

Types of longitudinal study designs, their purposes, and their strengths & weaknesses

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- Onderzoek
- Publicaties
- Samenwerking
- Gegevens
- Team
- Contact
- Con...



Generaties²



Experience

Generations²

Longitudinal birth cohort since 2008
N ~2,000

Transition to parenthood
Attachment, parenting, development



GENERATIES² BESTAAT 10 JAAR!

ag van de Jubileumdag

[meer](#)



PUBLICATIES

Generaties² rapporteert over onderzoeksresultaten via wetenschappelijke publicaties en nieuwsbrieven.

[meer](#)



CONTACT TIJDENS CORONA

Wegens het Coronavirus werken wij vanuit huis. Als u ons wilt bereiken kunt u dat het beste doen via email: info@generaties2.nl

[Lees meer](#)



ONDERZOEK

Generaties² volgt moeders en kinderen vanaf de zwangerschap. Centraal staat de wisselwerking tussen ouderschap, opvoeding en ontwikkeling.

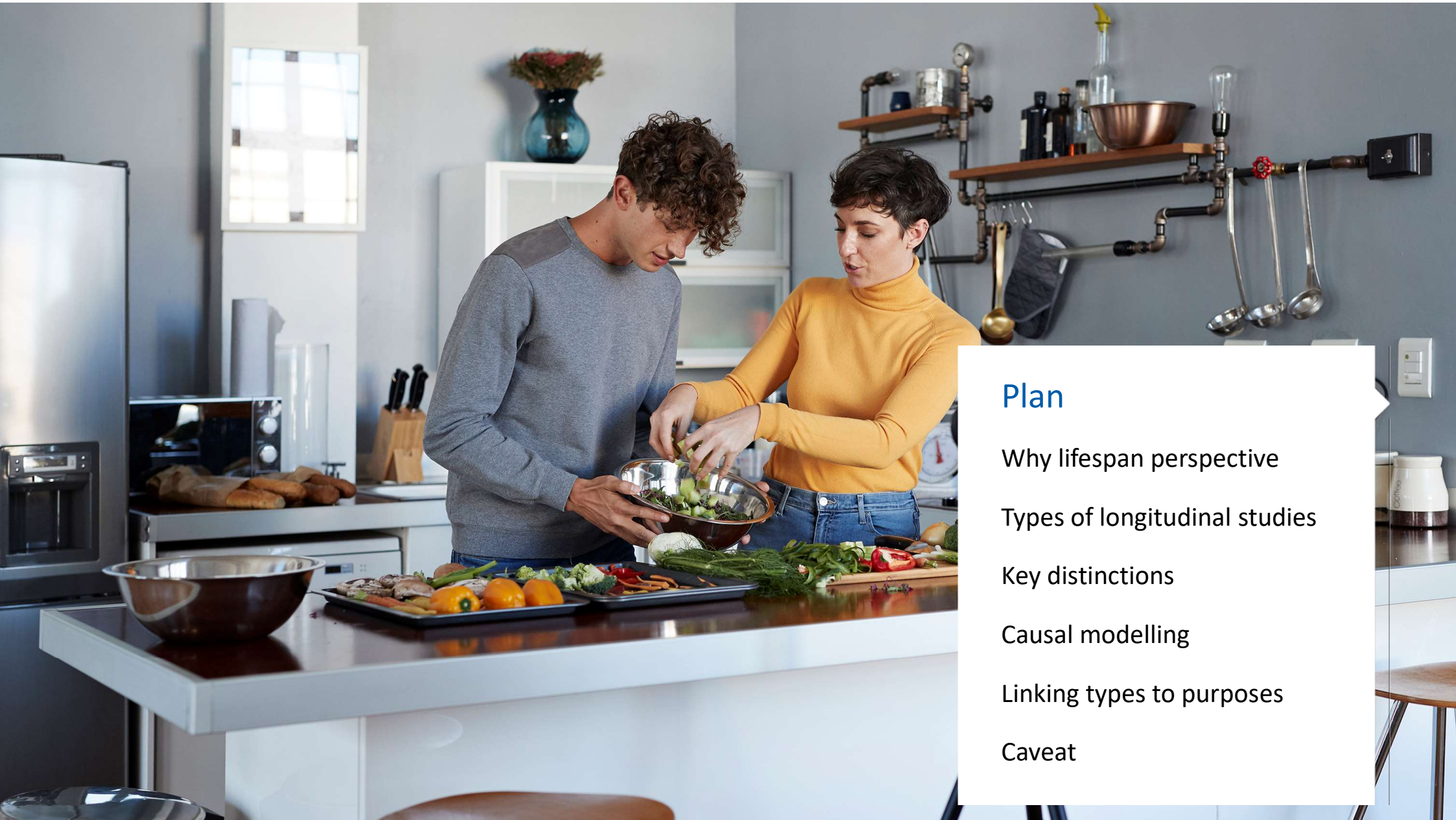
[Lees meer](#)



Experience

Joint / Associate Editor

Child Development (2014-2019)
Journal of Child Psychology &
Psychiatry (2021 -)



Plan

Why lifespan perspective

Types of longitudinal studies

Key distinctions

Causal modelling

Linking types to purposes

Caveat

Birth Trauma from a
life-span perspective

Go to menti.com or
use the mentimeter
app



Universal stages

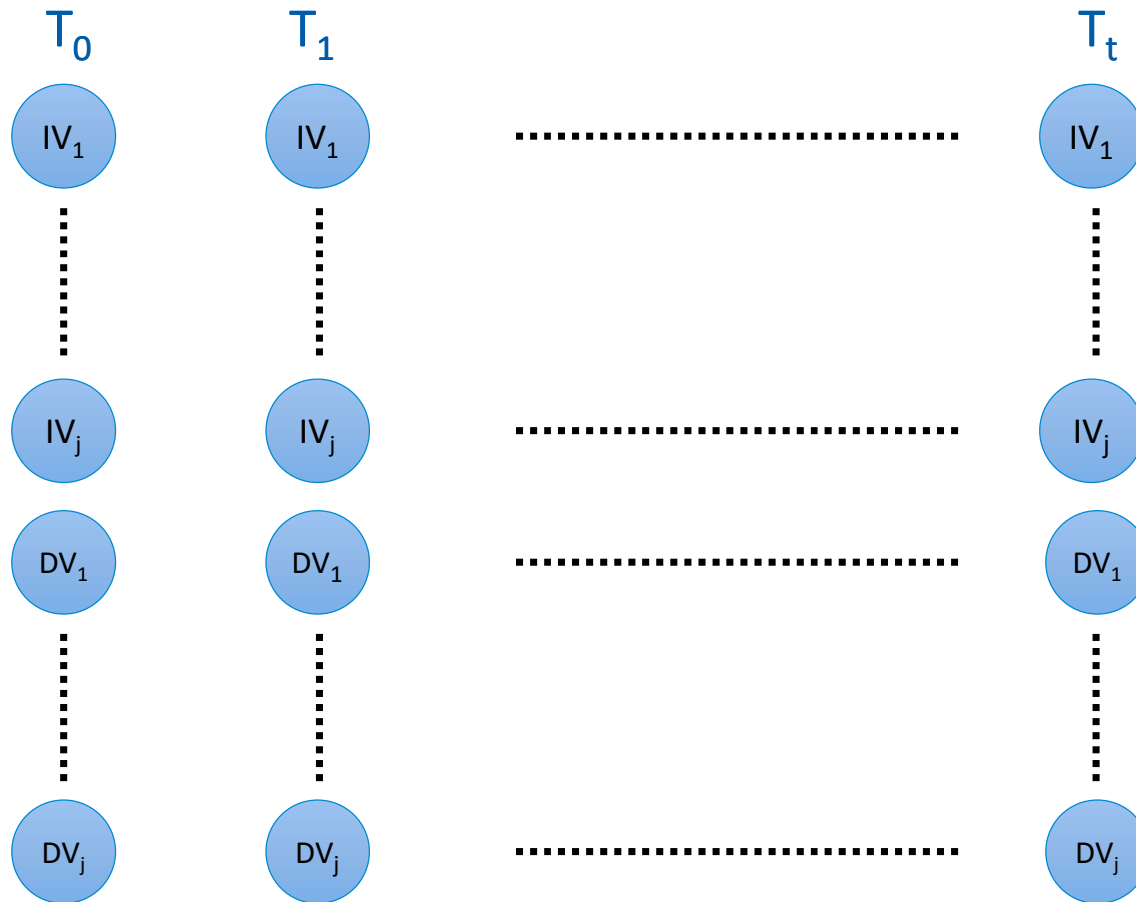


A photograph of a dense grove of trees, likely mangroves, characterized by thick, buttressed trunks and numerous aerial roots. The trees are closely packed, creating a complex network of vertical and horizontal stems. The foliage is green and dense, filling the upper portion of the frame. The ground is dark and appears to be a mix of soil and fallen leaves. The overall scene is a lush, natural environment.

Individual differences

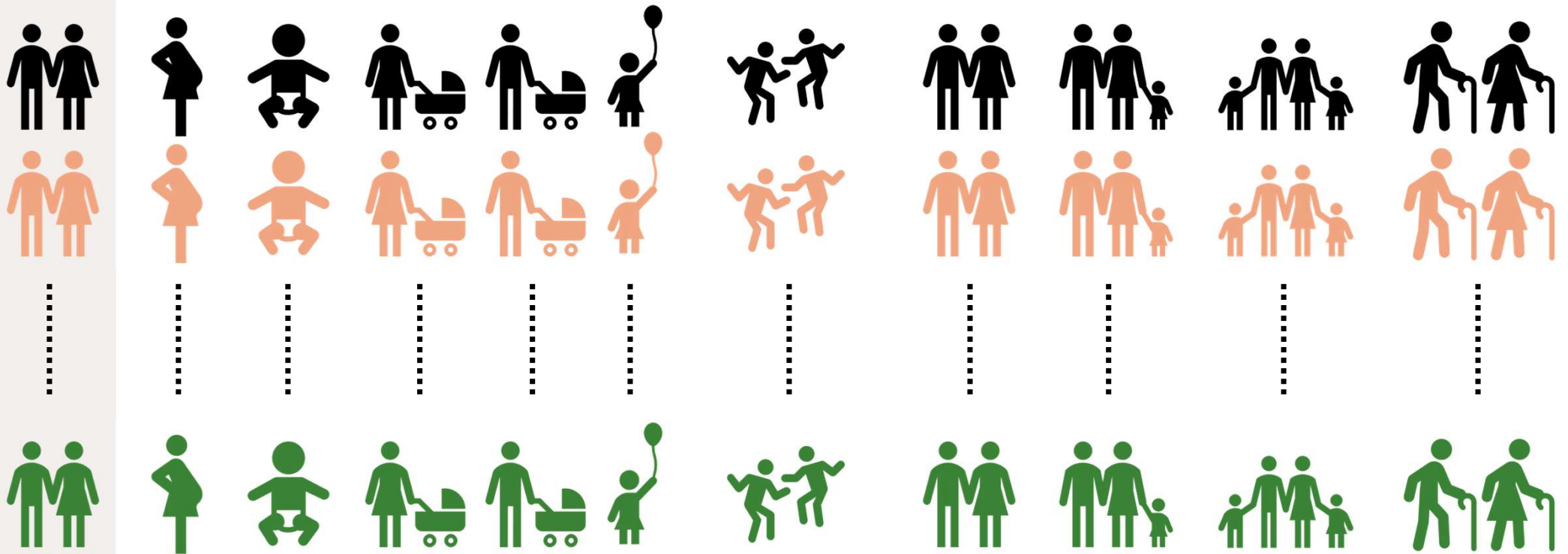
(WT-shared) Jtesla16 at wts wikivoyage

Basic longitudinal study

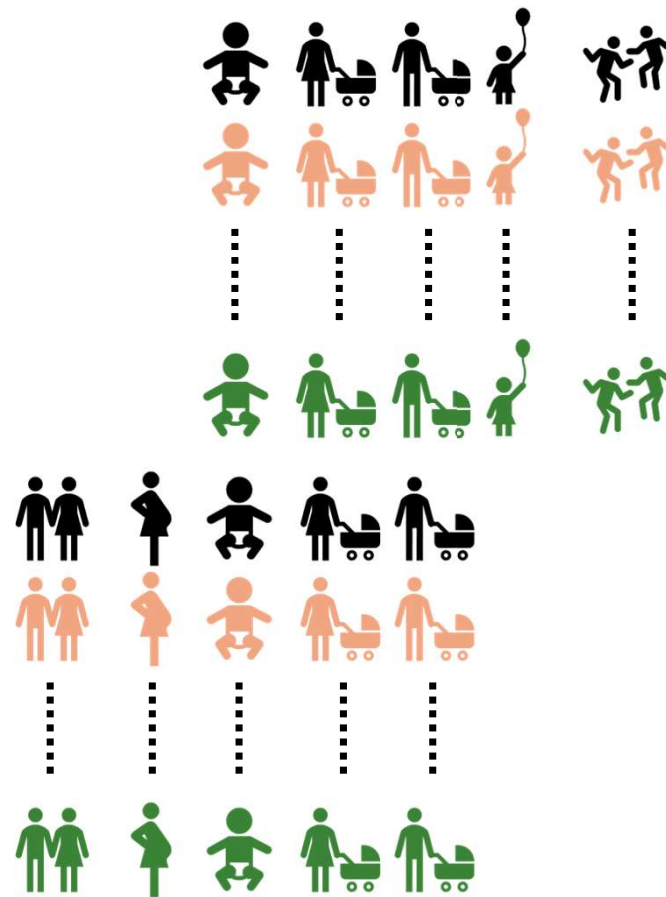


Surveys
Interviews
Informants
Observations
Tests
Imaging
Peripheral measures
Physical measures
Health records
Administrative data

(Birth) cohort studies



Accelerated longitudinal cohort studies



Longitudinal-experimental cohort studies

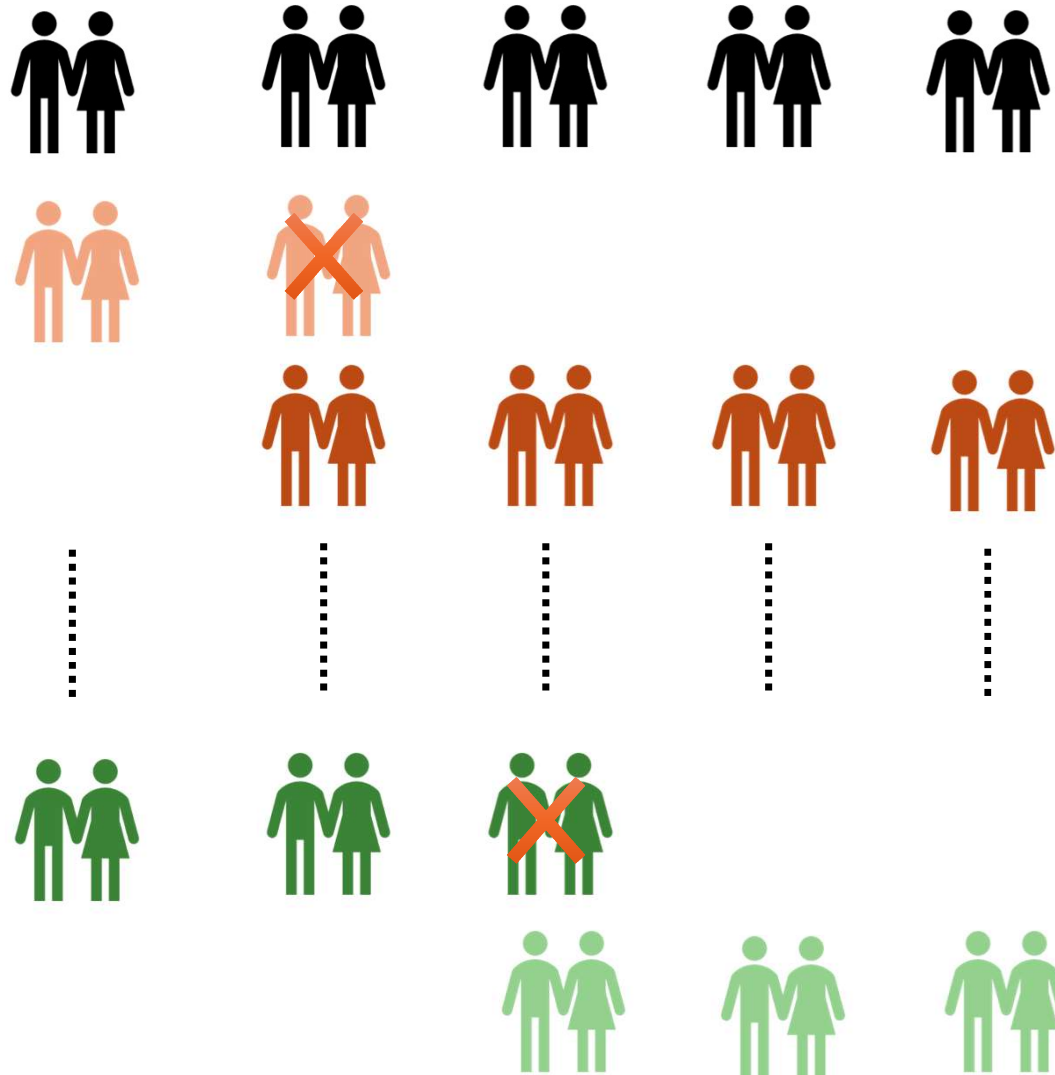
Experimental



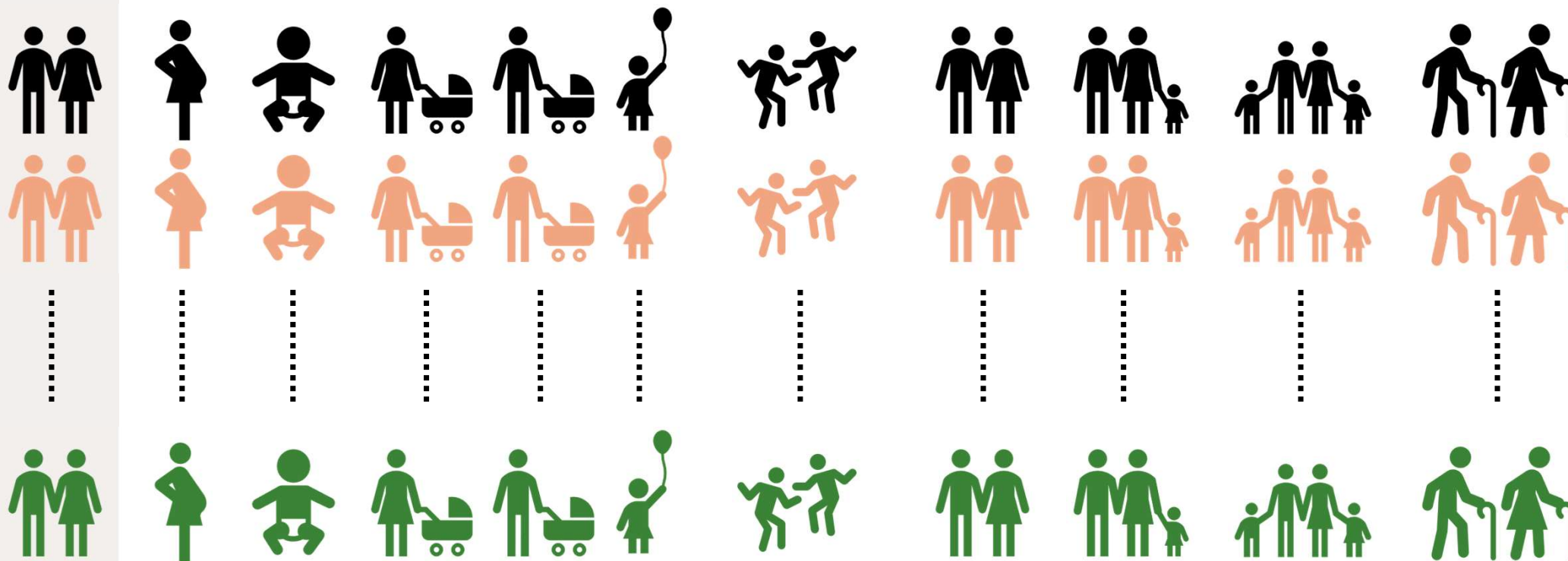
Observational

Observational
in case of null
effect on DV

Panel studies



Record linkage studies



Key distinctions

Prospective measurement

E.g., PTS symptoms, health record data

Retrospective measurement

E.g., traumatic birth experiences

Longitudinal analyses

Descriptive
incidence, course

Predictive
Risk, resilience, susceptibility

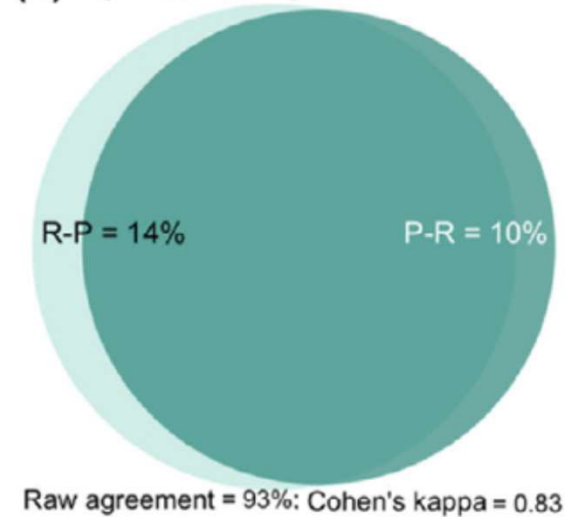
Explanatory
Causal model testing

Cross-sectional analyses

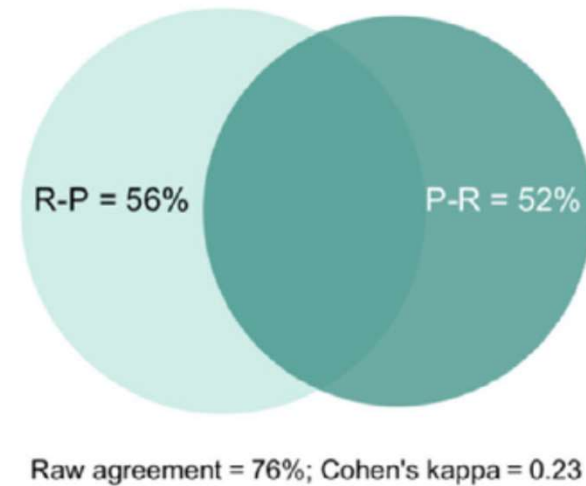
Descriptive
prevalence, associated factors

Insights from the cognate field of childhood trauma research

(A) Separation from parents



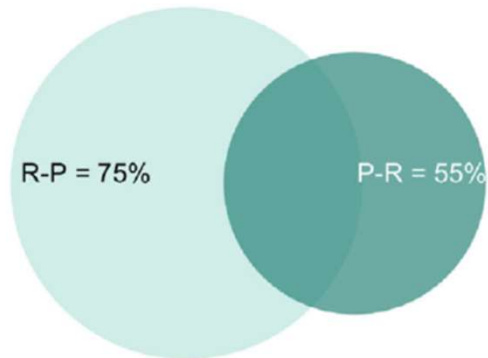
(B) Child maltreatment



Danese, A. (2020). Annual Research Review: Rethinking childhood trauma-new research directions for measurement, study design and analytical strategies. *J Child Psychol Psychiatry*, 61(3), 236-250. doi:10.1111/jcpp.13160

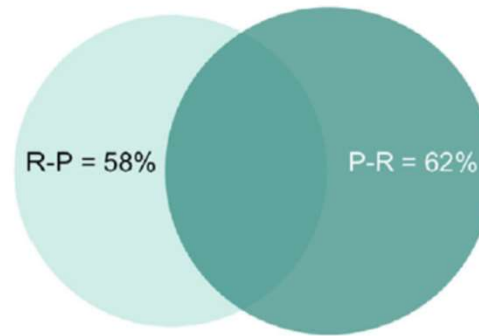
Retrospective / prospective

(C) Child sexual abuse



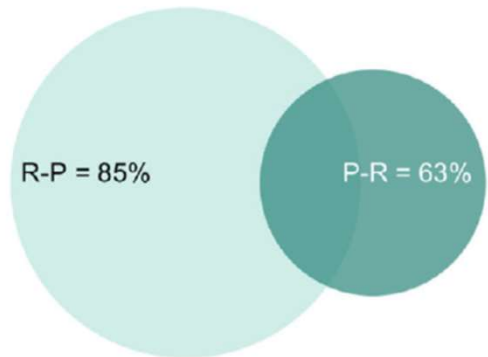
Raw agreement = 86%; Cohen's kappa = 0.16

(D) Child physical abuse



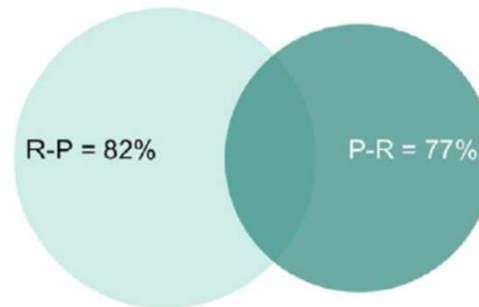
Raw agreement = 75%; Cohen's kappa = 0.17

(E) Childhood emotional abuse



Raw agreement = 76%; Cohen's kappa = 0.09

(F) Childhood neglect



Raw agreement = 84%; Cohen's kappa = 0.09



Danese, A. (2020). Annual Research Review: Rethinking childhood trauma-new research directions for measurement, study design and analytical strategies. *J Child Psychol Psychiatry*, 61(3), 236-250. doi:10.1111/jcpp.13160

Retrospective / prospective

Who

How

Which



Danese, A. (2020). Annual Research Review: Rethinking childhood trauma-new research directions for measurement, study design and analytical strategies. *J Child Psychol Psychiatry*, 61(3), 236-250.
doi:10.1111/jcpp.13160

Description & prediction

- Precision & accuracy: operationalization, statistical power
- Generalizability: pre-registration, replication

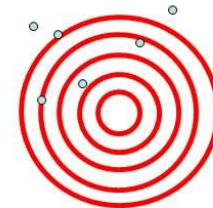
Errors in Measurement

There are 2 different types of errors illustrated in the figures below:

Random errors

and

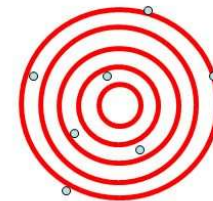
systematic errors



Neither accurate nor precise



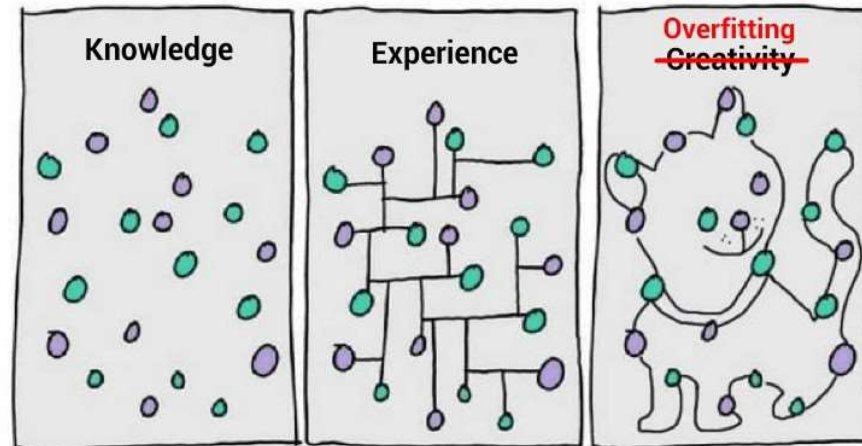
Precise, not accurate



Accurate, not precise

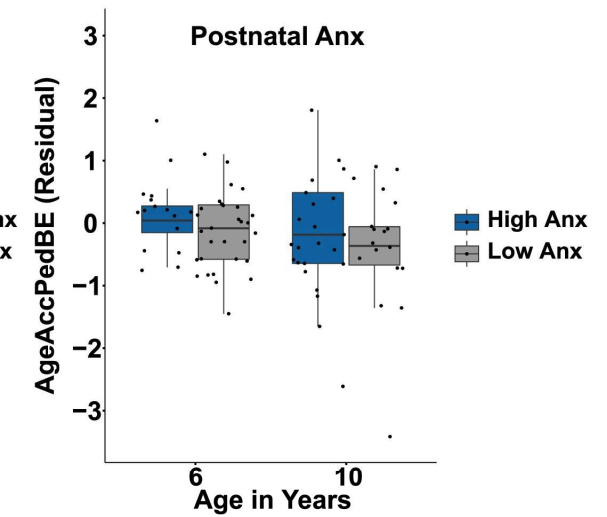
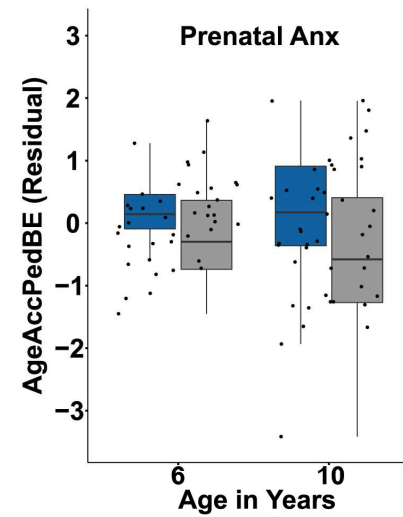


Accurate and precise

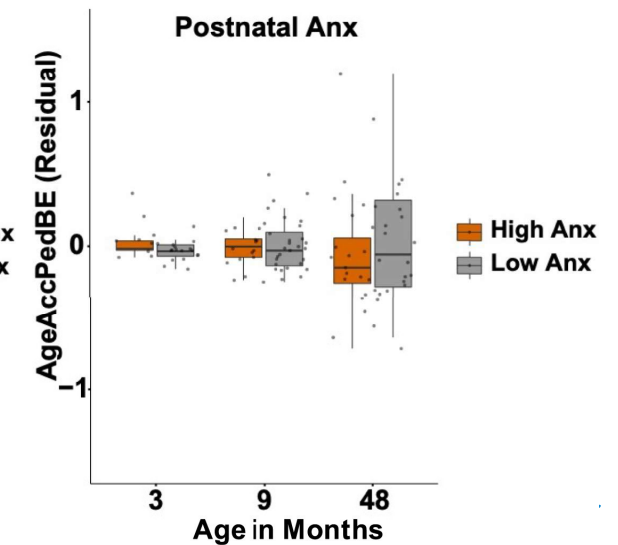
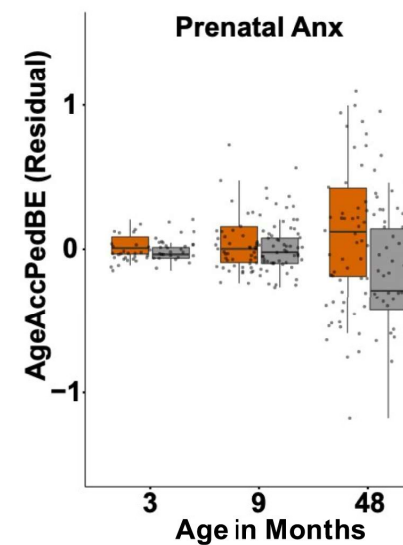


Example

- Precision
- Generalizability



GUSTO



- ☹ Power
- ☹ Preregistration
- ✓ Replication (negative)

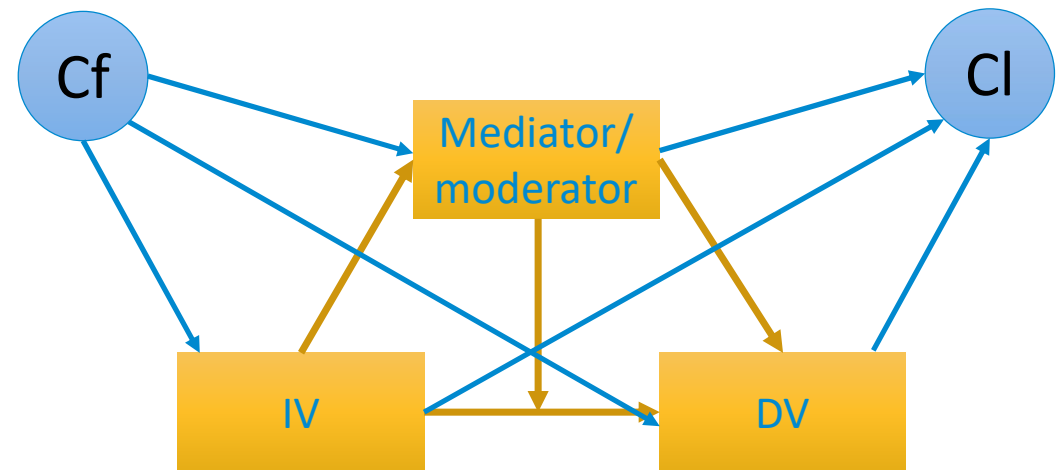
McGill, M. G., Pokhvisneva, I., Clappison, A. S., McEwen, L. M., Beijers, R., Tollenaar, M., Pham, H., Kee, M., Garg, E., de Mendonça Filho, E. J., Karnani, N., Silveira, P. P., Kobor, M. S., de Weerth, C., Meaney, M. J., & O'Donnell, K. J. (2022). Maternal prenatal anxiety and the fetal origins of epigenetic aging. *Biological Psychiatry*, 91(3), 303-312.

<https://doi.org/10.1016/j.biopsych.2021.07.025>

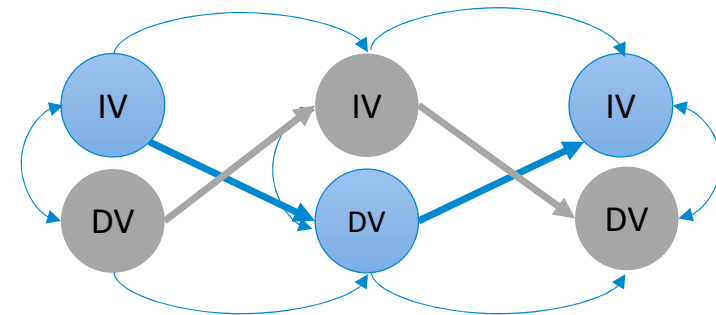
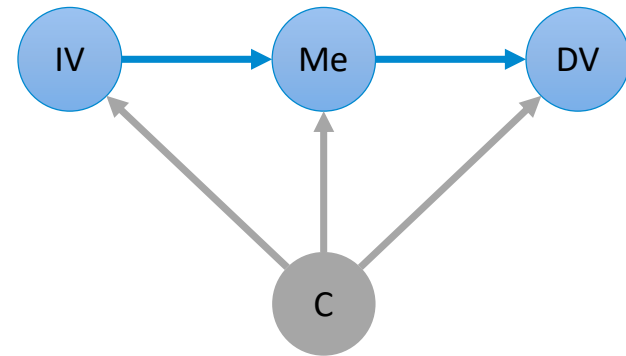
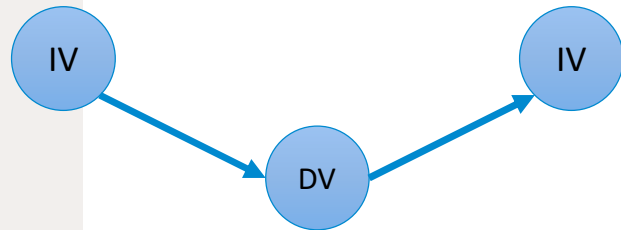
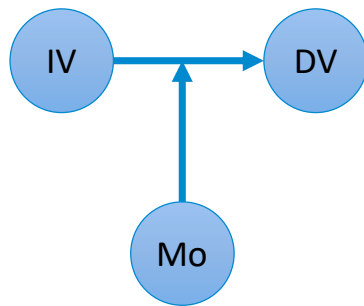
Explanation

Causal inference

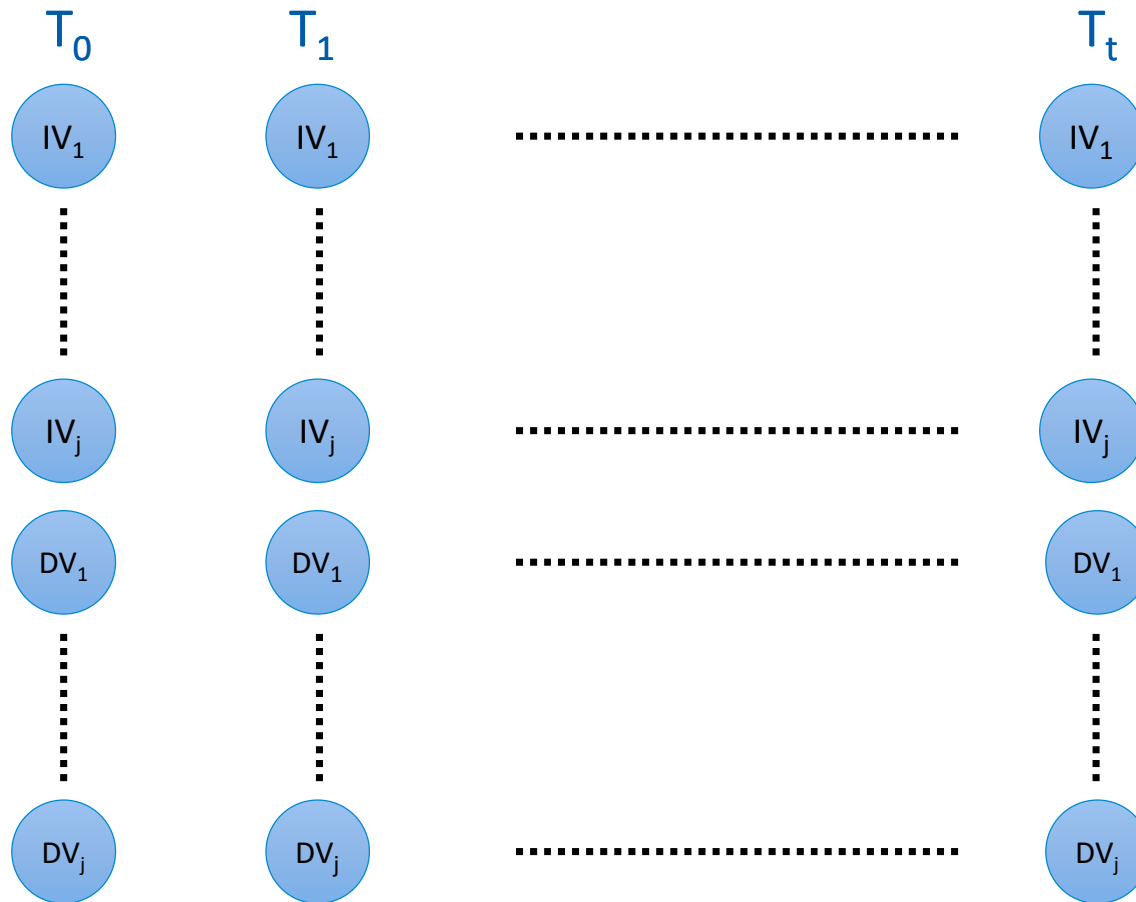
- Association
- IV temporally precedes DV
- Confounders controlled
- Colliders left out



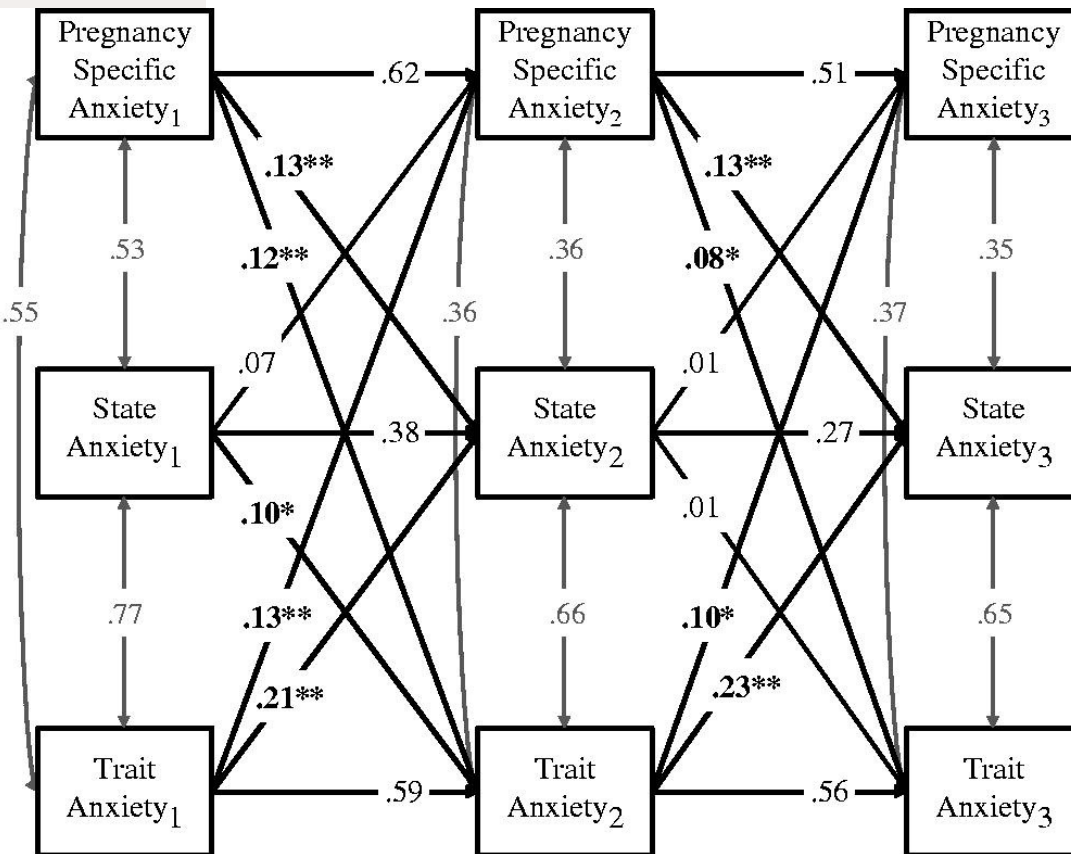
Basic tools of causal modeling: directed acyclical graphs



Basic longitudinal study



Basic longitudinal study

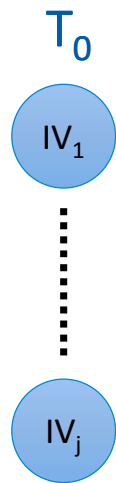


23

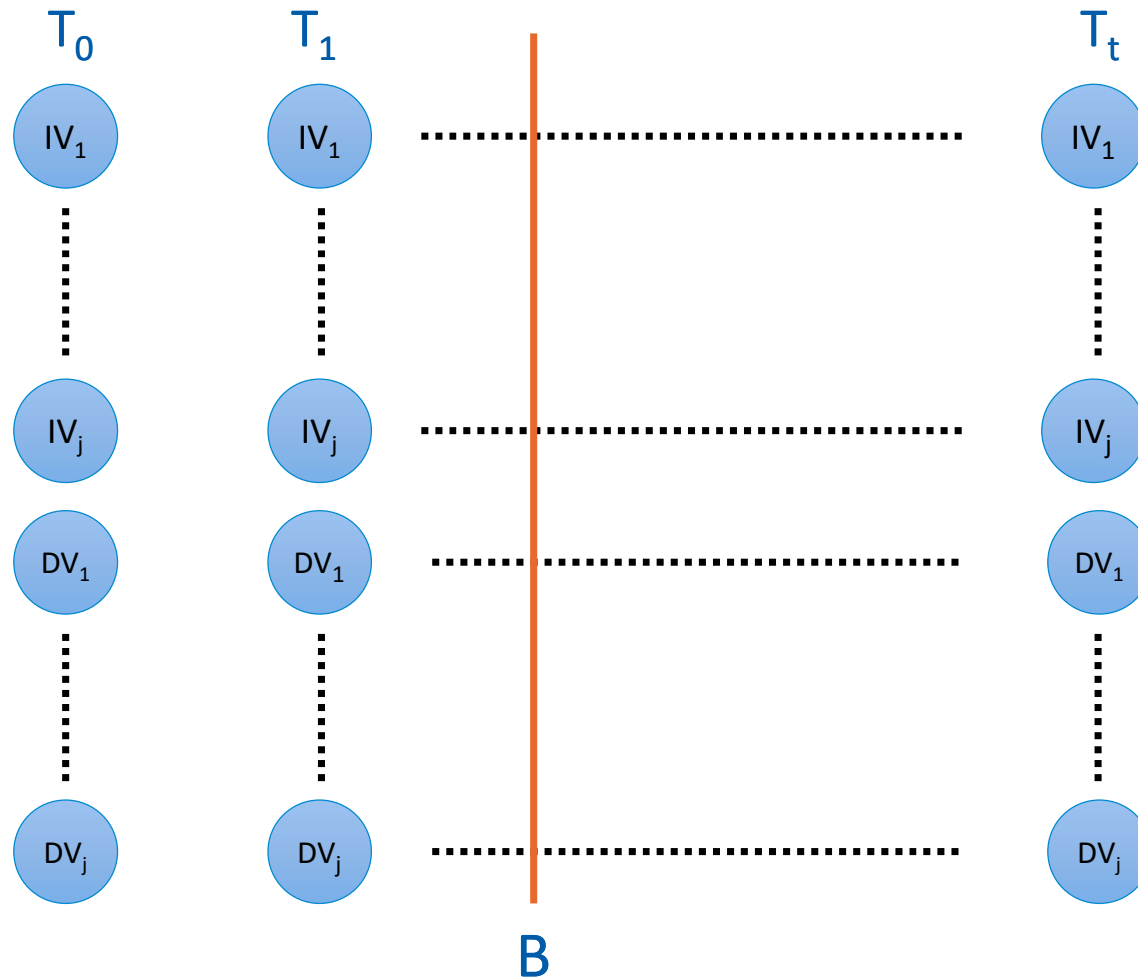
- ✓ Power
- ⊗ Preregistration
- ⊗ Replication
- ✓ Association
- ✓ Temporal precedence
- ⊗ Confounders controlled

Huizink, A. C., Menting, B., Oosterman, M., Verhage, M. L., Kunseler, F. C., & Schuengel, C. (2014). The interrelationship between pregnancy-specific anxiety and general anxiety across pregnancy: a longitudinal study. *Journal of Psychosomatic Obstetrics and Gynecology*, 35(3), 92-100.
<https://doi.org/10.3109/0167482X.2014.944498>

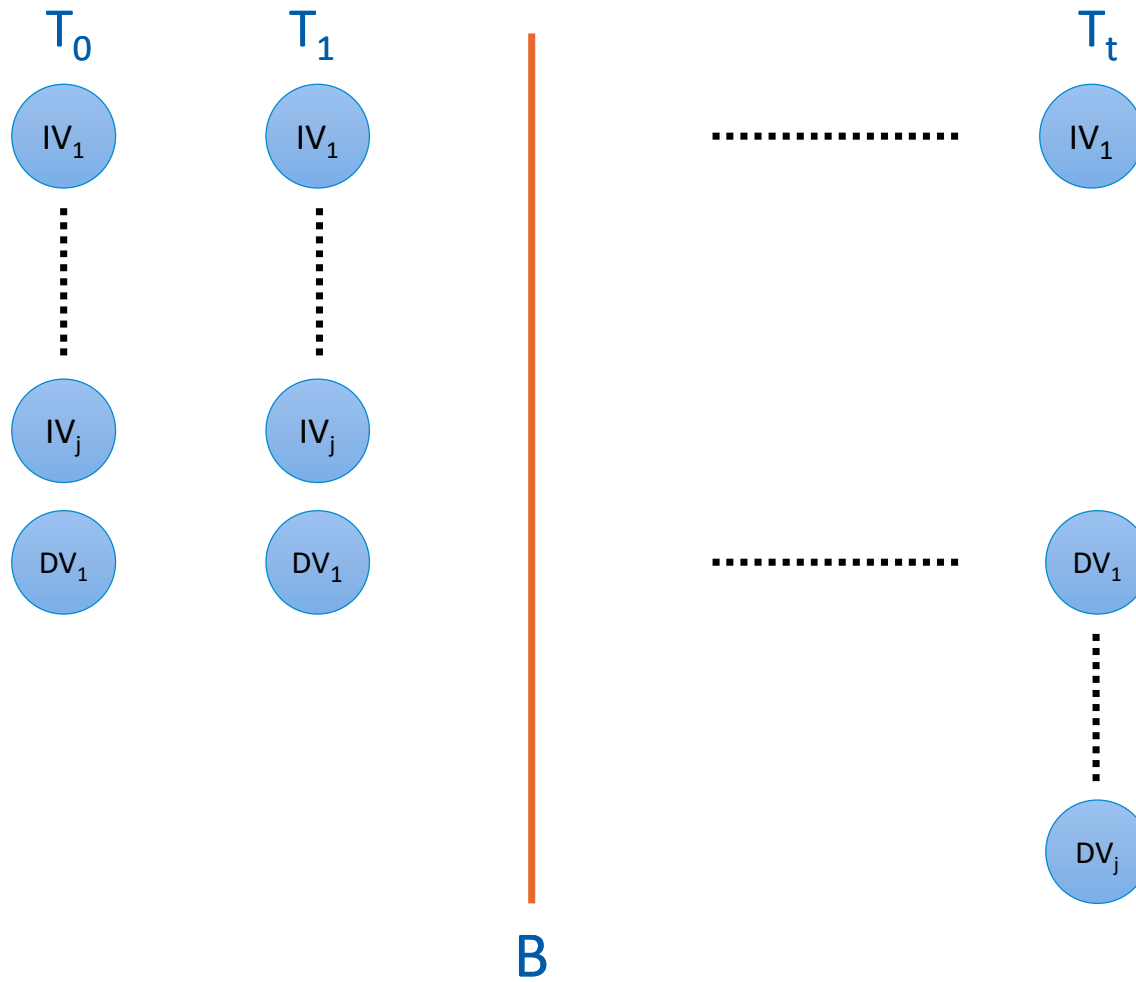
Basic follow-up study



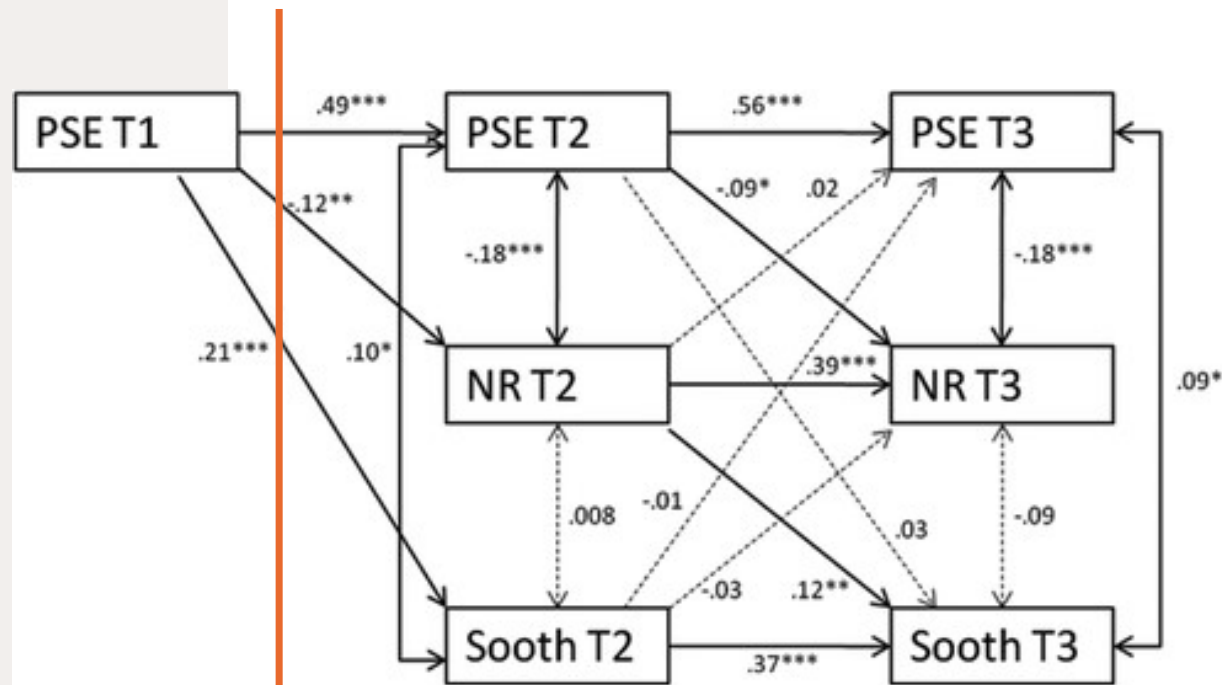
Ideal longitudinal birth cohort study



Common longitudinal birth cohort study



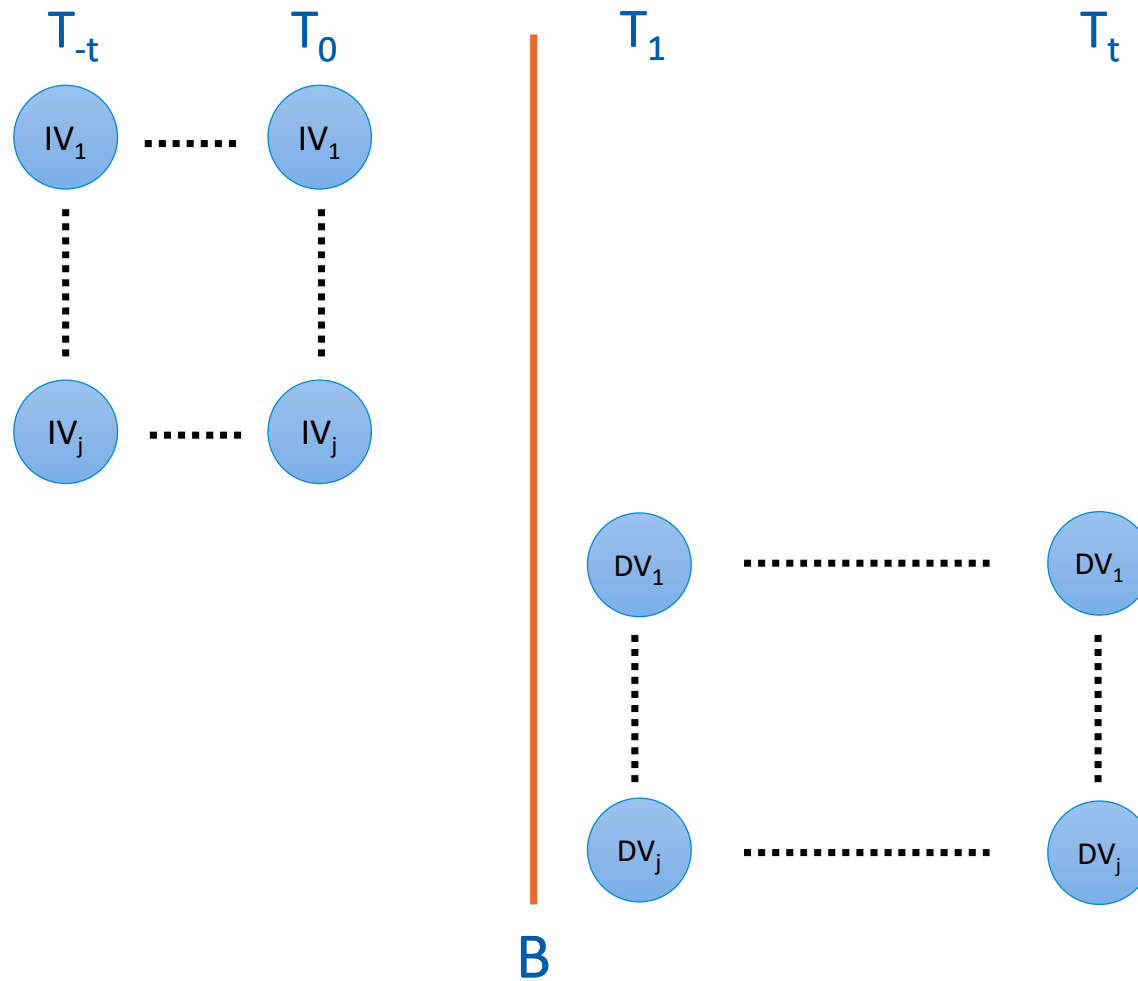
Controlling for autoregression



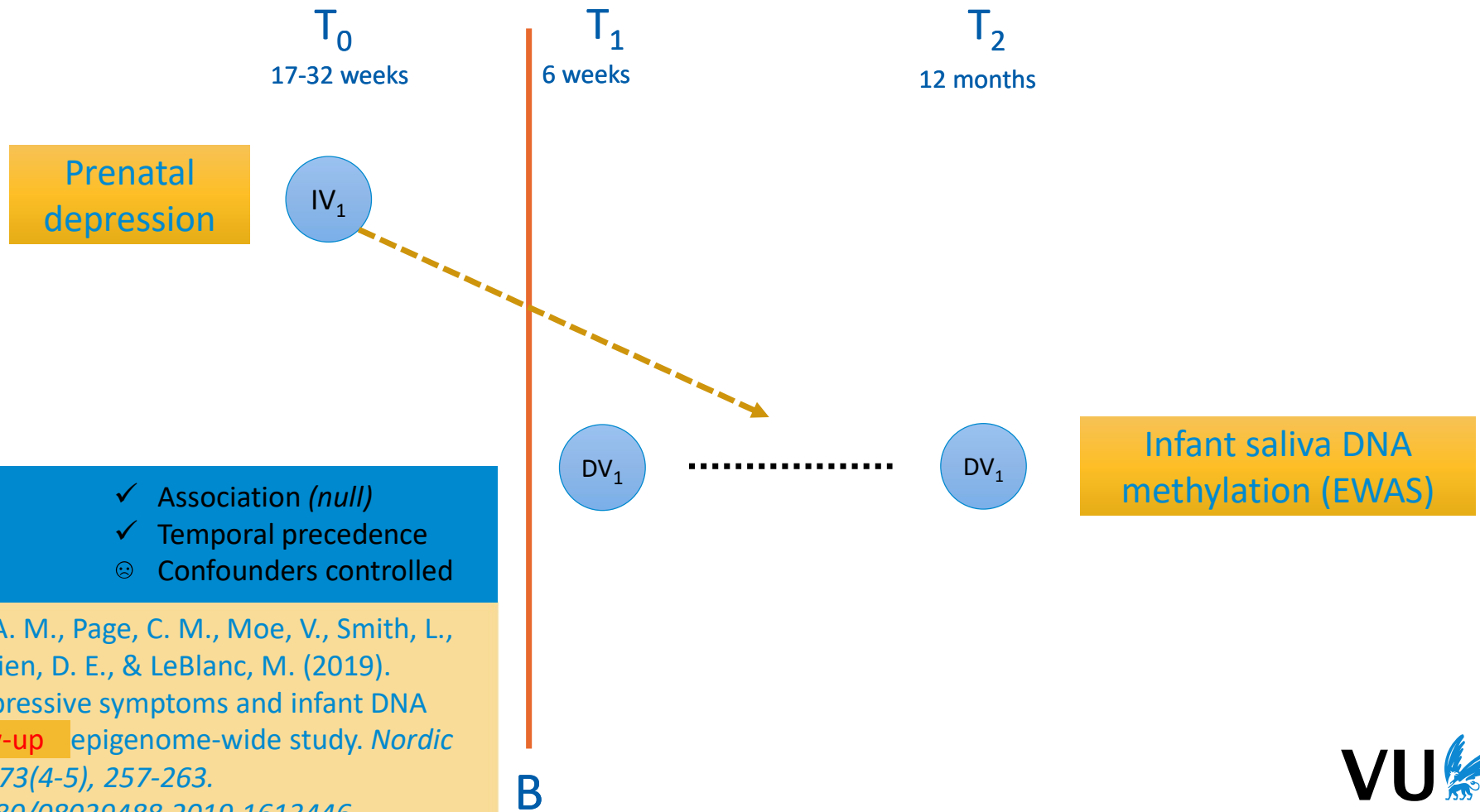
- ✓ Power
- ⊗ Preregistration
- ⊗ Replication
- ✓ Association
- ✓ Temporal precedence
- ⊗ Confounders controlled

Verhage, M. L., Oosterman, M., & Schuengel, C. (2013). Parenting Self-Efficacy Predicts Perceptions of Infant Negative Temperament Characteristics, Not Vice Versa. *Journal of Family Psychology, 27*(5), 844-849. <https://doi.org/10.1037/a0034263>

Common pregnancy follow-up study



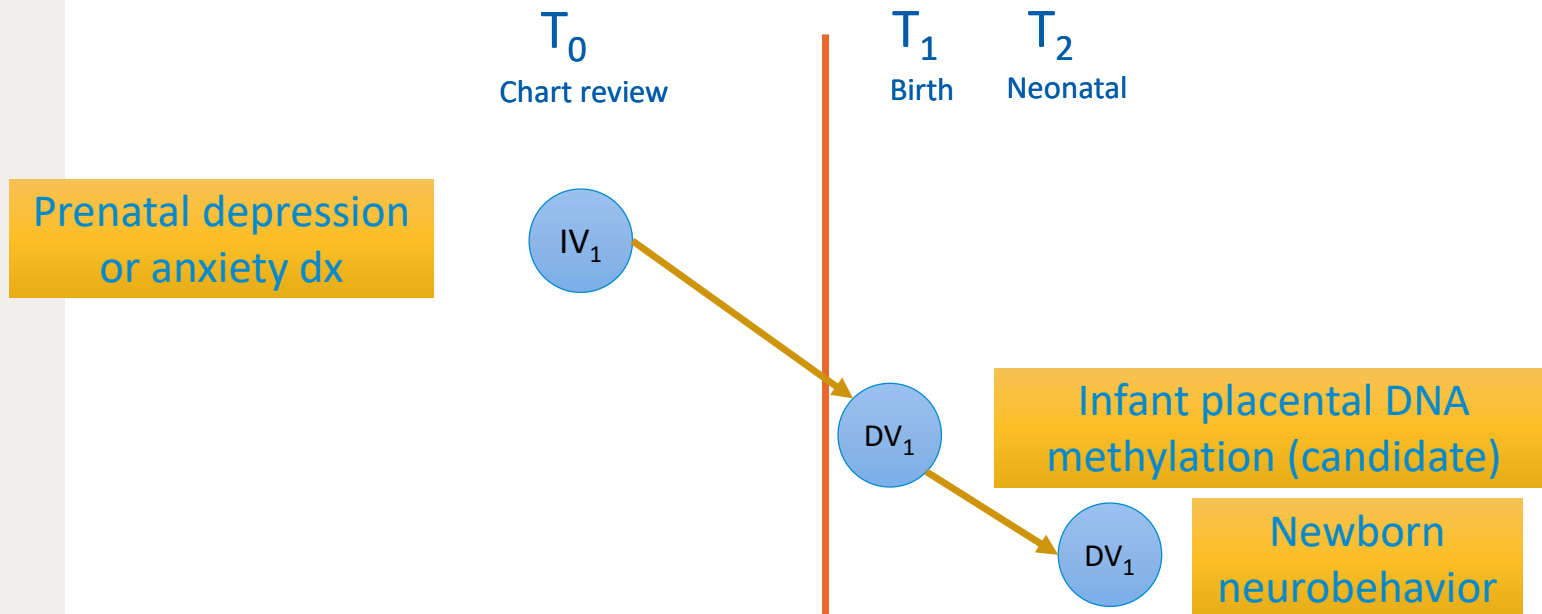
Common pregnancy follow-up study example



- ✓ Power (65%)
- ⊗ Preregistration
- ⊗ Replication
- ✓ Association (null)
- ✓ Temporal precedence
- ⊗ Confounders controlled

Wikenius, E., Myhre, A. M., Page, C. M., Moe, V., Smith, L., Heiervang, E. R., Undlien, D. E., & LeBlanc, M. (2019). Prenatal maternal depressive symptoms and infant DNA methylation: a **Follow-up** epigenome-wide study. *Nordic Journal of Psychiatry*, 73(4-5), 257-263. <https://doi.org/10.1080/08039488.2019.1613446>

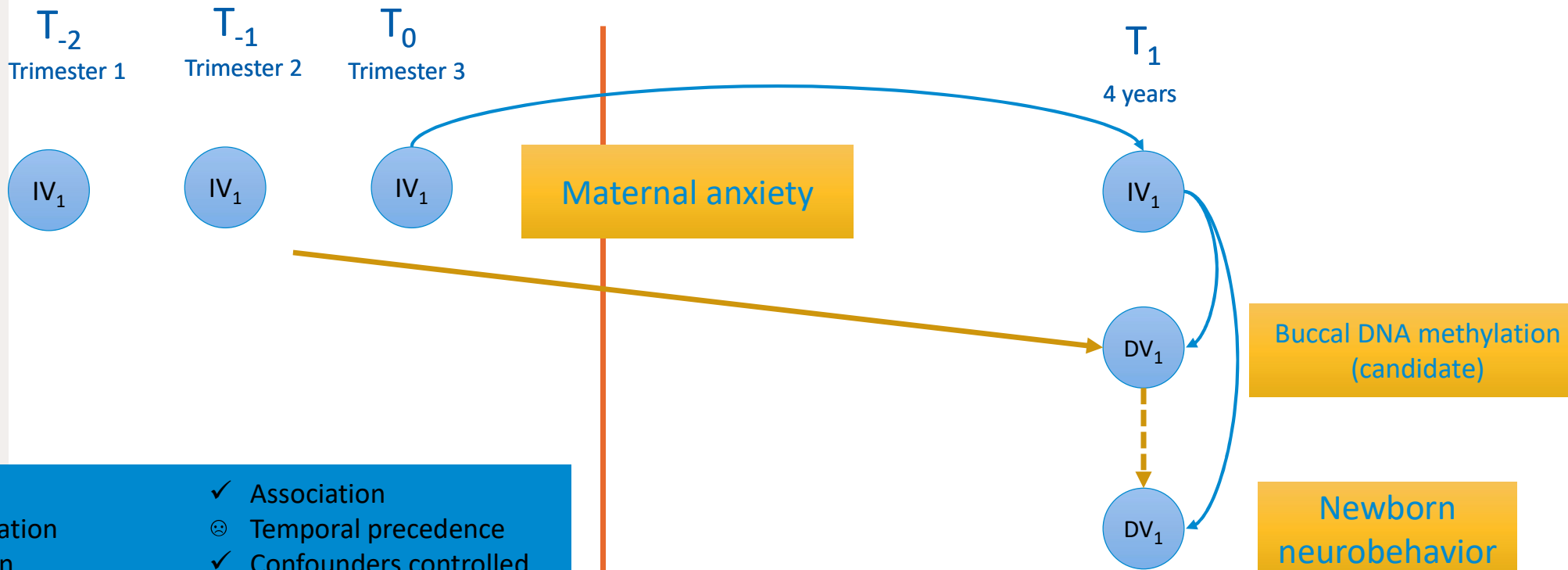
Common pregnancy follow-up study of mediation example



- | | |
|-------------------|--------------------------|
| ⊗ Power | ✓ Association |
| ⊗ Preregistration | ✓ Temporal precedence |
| ⊗ Replication | ⊗ Confounders controlled |

Conradt, E., Lester, B. M., Appleton, A. A., Armstrong, D. A., & Marsit, C. J. (2013). The roles of DNA methylation of NR3C1 and 11 β -HSD2 and exposure to maternal mood disorder in utero on newborn neurobehavior. *Epigenetics*, 8(12), 1321-1329. <https://doi.org/10.4161/epi.26634>

Rare pregnancy longitudinal study of mediation example



- ⊗ Power
- ⊗ Preregistration
- ⊗ Replication
- ✓ Association
- ⊗ Temporal precedence
- ✓ Confounders controlled

Cao-Lei, L., van den Heuvel, M. I., Huse, K., Platzer, M., Elgbeili, G., Braeken, M. A. K. A., Otte, R. A., Witte, O. W., Schwab, M., & Van den Bergh, B. R. H. (2021). Epigenetic Modifications Associated with Maternal Anxiety during Pregnancy and Children's Behavioral Measures. *Cells*, 10(9), 2421. <https://www.mdpi.com/2073-4409/10/9/2421>

B

Caveats

Prospective measurement

E.g., PTS symptoms

Caveats

Duration, retention, selection, measurement availability and invariance

Retrospective measurement

E.g., traumatic birth experiences

Caveats

Might be confounded with / seen as current state of mind

Longitudinal questions

Descriptive

incidence, course

Predictive

Risk, resilience , susceptibility

Explanatory

Causal model testing

Caveats

Funding, preparation time, measurement compromises

Cross-sectional questions

Descriptive

prevalence, associated factors

Caveats

Non-actionable