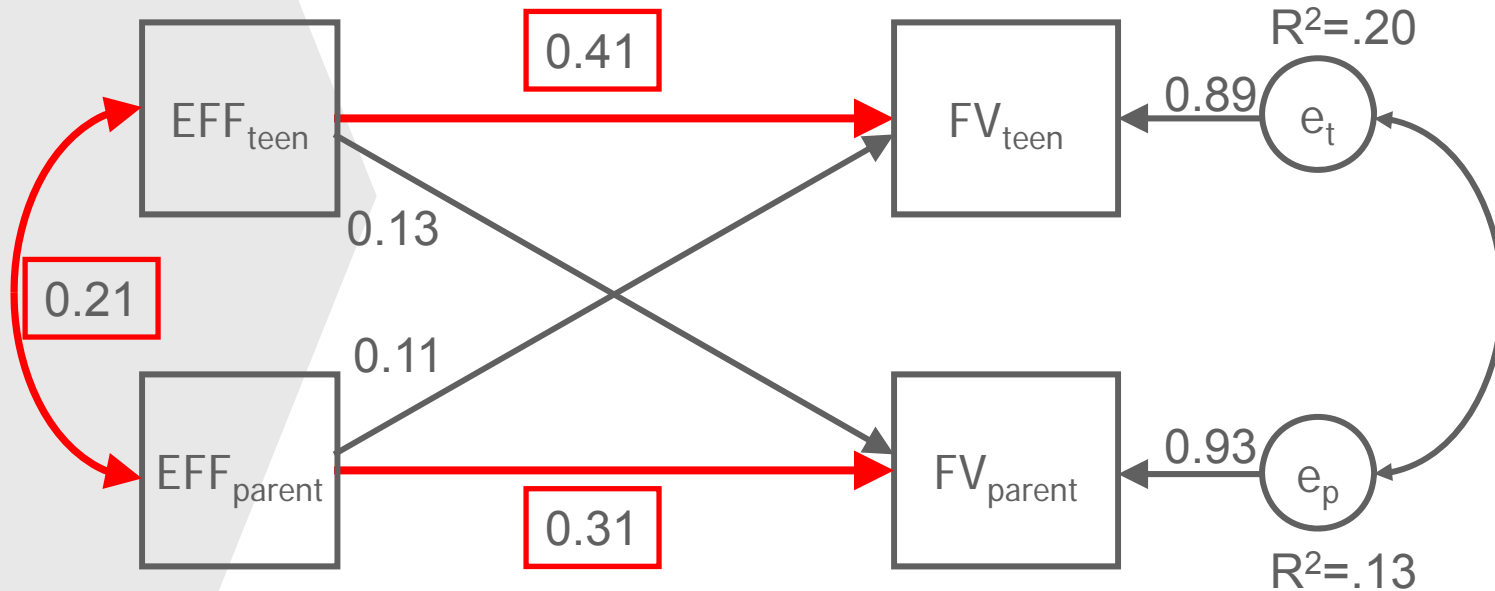
Path Tracing: Partner-effect Driven (Standardized Estimates)
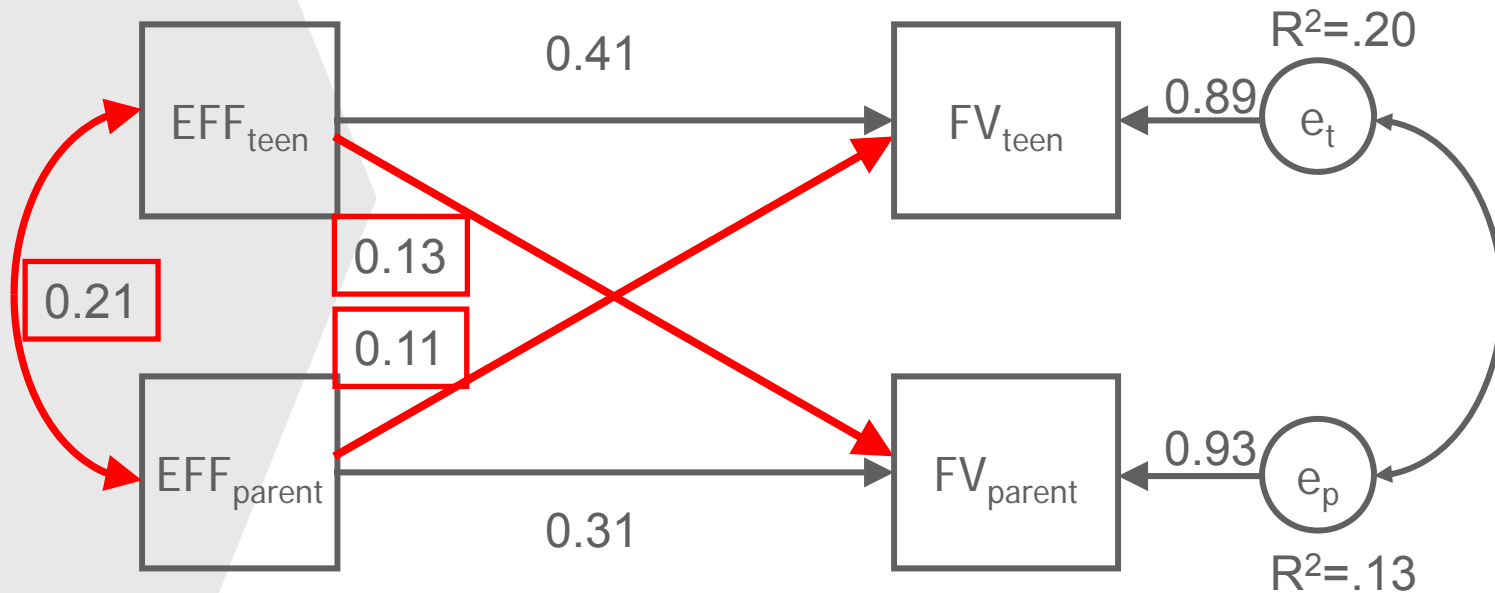
Partner-effect driven: 0.13*0.21*0.11 = 0.003

Decomposing the Dyadic Correlation in FV

- Teen Driven: 11% (0.053)
- Parent Driven:
- Actor-Effect Driven:
- Partner-Effect Driven: 5% (0.027)
  7% (0.034) (0.003)
- Residual:
- Total: 100% (0.488)

24% (0.117) of FV correlation is explained by APIM effects

76% (0.371)

Acknowledgments

- The data modeling ideas in this webinar are drawn from prior work by:

  - Kenny, Kashy and Cook, authors of the 2006 book, *Dyadic Data Analysis*.

  - Gonzalez and Griffin, authors of several classic papers.

- We will give references to these, as well as other resources, later.

Suggested Resources

- Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic data analysis. New York: Guilford.*

- Gonzalez, R., & Griffin, D. (1997). On the statistics of interdependence: Treating dyadic data with respect. In S. Duck (Ed.), *Handbook of personal relationships: Theory, research and interventions (2nd ed., pp. 271-302). Hoboken, NJ: Wiley.*

- Gonzalez, R., & Griffin, D. (2001). A statistical framework for modeling homogeneity and interdependence in groups. In G. J. O. Fletcher & M. S. Clark (Eds.), *Blackwell handbook of social psychology: Interpersonal processes (pp. 505-534). Malden, MA: Blackwell.*

- Griffin, D., & Gonzalez, R. (1995). The correlational analysis of dyad-level data: I. Models for the exchangeable case. *Psychological Bulletin, 118.*

- Cohen, P., Cohen, J., Aiken, L. S., & West, S. G. (1999). The problem of units and the circumstance for POMP. *Multivariate Behavioral Research, 34,* 315-346.

For dyadic analyses of diary, experience sampling, and other intensive longitudinal data:

- Bolger, N., & Laurenceau, J.-P. (2013). *Intensive longitudinal methods: An introduction to diary and experience sampling research. New York: Guilford.*

- Laurenceau, J.-P., & Bolger, N. (2005). Using diary methods to study marital and family processes. *Journal of Family Psychology, 19, 86-97.*

- Laurenceau, J.-P., & Bolger, N. (2011). Analyzing diary and intensive longitudinal data from dyads. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life (pp. 407-422). New York: Guilford.*

Q&A

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Questions

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