

# Beyond Static Traits in the Study of Personality

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# **What is personality?**

**Personality is what personality tests test.**



**Between-Person /  
Nomothetic**

**Traits, dispositions, tendencies,  
broad summaries**

**Within-Person**

**States, emotions, behaviors,  
momentary experiences**

**Idiographic**

**Processes, affects, cognitions,  
motivation**

## Between-Person / Nomothetic

**Beck & Jackson (2021a, *JPSP*)**  
**Beck, Condon & Jackson (revision submitted, *EJP*)**  
**Jackson & Beck (2021a, *JG:SB*)**  
**Yoneda et al. (in press, *Neuropsychology*)**

## Within-Person

Hill, **Beck & Jackson (2021, *JG:SB*)<sup>+</sup>**  
Bollich, **Beck, Hill, & Jackson (2021, *JPSP*)<sup>+</sup>**  
Eldesouky, **Beck, Gross, & English (under review)<sup>+</sup>**  
\*Cheung, \***Beck, Thapa, & Jackson (under review)**  
**Beck, Scott, et al. (in prep)**

## Idiographic

**Beck & Jackson (2020a, *JPSP*)<sup>x</sup>**      **Jackson & Beck (2021b, *JP*)**  
**Beck & Jackson (2020b, *CDPS*)**      **Frumkin et al. (2020, *PR*)**  
**Beck & Jackson (under revision, *PS*)**      **Piccirillo, Beck et al. (2019, *BT*)**  
**Beck & Jackson (2021b, *EJP*)**  
**Beck & Jackson, (2021c, *JPA*)**

## Methods

**Nosek, Beck et al. (2019, *TiCS*)**  
**Beck & Jackson (2021c, *JPA*)**  
**Beck et al. (2021, *PersSci*)**

**Beck, Willroth, et al. (in prep)**  
**Beck & Jackson (2020a, *JPSP*)**  
**Beck & Jackson (2021a, *JPSP*)**

\* = Equal contributions, + = cross-listed with B/w person, x = cross-listed with within-person

## Between-Person / Nomothetic

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Description	Prediction	Explanation
Between Person	Within-Person	Idiographic

**Can we use differentiation / divergence and network models to capture structural change in personality across age groups?**

## Description

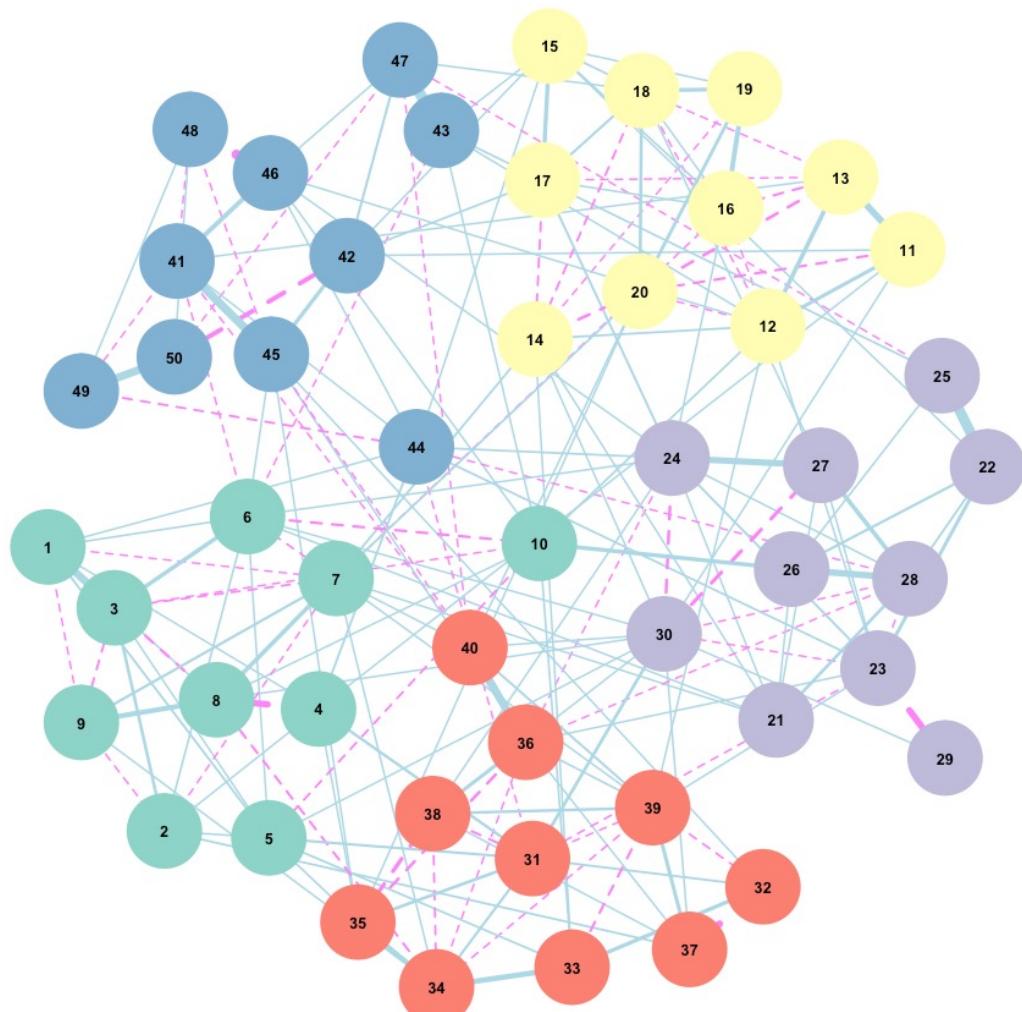
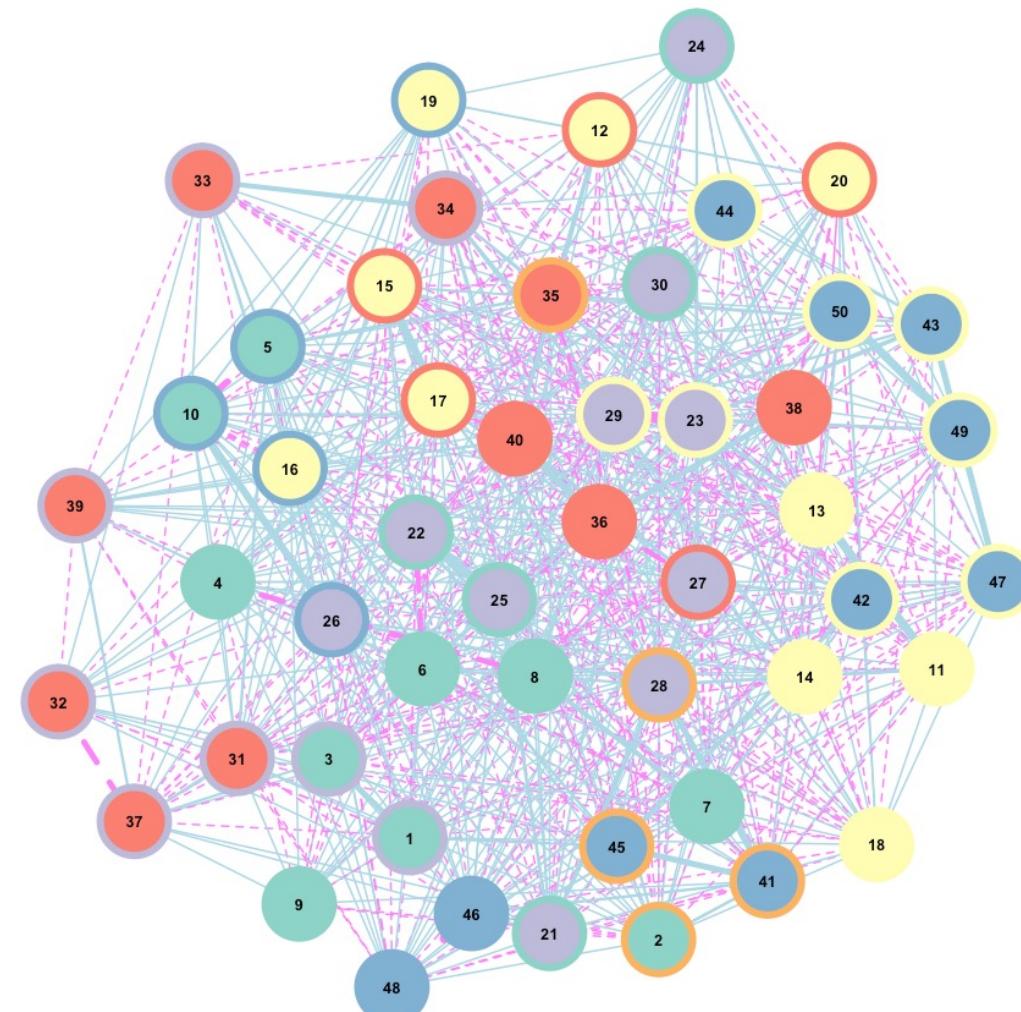
Between Person

## Prediction

Within-Person

## Explanation

Idiographic

**20s****60s**

### Description

Between Person

### Prediction

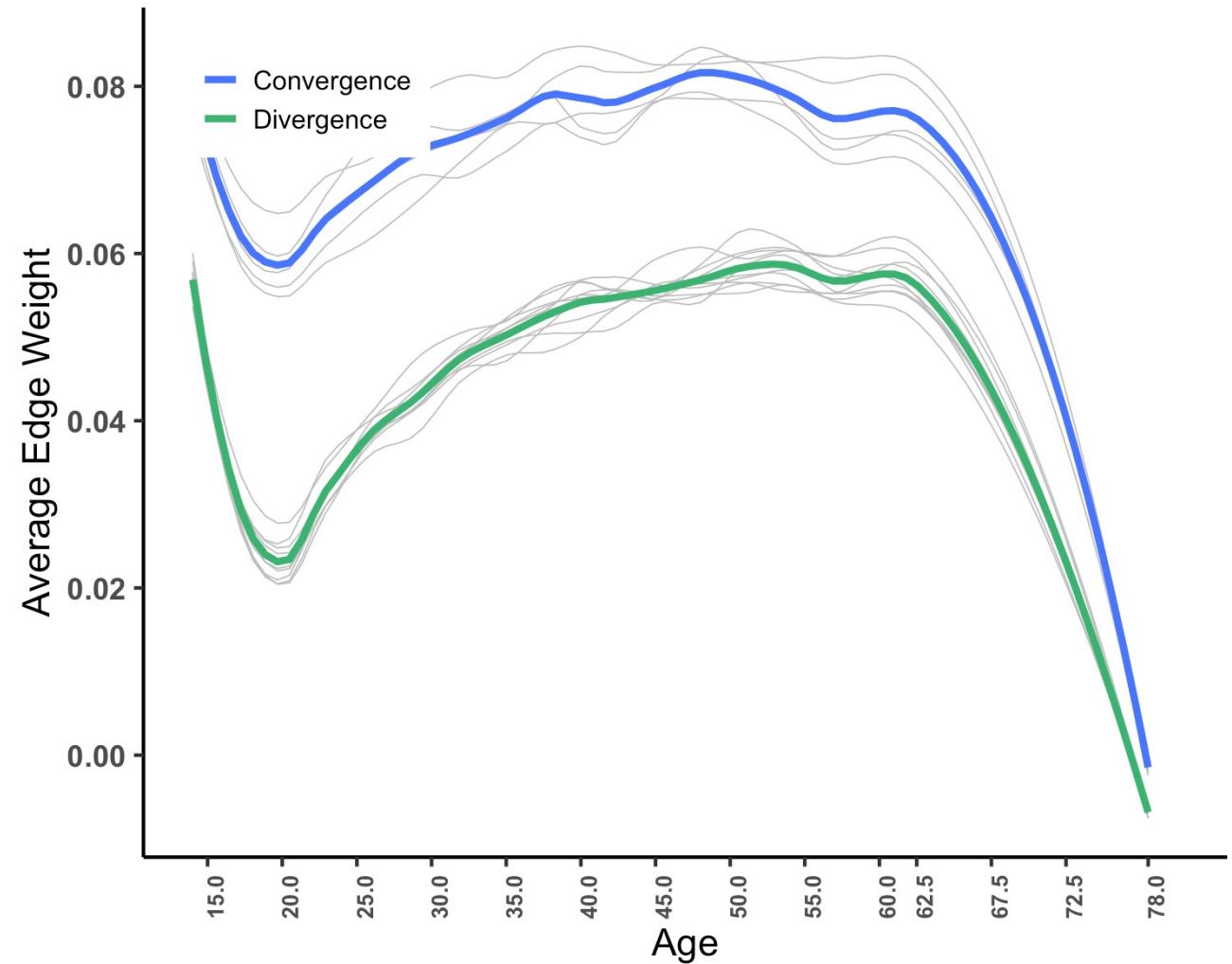
Within-Person

### Explanation

Idiographic

**Divergence** = average inter-item partial correlation across putative trait boundaries

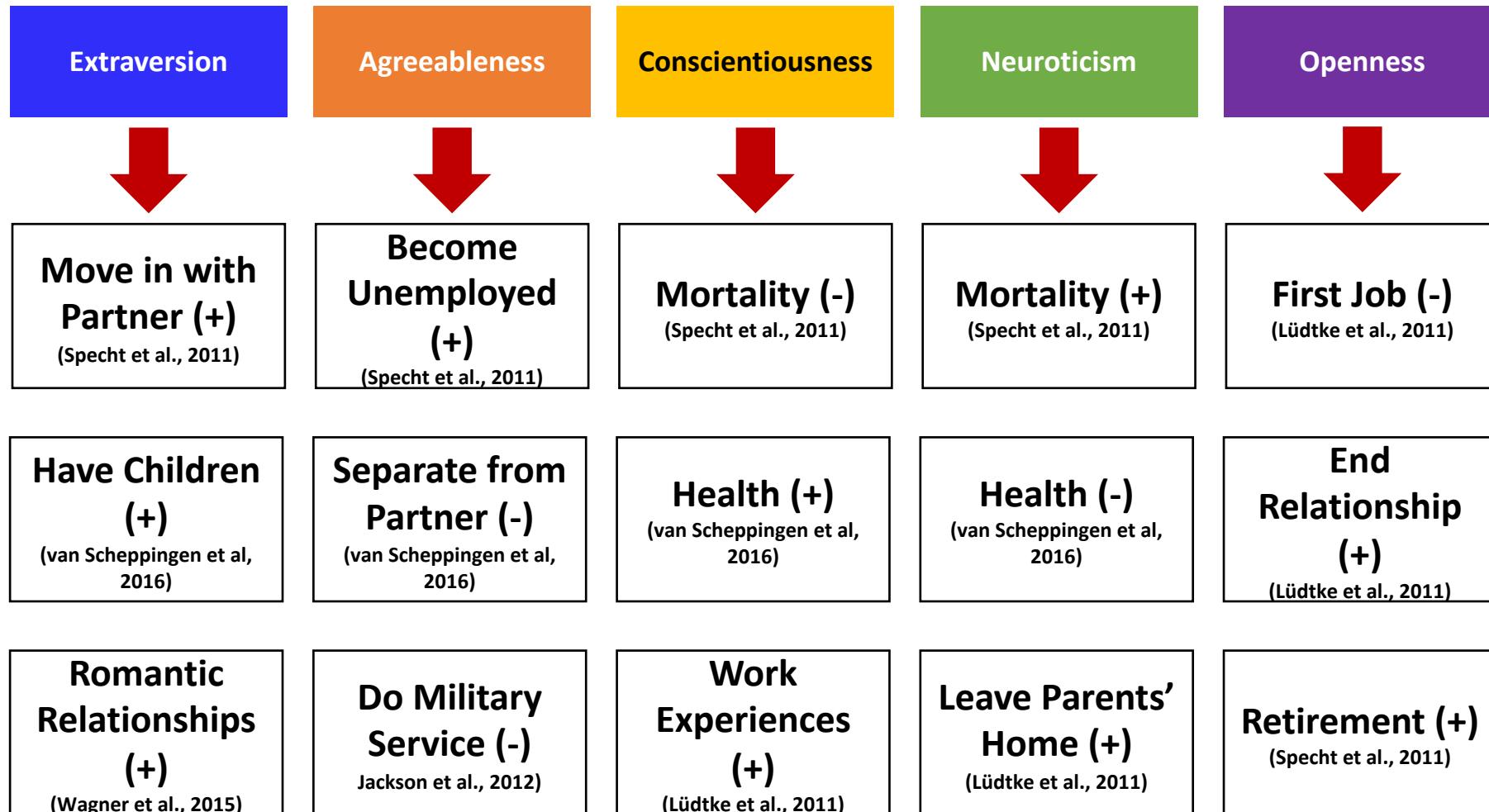
**Convergence** = average inter-item partial correlation within putative trait boundaries





Description	Prediction	Explanation
Between Person	Within-Person	Idiographic

# Selection



**14 Predictors**

**14 Outcomes**

**8 Moderators**

**10 Studies**

**2 Methods**

**14 Predictors**

**14 Outcomes**

**8 Moderators**

**10 Studies**

Extraversion

Agreeableness

Conscientiousness

Neuroticism

Openness to Experience

Self-Esteem

Optimism / Pessimism

Satisfaction with Life

Positive Affect

Negative Affect

Locus of Control

Social Support

IQ / Cognitive Ability

Depression

**8 Moderators**

**2 Methods**

**14 Predictors****14 Outcomes****8 Moderators****10 Studies**

Extraversion

**Mortality**

Agreeableness

**Major Health Event**

Conscientiousness

**Mental Health Event**

Neuroticism

**Childbirth**

Openness to Experience

**Move in with a Partner**

Self-Esteem

**Marriage**

Optimism / Pessimism

**Divorce**

Satisfaction with Life

**Child Moves Out**

Positive Affect

**Higher Education**

Negative Affect

**First Job**

Locus of Control

**Unemployment**

Social Support

**Retirement**

IQ / Cognitive Ability

**Volunteering**

Depression

**Criminal Behavior**

Health

Social

Work/Edu

Civic

**2 Methods**

14 Predictors	14 Outcomes	8 Moderators	10 Studies
Extraversion	Mortality	Age	
Agreeableness	Major Health Event	Gender	
Conscientiousness	Mental Health Event	Race	
Neuroticism	Childbirth	Parental Education (SES)	
Openness to Experience	Move in with a Partner	Par. Occ. Prestige (SES)	
Self-Esteem	Marriage	Gross Wages (SES)	
Optimism / Pessimism	Divorce	Reliability	
Satisfaction with Life	Child Moves Out	Prediction Interval	
Positive Affect	Higher Education	2 Methods	
Negative Affect	First Job		
Locus of Control	Unemployment		
Social Support	Retirement		
IQ / Cognitive Ability	Volunteering		
Depression	Criminal Behavior		

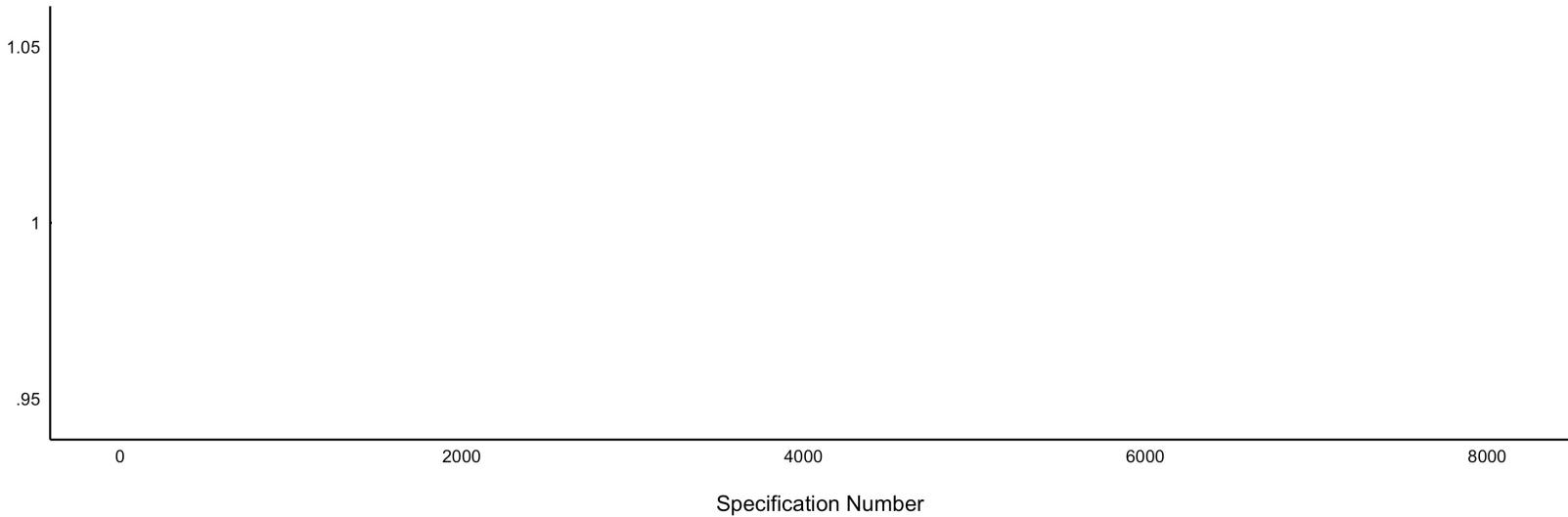
14 Predictors	14 Outcomes	8 Moderators	10 Studies
Extraversion	Mortality	Age	Add Health
Agreeableness	Major Health Event	Gender	BHPS (and US)
Conscientiousness	Mental Health Event	Race	GSOEP
Neuroticism	Childbirth	Parental Education (SES)	HILDA
Openness to Experience	Move in with a Partner	Par. Occ. Prestige (SES)	HRS
Self-Esteem	Marriage	Gross Wages (SES)	LISS
Optimism / Pessimism	Divorce	Reliability	MIDUS
Satisfaction with Life	Child Moves Out	Prediction Interval	NLSY
Positive Affect	Higher Education	2 Methods	SHP WLS (G&S)
Negative Affect	First Job		
Locus of Control	Unemployment		
Social Support	Retirement		
IQ / Cognitive Ability	Volunteering		
Depression	Criminal Behavior		

14 Predictors	14 Outcomes	8 Moderators	10 Studies
Extraversion	Mortality	Age	Add Health
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Satisfaction with Life	Child Moves Out	Prediction Interval	NLSY
Positive Affect	Higher Education	2 Methods	SHP WLS (G&S)
Negative Affect	First Job		
Locus of Control	Unemployment		
Social Support	Retirement		
IQ / Cognitive Ability	Volunteering	Propensity Score Matching	
Depression	Criminal Behavior	Specification Curve Analysis	

**Description****Prediction****Explanation****Between Person****Within-Person****Idiographic****A**

Conscientiousness → Major Health Event

Effect of Conscientiousness on Major Health Event (OR)

**B**

SRhealth  
smokes1  
race2  
race1  
PhysFunc1  
parOccPrstg  
parEdu3  
parEdu2  
p\_value  
married1  
grsWages  
gender1  
exercise  
education2  
education1  
BMI  
alcohol1  
age

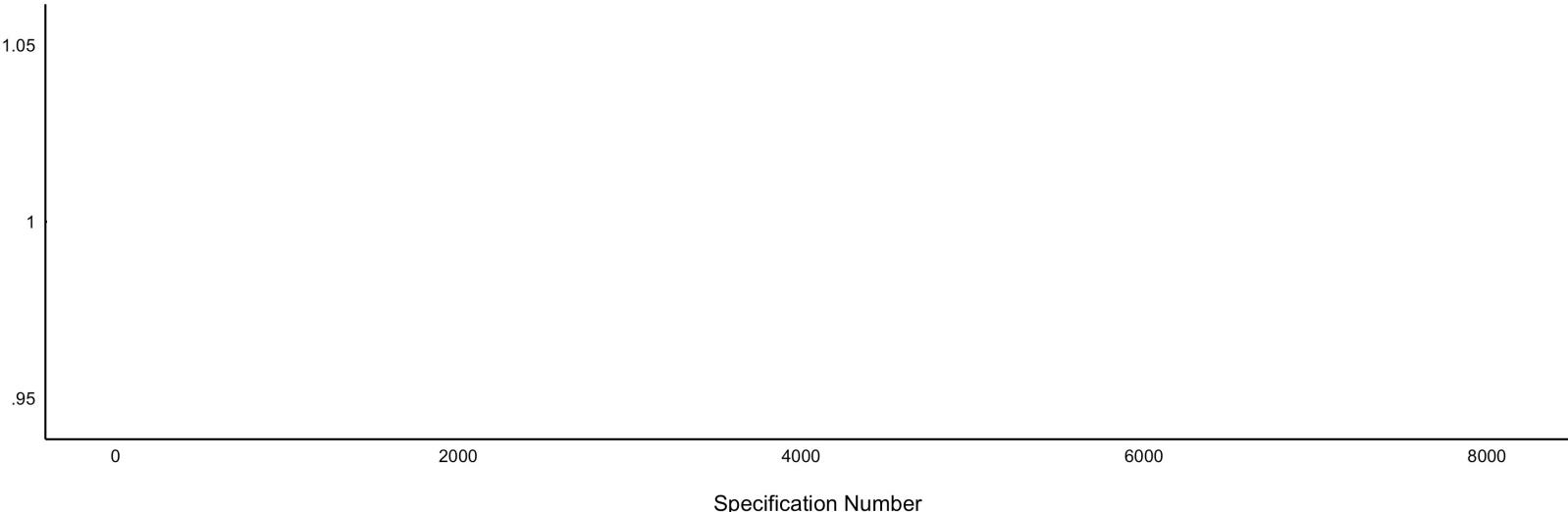
Variables

Specification Number

**Description****Prediction****Explanation****Between Person****Within-Person****Idiographic****A**

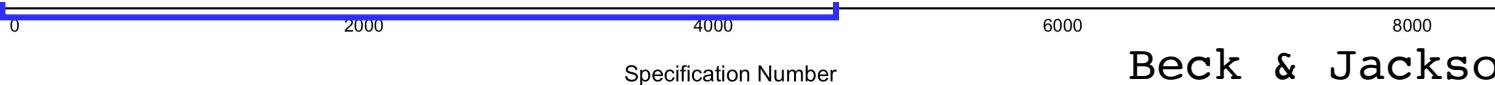
Conscientiousness → Major Health Event

Effect of Conscientiousness on Major Health Event (OR)

**B**

Variables

- SRhealth
- smokes1
- race2
- race1
- PhysFunc1
- parOccPrstg
- parEdu3
- parEdu2
- p\_value
- married1
- grsWages
- gender1
- exercise
- education2
- education1
- BMI
- alcohol1
- age



## Description

## Prediction

## Explanation

Between Person

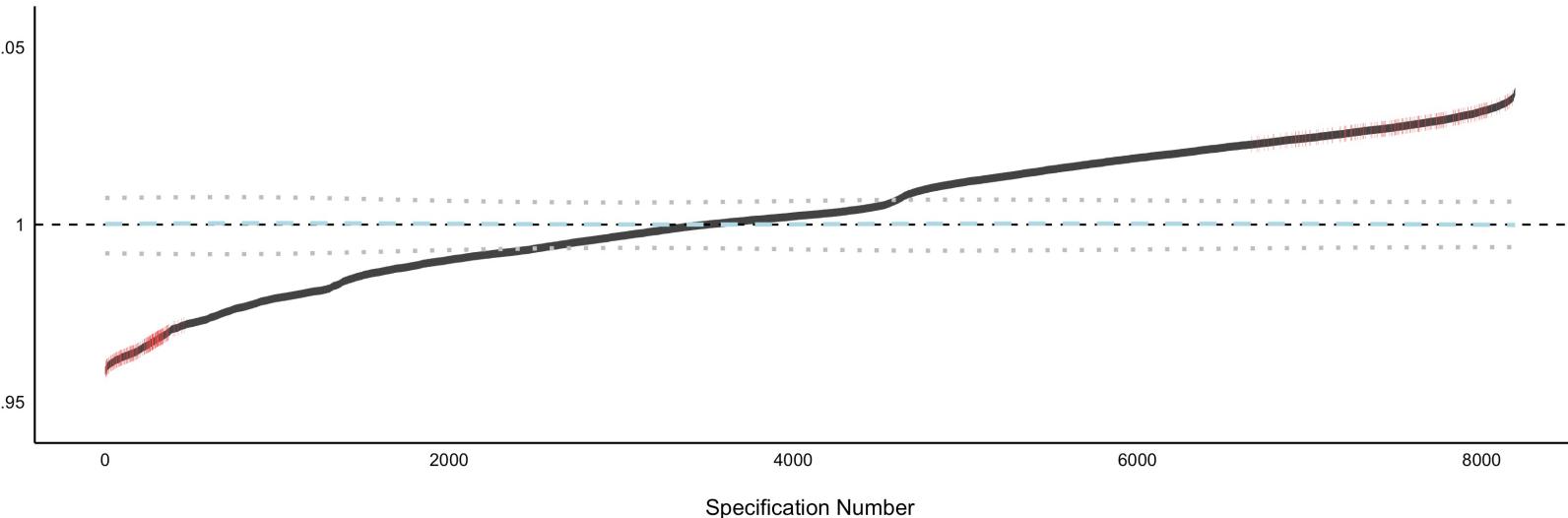
Within-Person

Idiographic

**Not Robust****60/196 (30.61%)****A**

Conscientiousness → Major Health Event

Effect of Conscientiousness on Major Health Event (OR)

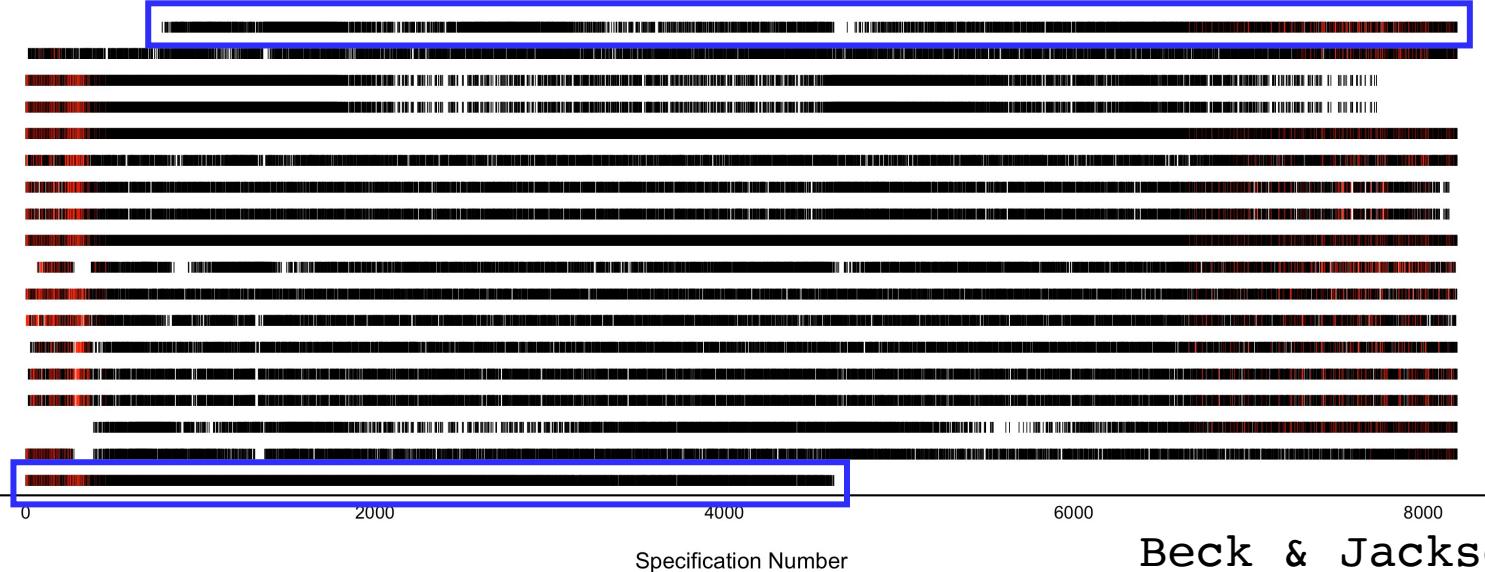
**B**

SRhealth  
smokes1  
race2  
race1  
PhysFunc1  
parOccPrstg  
parEdu3  
parEdu2  
p\_value  
married1  
grsWages  
gender1  
exercise  
education2  
education1  
BMI  
alcohol1  
age

**Self-rated health attenuates the relationship**

Variables

**Age impacts the direction of the relationship**



## Description

## Prediction

## Explanation

Between Person

Within-Person

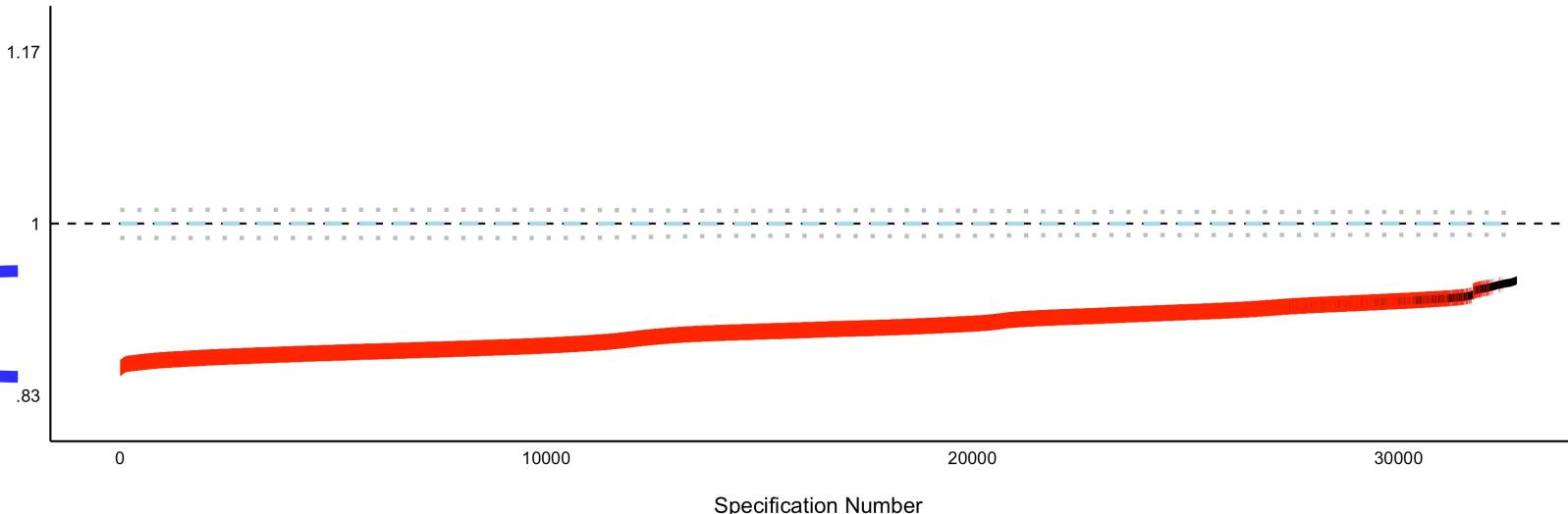
Idiographic

**Robust****18/196 (9.18%)****A**

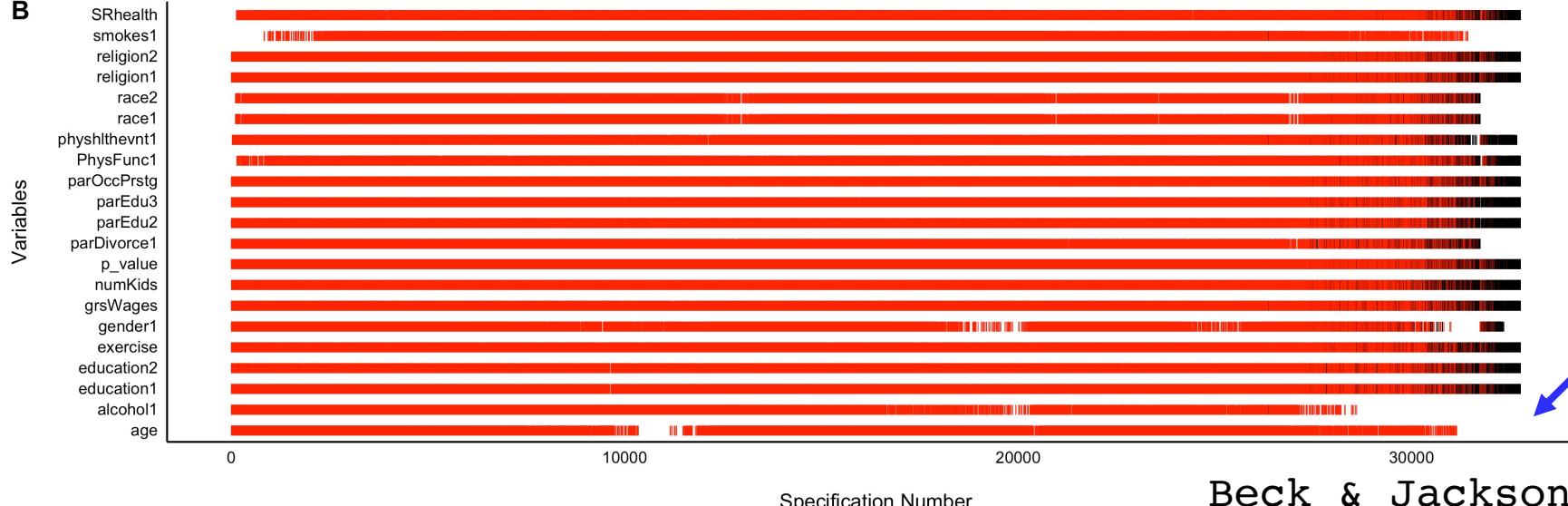
Social Support → Divorce

Effect of Social Support on Divorce (OR)

.83



**Not a lot of effect size change**

**B**

**Only specifications including age and alcohol are significant**

## Description

## Prediction

## Explanation

Between Person

Within-Person

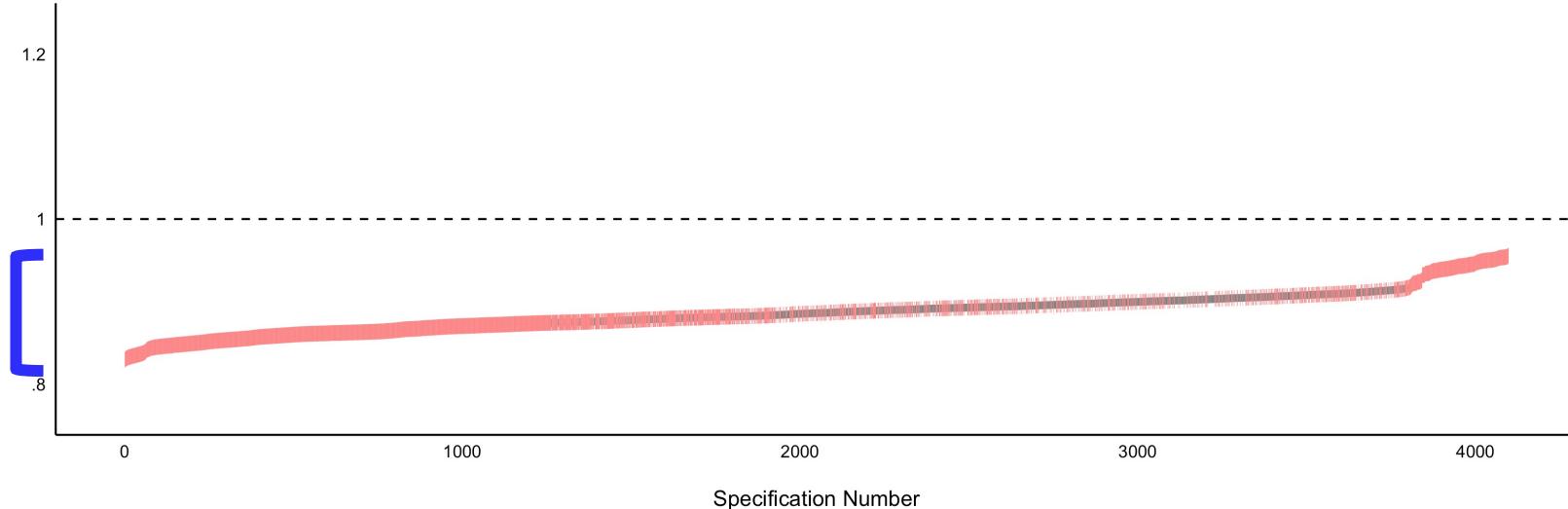
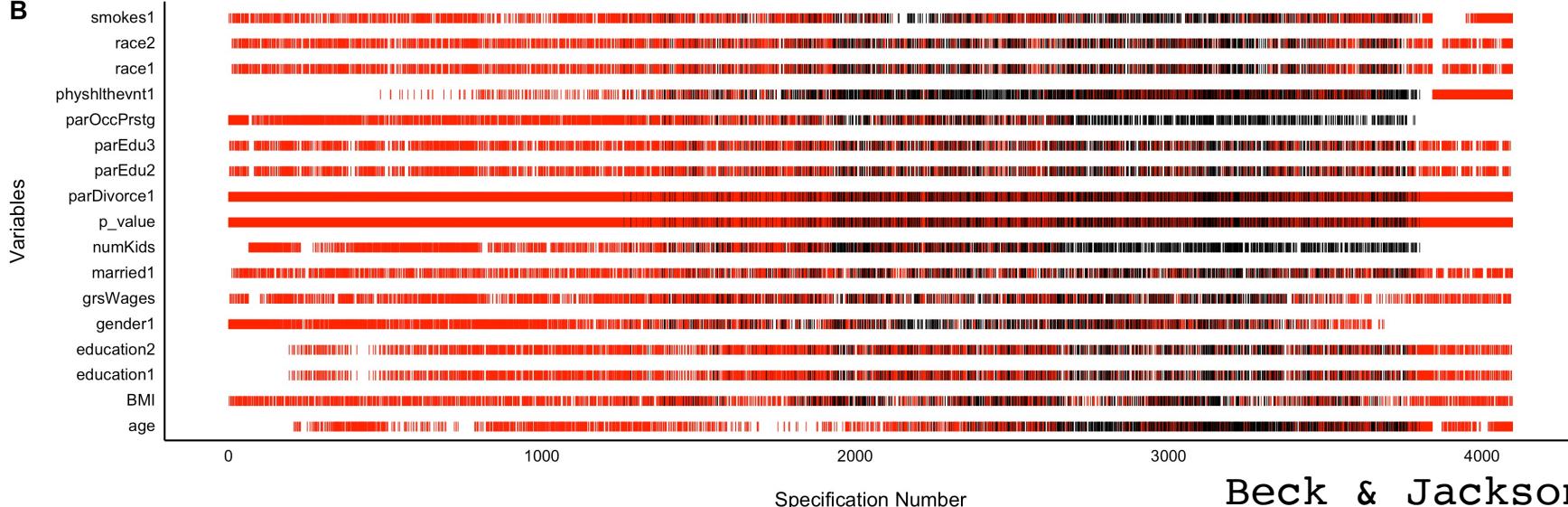
Idiographic

**Differential, No clear pattern****16/196 (8.16%)****A**

Self-Esteem → Criminality

Effect of Self-Esteem on  
Criminality (OR)

**Not a lot of  
effect size  
change**


**B**

## Description

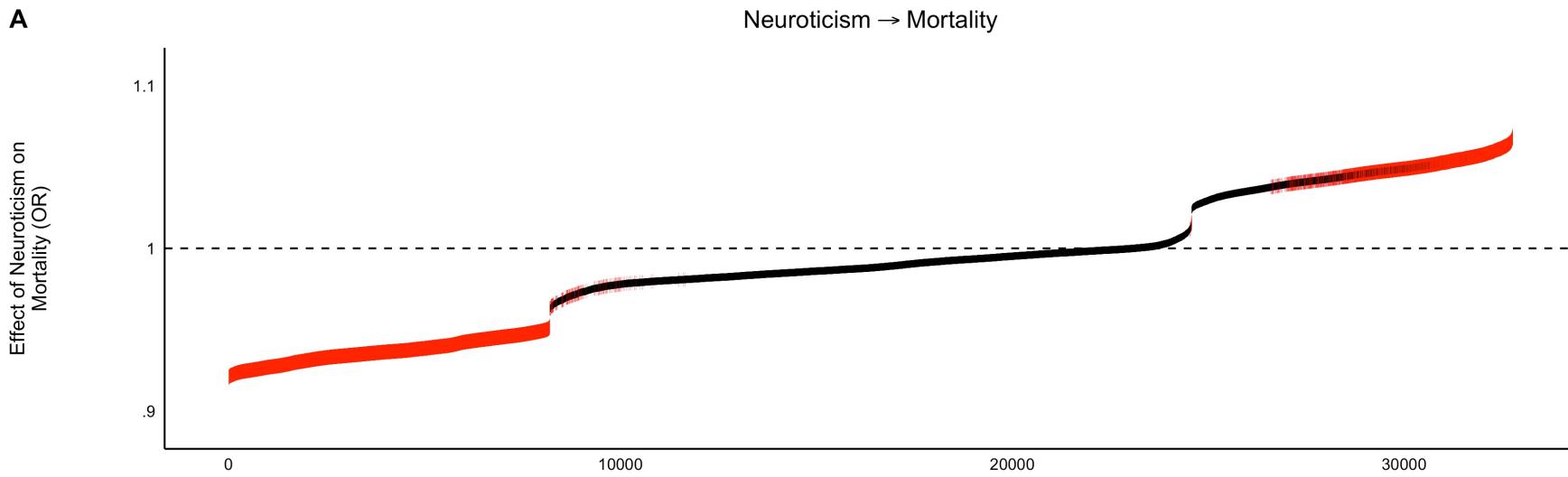
## Prediction

## Explanation

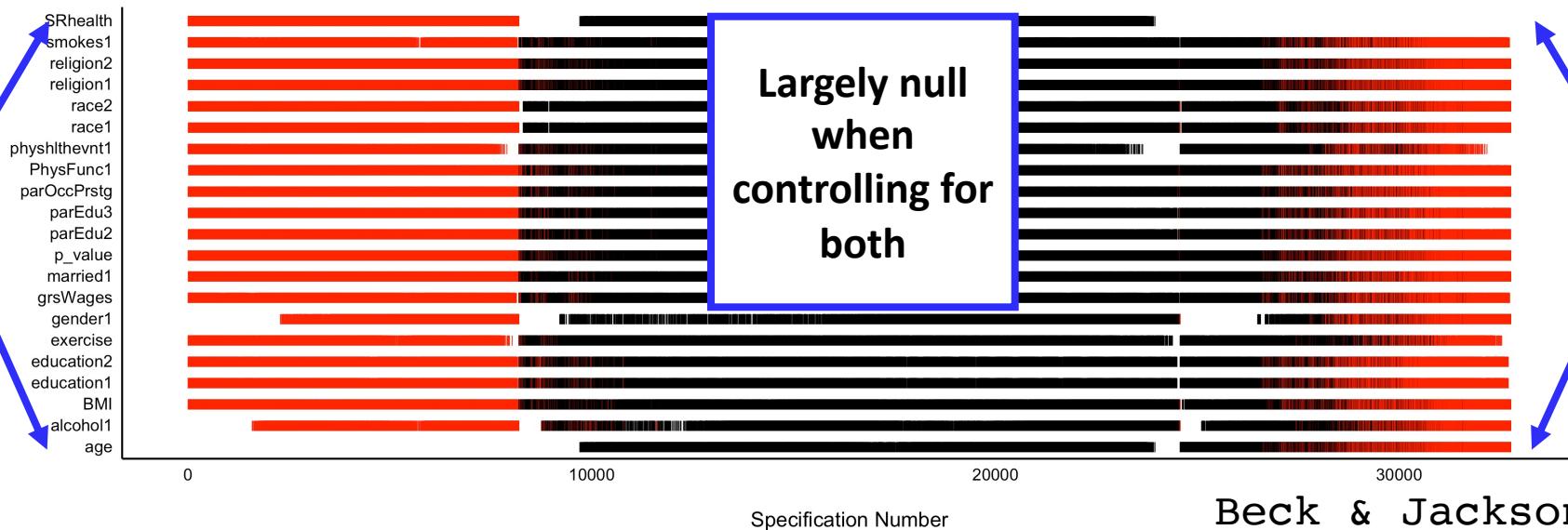
Between Person

Within-Person

Idiographic

**Differential, Clear pattern****102/196 (52.04%)****A**

**Significant and negative with self-rated health but not age**

**B**

**Somewhat Significant and positive with age but not self-rated health**

Description

Prediction

Explanation

Between Person

Within-Person

Idiographic

**Our understanding of between-person personality structure is far from over and requires sensitivity to age and other sociocultural factors**

**Arbitrary covariate use can have implications for robustness and replicability**

**Between-person characteristics remain robust predictors of long-term outcomes.**



Description

Prediction

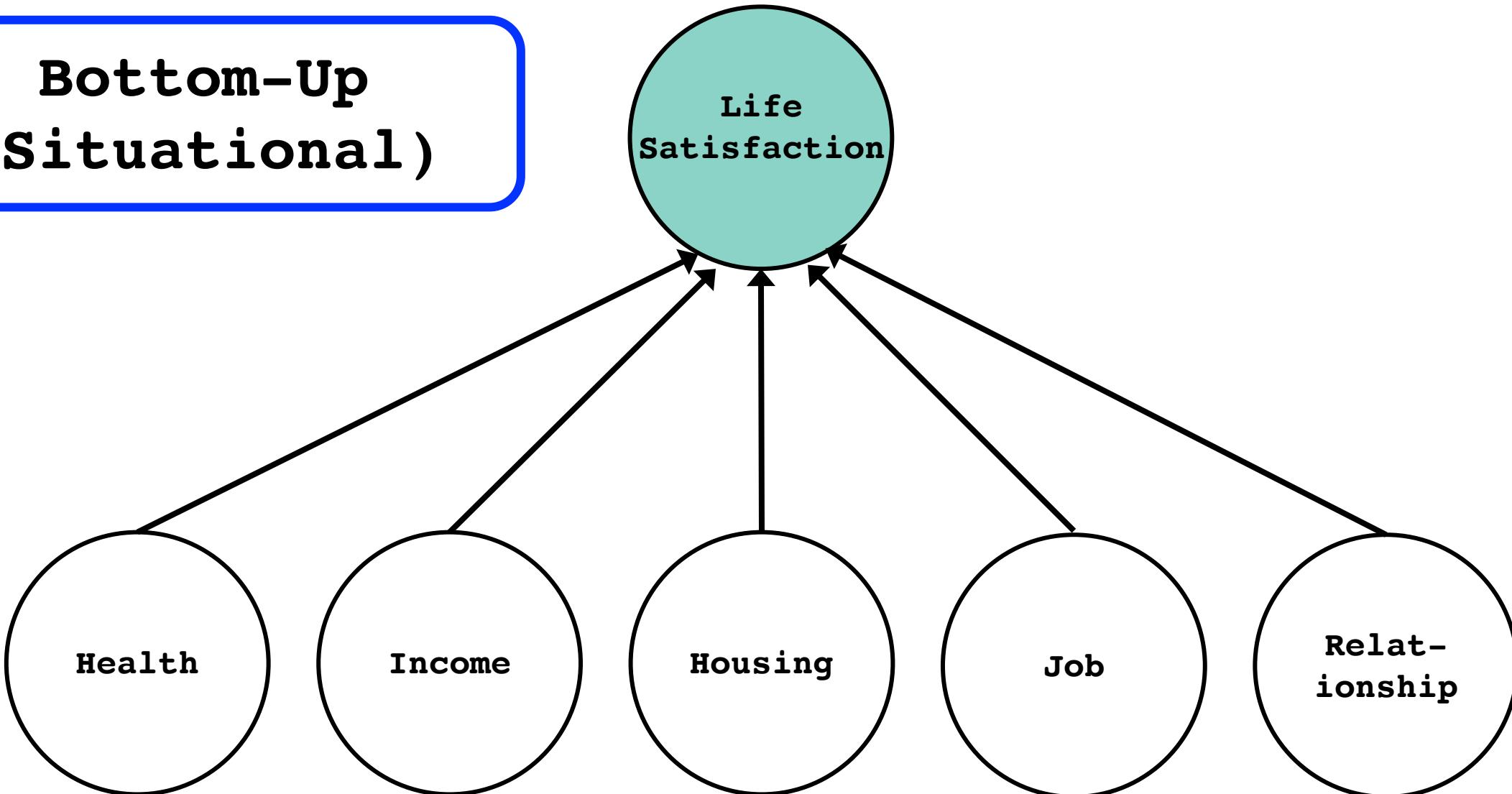
Explanation

Between Person

Within-Person

Idiographic

**Bottom-Up  
(Situational)**



Description

Prediction

Explanation

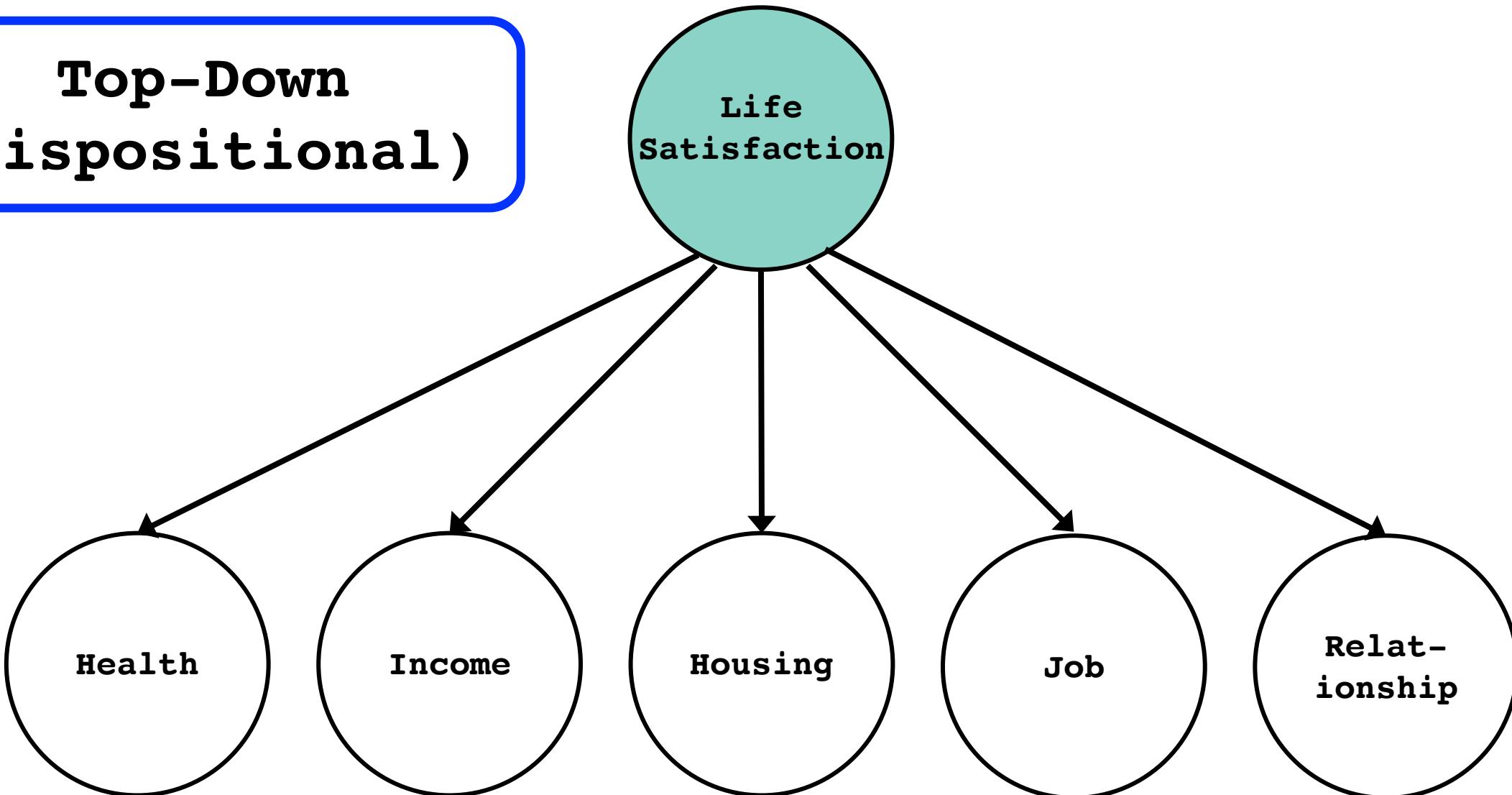
Between Person

Within-Person

Idiographic

**Top-Down  
(Dispositional)**

Domain Satisfaction



Description

Prediction

Explanation

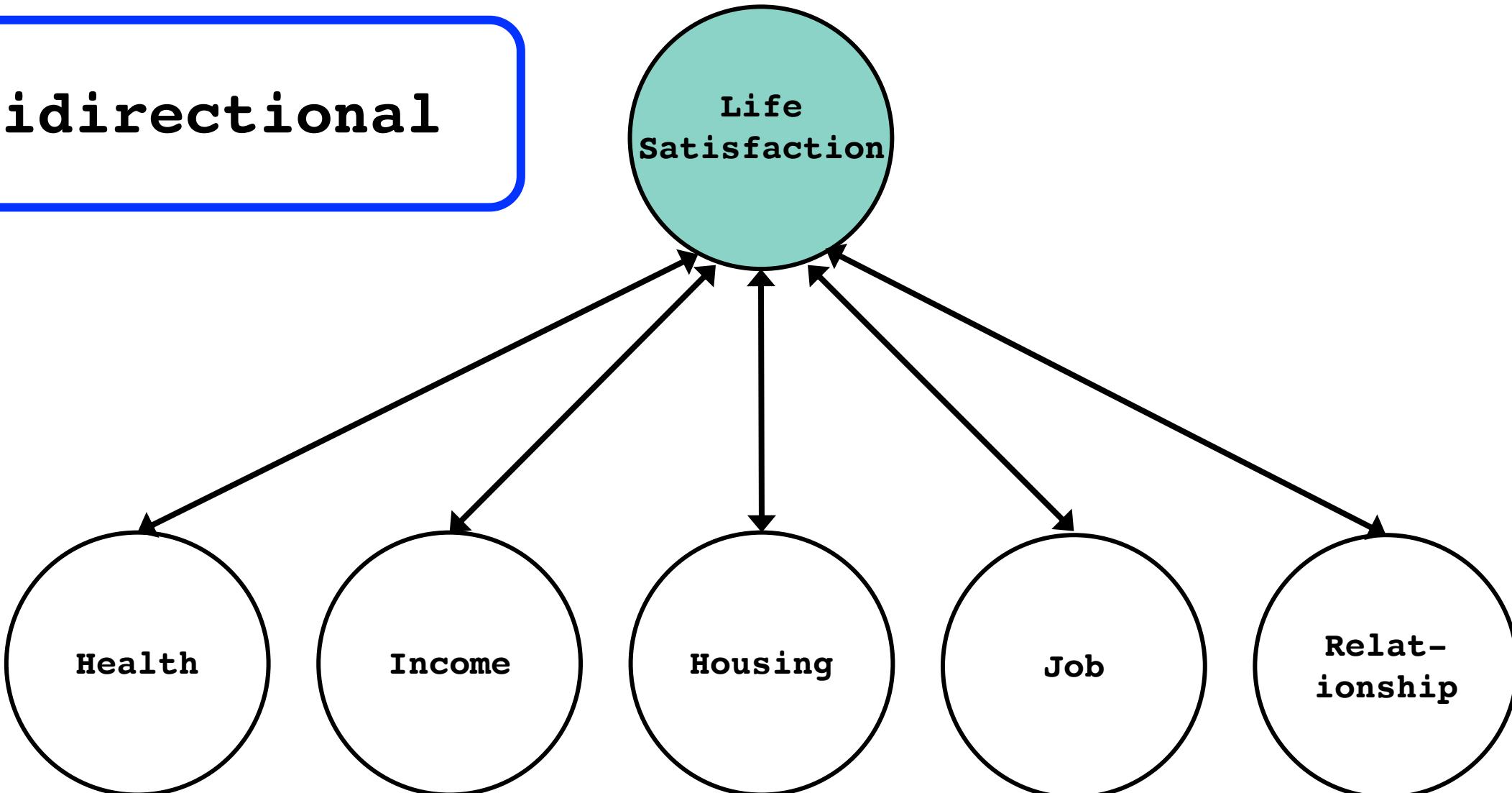
Between Person

Within-Person

Idiographic

**Bidirectional**

Domain Satisfaction



Description

Prediction

Explanation

Between Person

Within-Person

Idiographic

**GSOEP****HILDA****SHP****BHPS****LISS****Multilevel VAR(1) Models****Level 1:**

$$Y_{ptj} = \beta_{0pj} + \beta_{1pj} * V_{1,p,t-1} + \dots + \beta_{kpj} * V_{k,p,t-1} + \varepsilon_{ptj}$$

**Level 2:**

$$\beta_{0pj} = \gamma_{00j} + \gamma_{01j} * \bar{V}_{1,p} + \dots + \gamma_{01j} * \bar{V}_{kp} + r_{0pj}$$

$$\vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots$$

$$\beta_{kpj} = \gamma_{k0j} + \gamma_{k1j} * \bar{V}_{p,1} + \dots + \gamma_{kkj} * \bar{V}_{pj} + r_{kpj}$$

**Between-Person Effects  
(Level 2)**

$$\gamma_{01j} - \gamma_{0kj}$$

**Within-Person Effects  
(Level 1)**

$$\gamma_{10j} - \gamma_{kkj}$$

**Person-Specific Effects  
(Level 2 random effects)**

$$r_{0pj} - r_{kpj}$$

Description	Prediction	Explanation
Between Person	Within-Person	Idiographic
		*Cheung, *Beck, Thapa, & Jackson (under review)

Description	Prediction	Explanation
Between Person	Within-Person	Idiographic
	Top Down	Bi-directional
	Non-Directional	Bottom Up

\*Cheung, \*Beck,  
Thapa, & Jackson  
(under review)

## Description

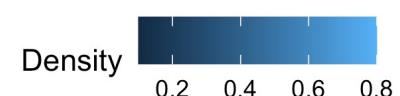
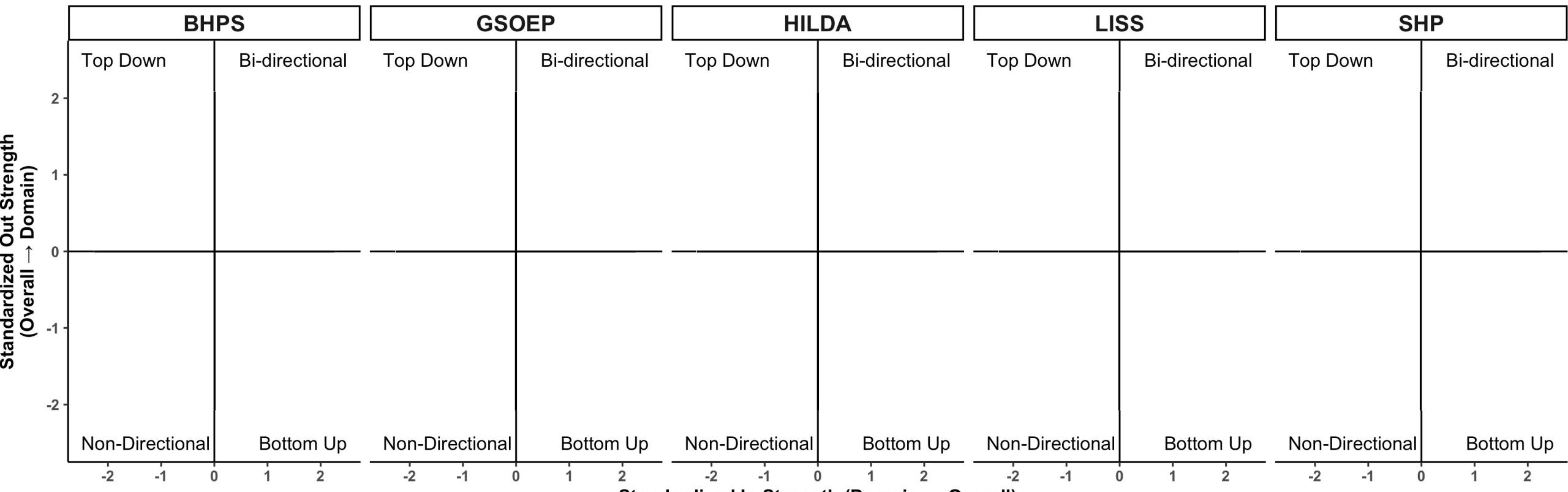
## Prediction

## Explanation

Between Person

Within-Person

Idiographic





Description

Prediction

Explanation

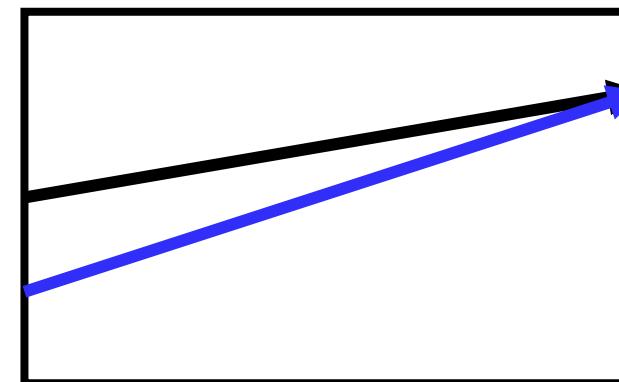
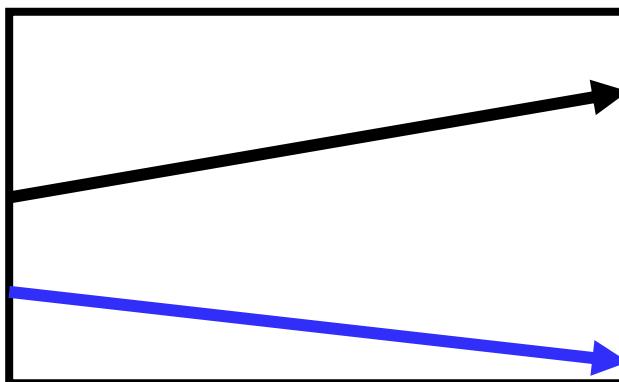
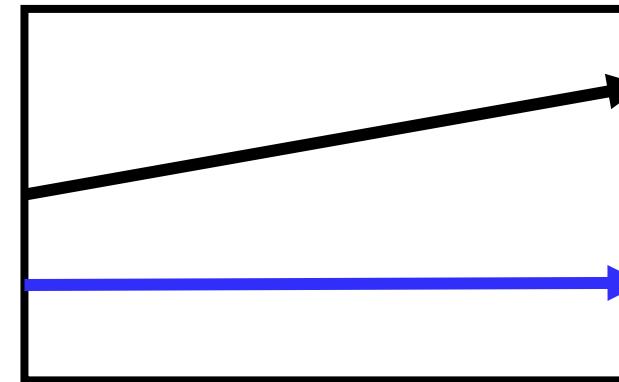
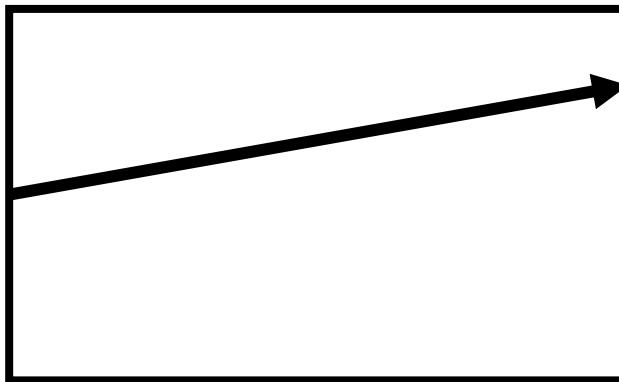
Between Person

Within-Person

Idiographic

# Socialization

Selection Bias



Description

Prediction

Explanation

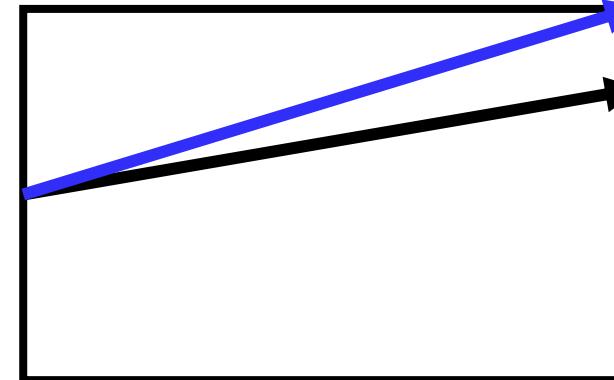
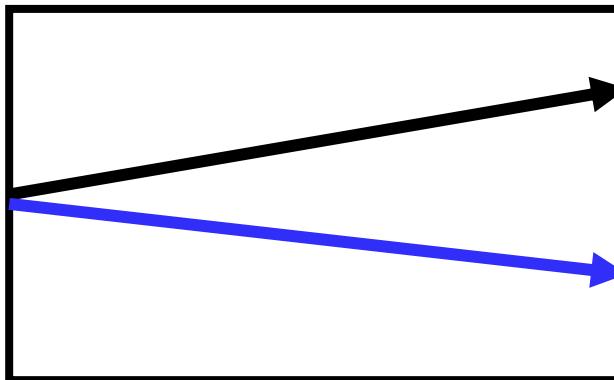
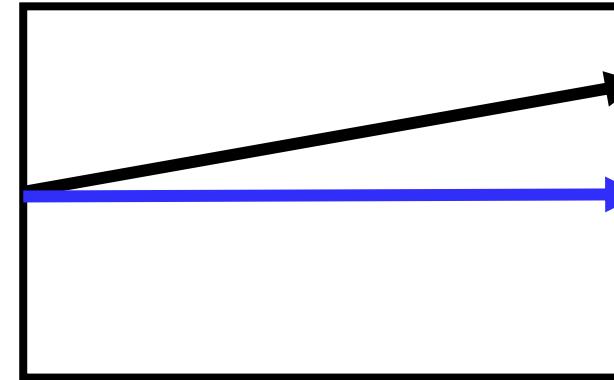
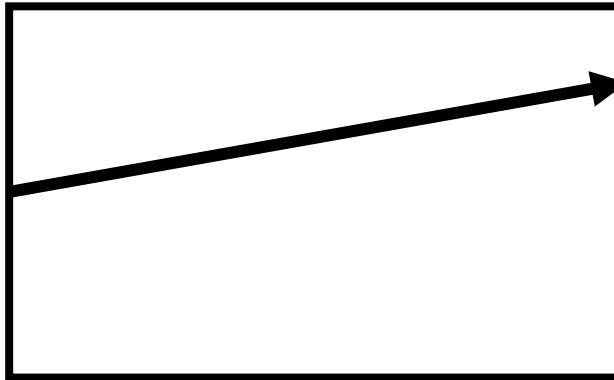
Between Person

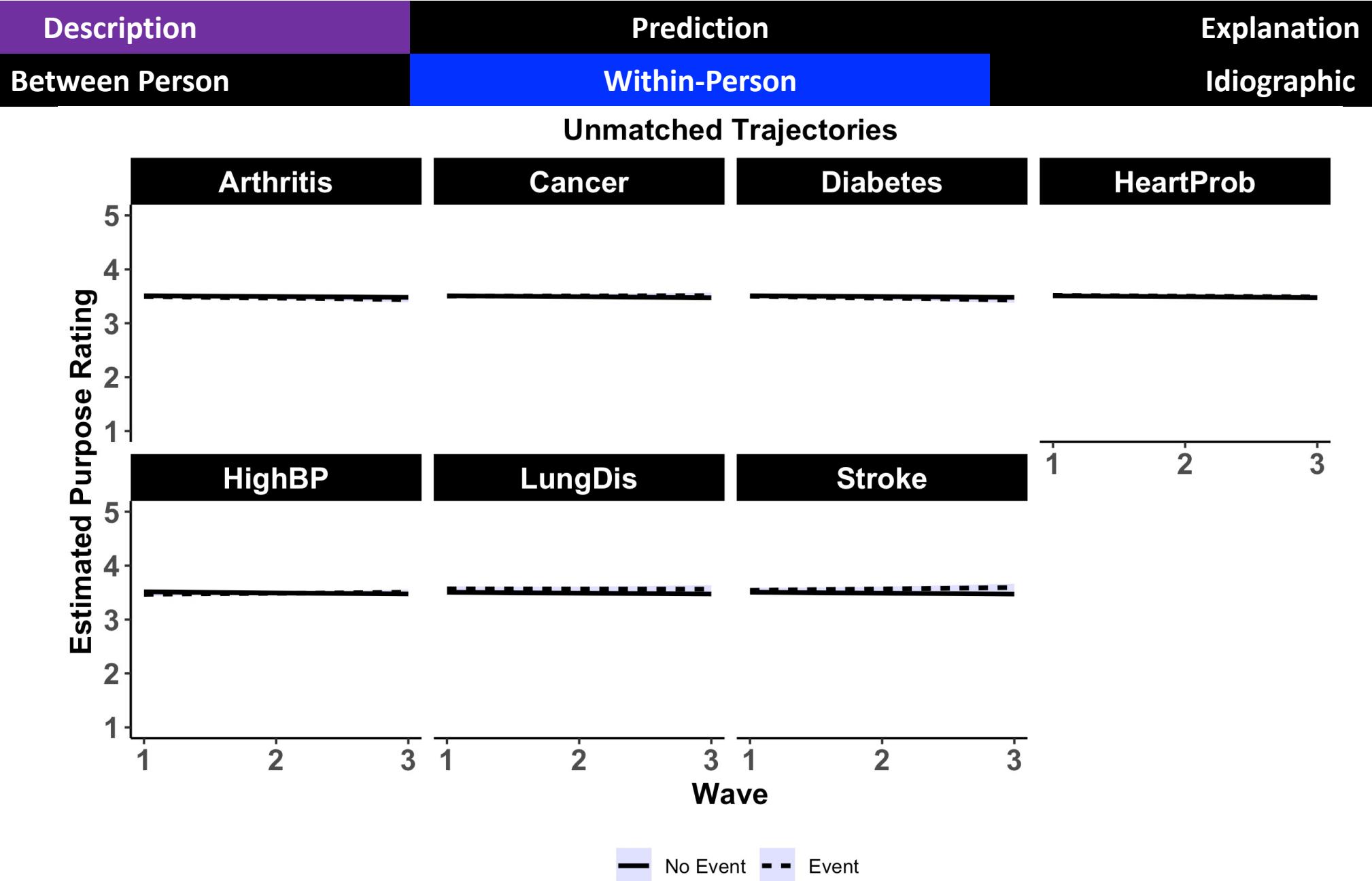
Within-Person

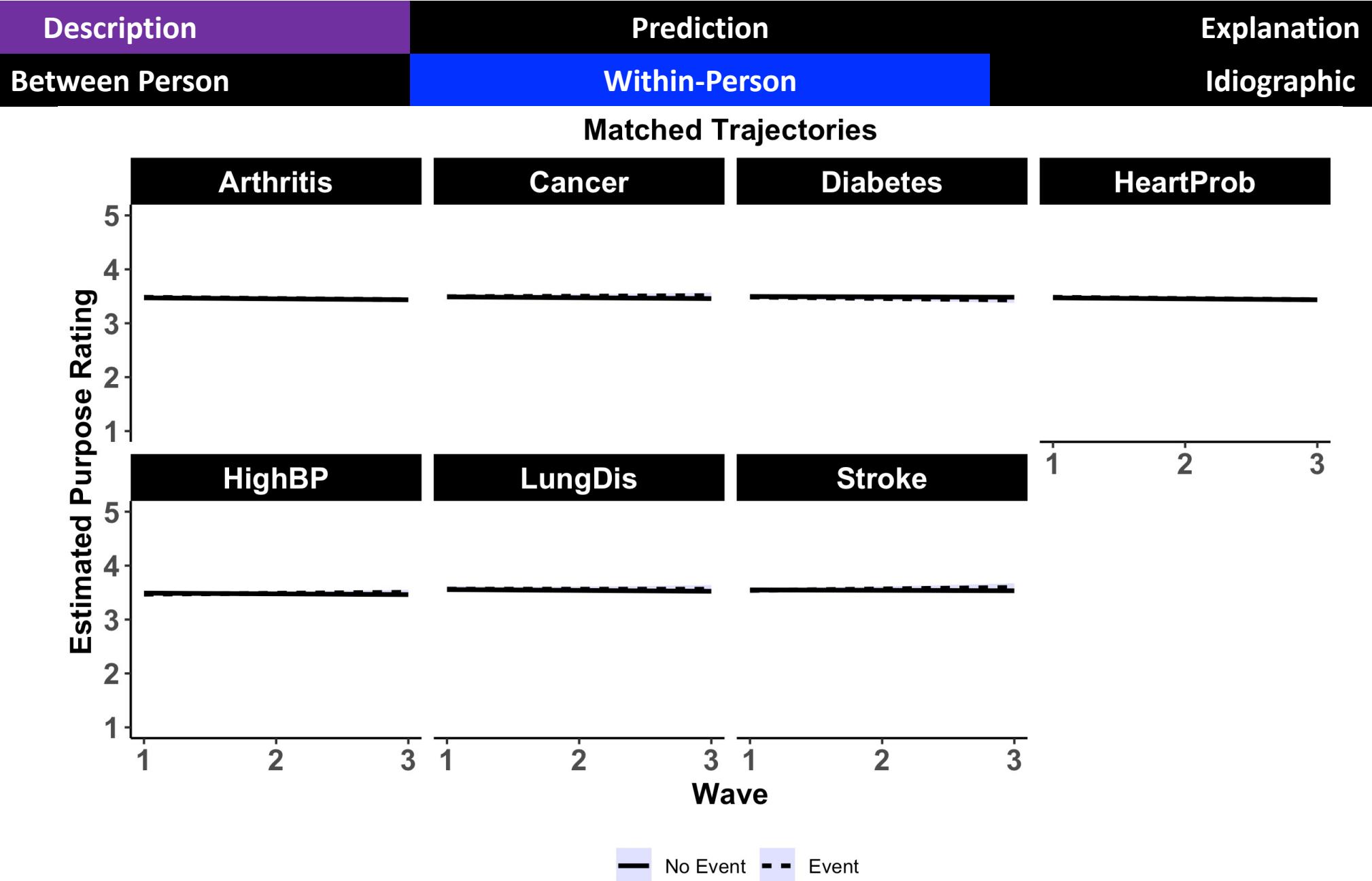
Idiographic

# Socialization

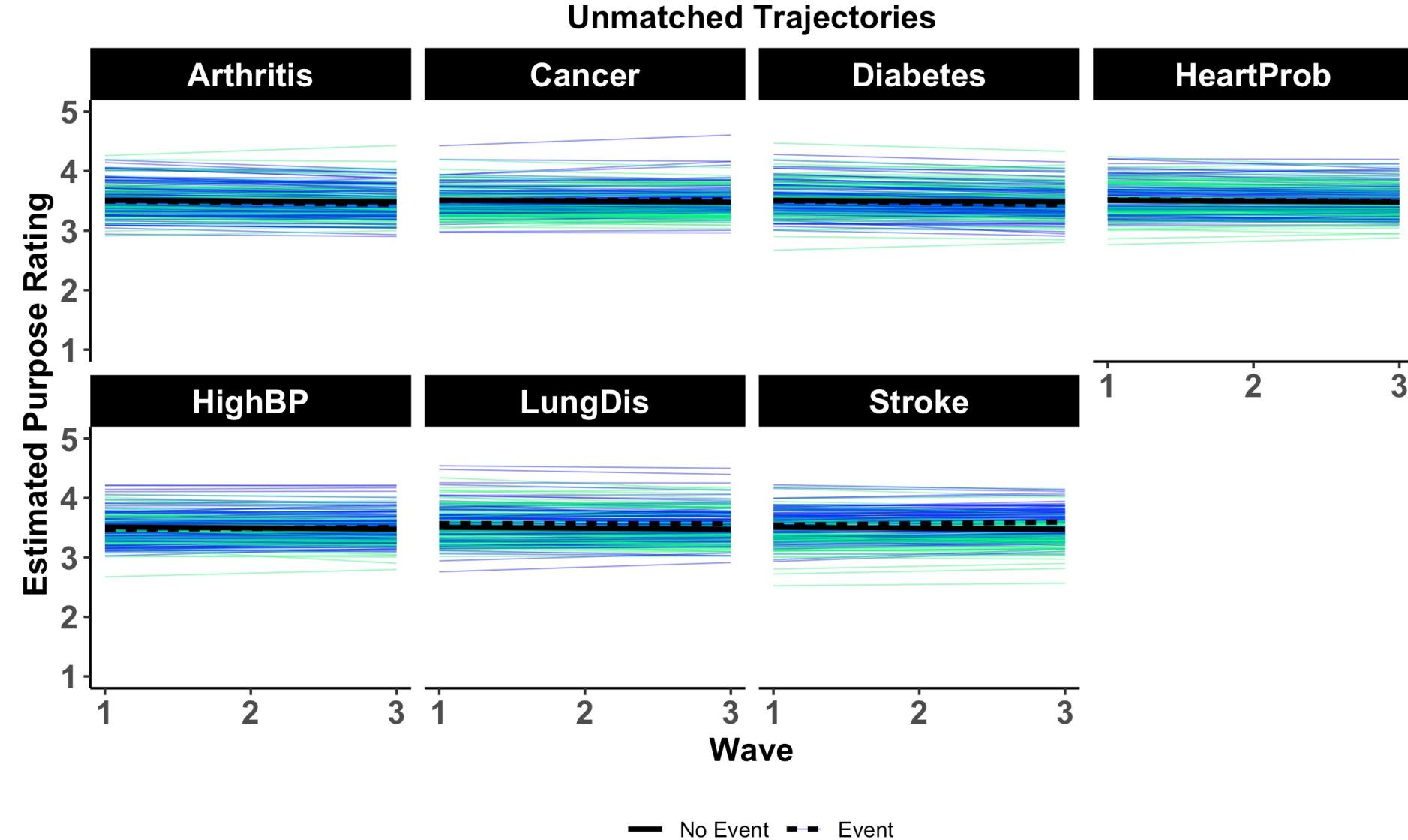
Selection Bias

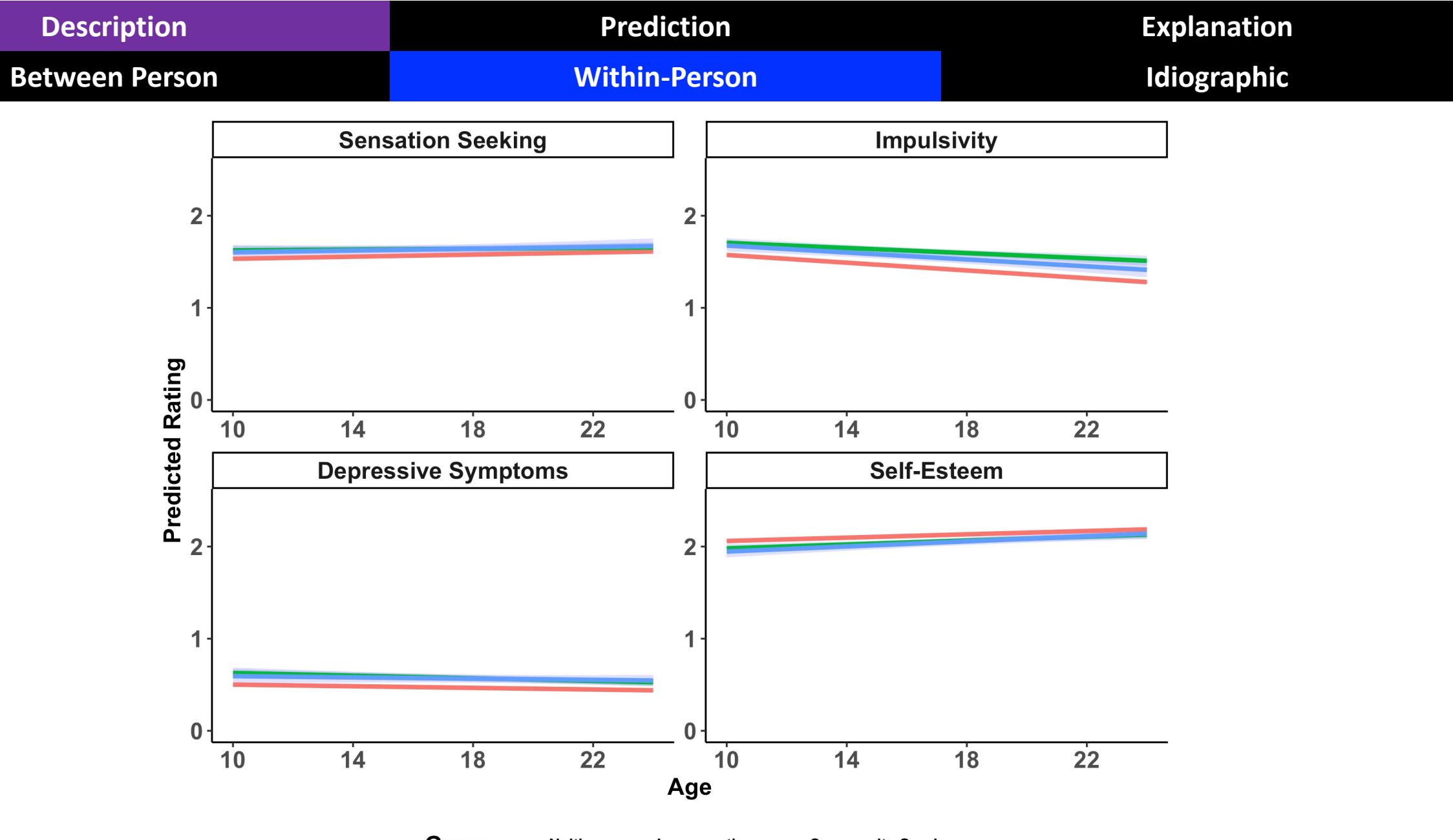


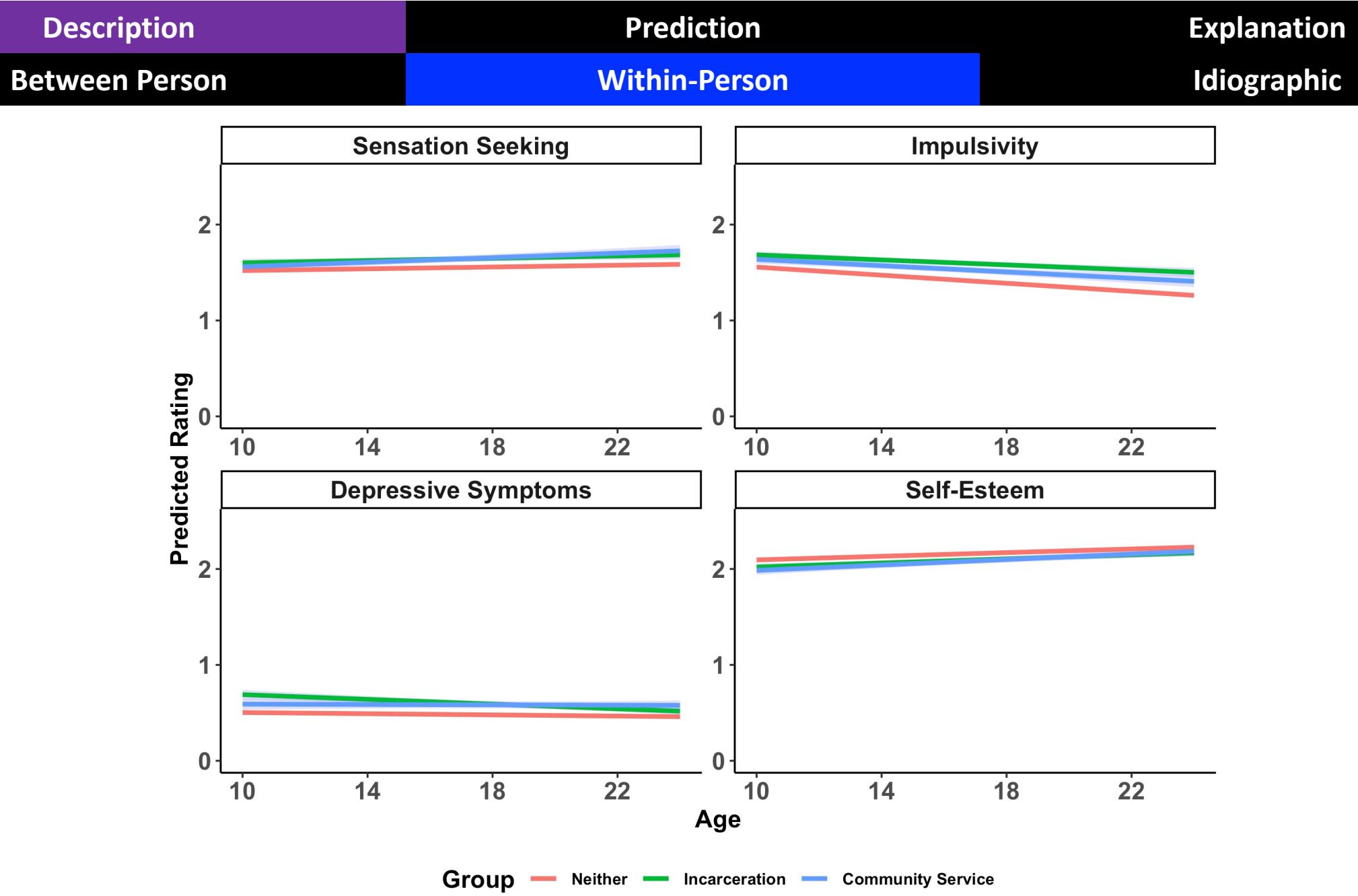




Description	Prediction	Explanation
Between Person	Within-Person	Idiographic







## Description

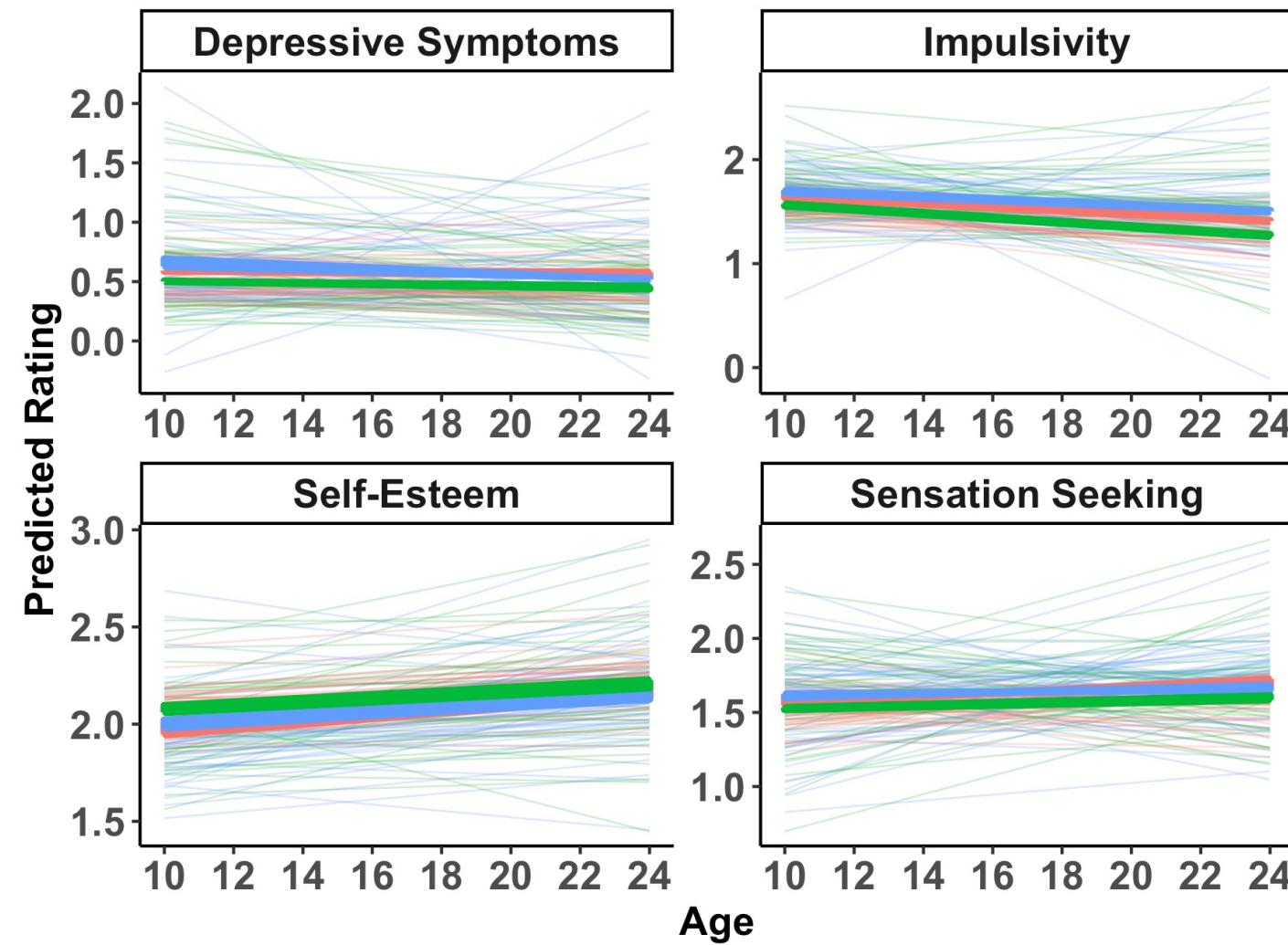
Between Person

## Prediction

Within-Person

## Explanation

Idiographic



Group — Community Service — Neither — Incarceration

Bollich, Beck, Hill, & Jackson (2021; *JPSP*)

Description	Prediction	Explanation
Between Person	Within-Person	Idiographic

The importance of disaggregating *person-specific* effects from average, within-person (*person-centered*) effects.

Examining personality at one level of aggregation may mask the full picture.

There are many challenges of linking within-person personality change to life and health events.



Description

Between Person

Prediction

Within-Person

Explanation

Idiographic

Description

Between Person

Prediction

Within-Person

Explanation

Idiographic

Description

Prediction

Explanation

Between Person

Within-Person

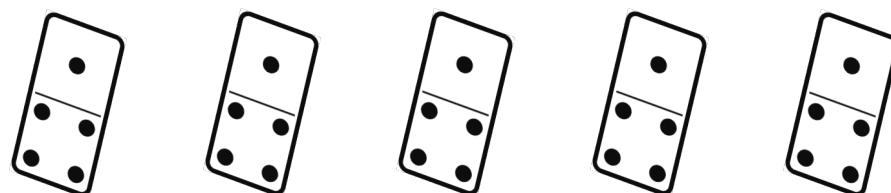
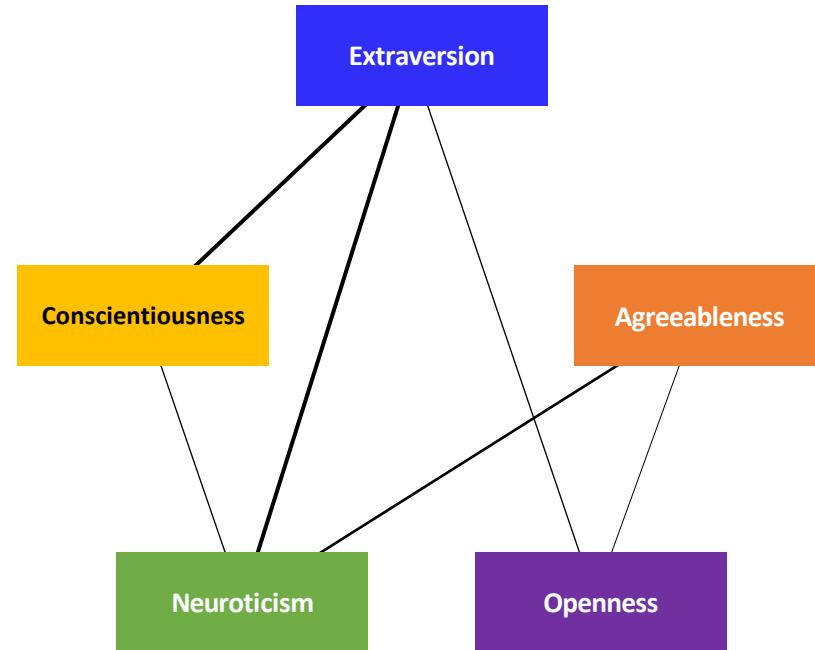
Idiographic

***“No trait operates alone”***

Allport, 1937, p. 330

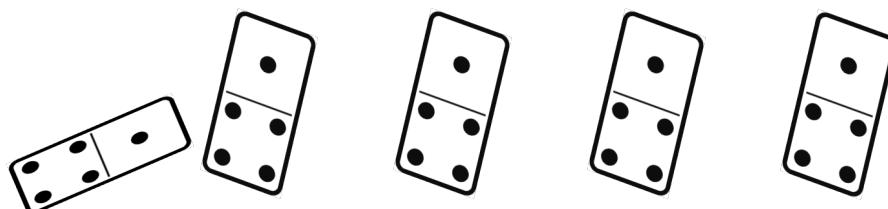
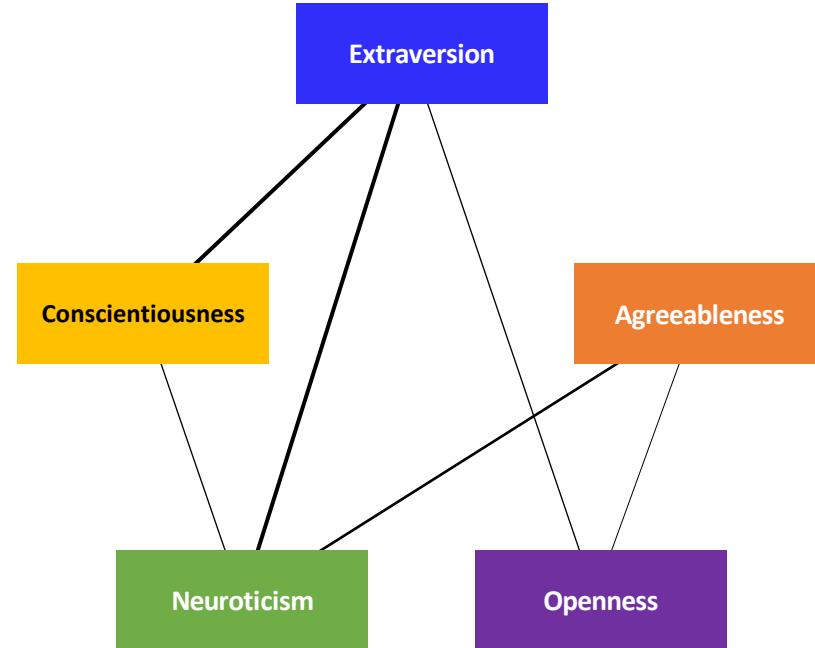
***“No trait operates alone”***

Allport, 1937, p. 330



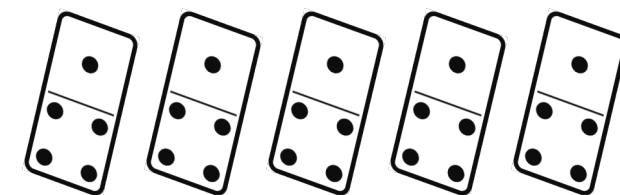
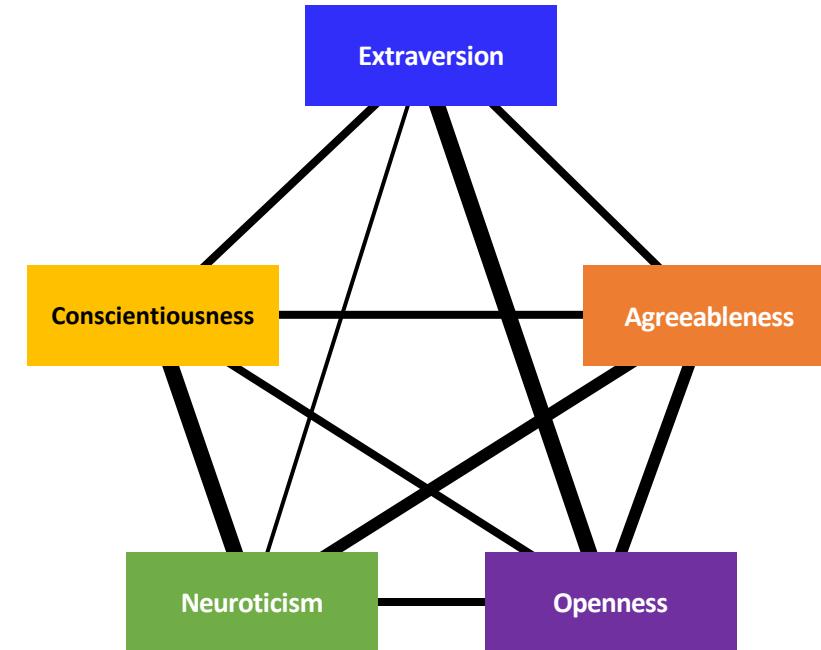
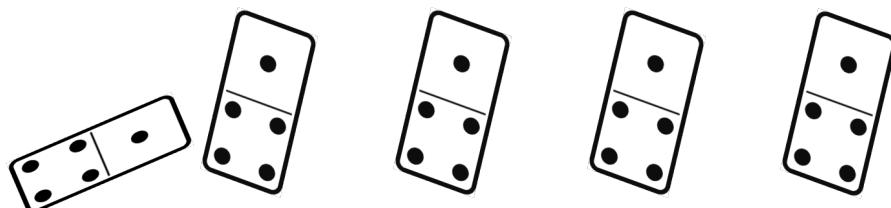
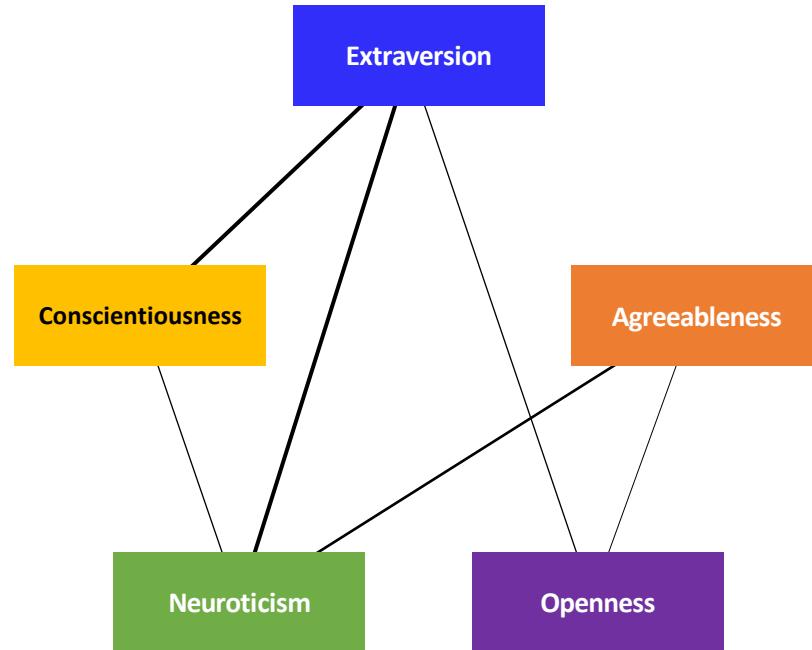
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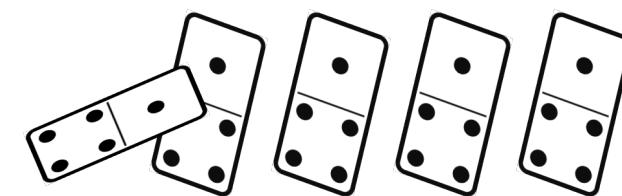
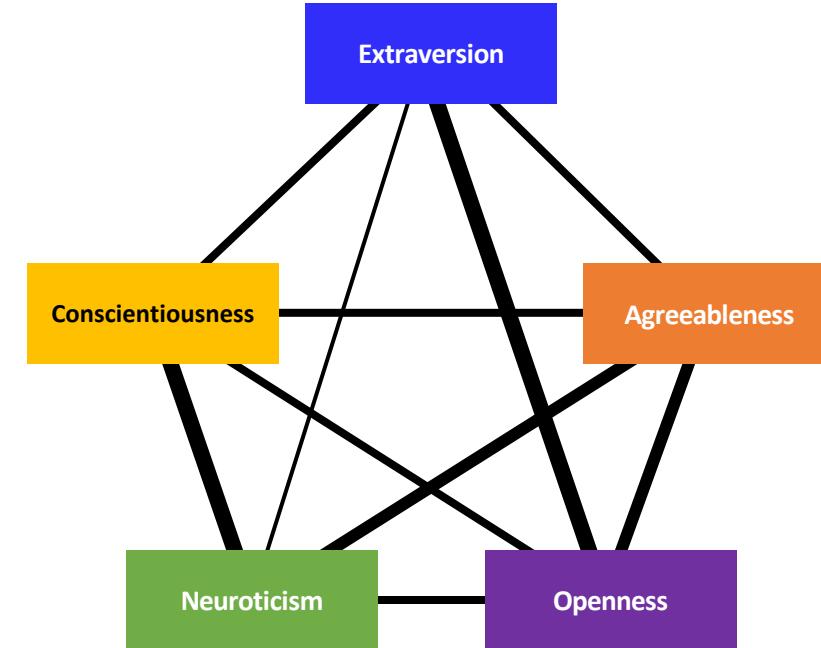
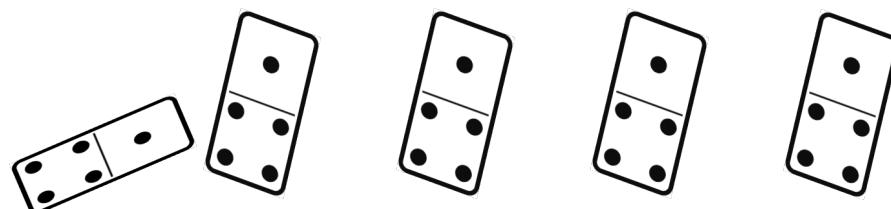
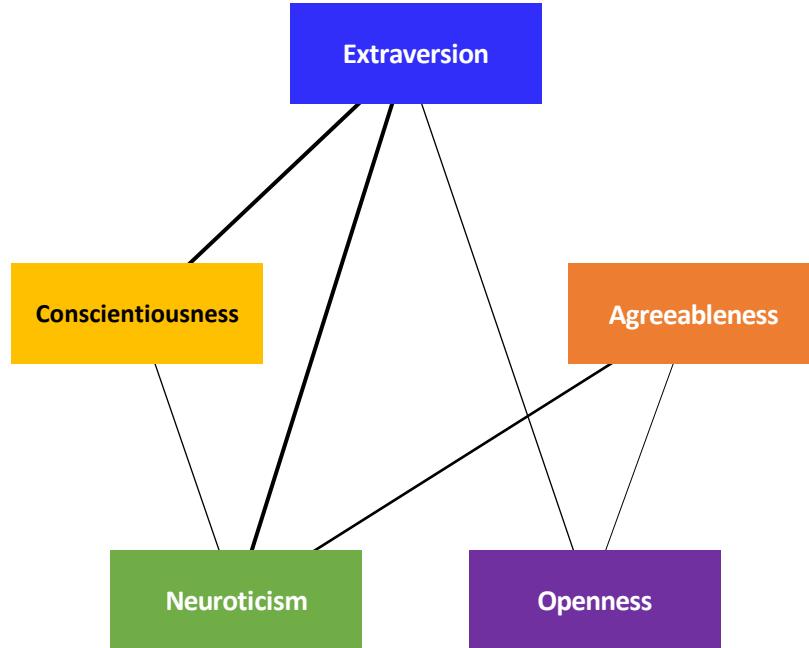
***“No trait operates alone”***

Allport, 1937, p. 330



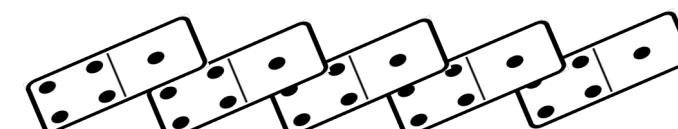
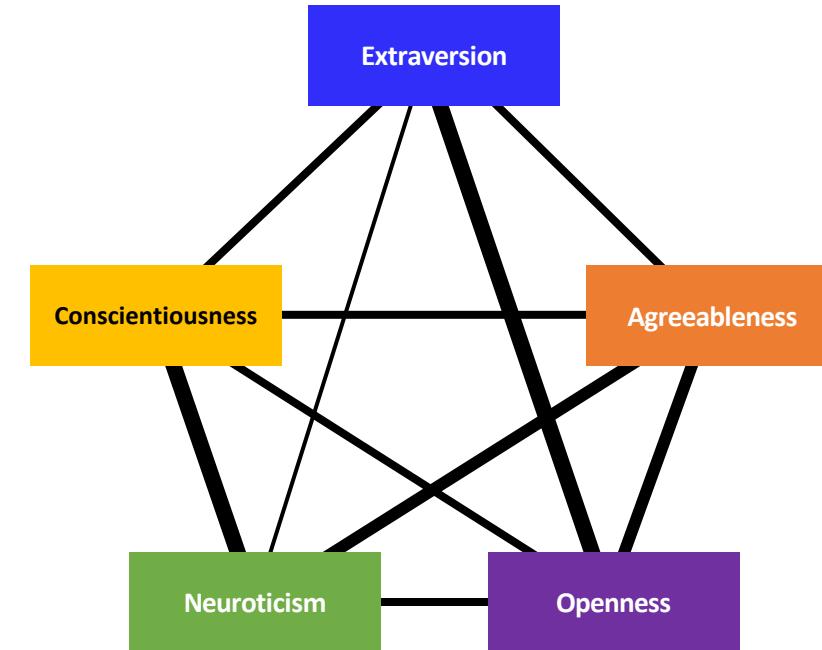
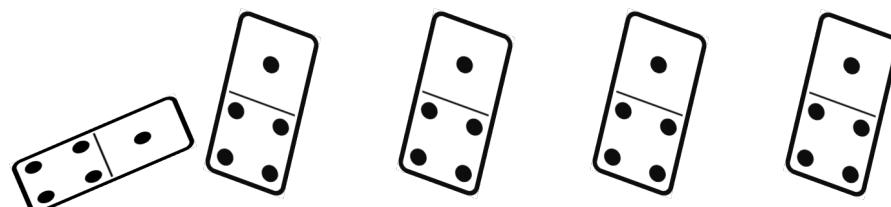
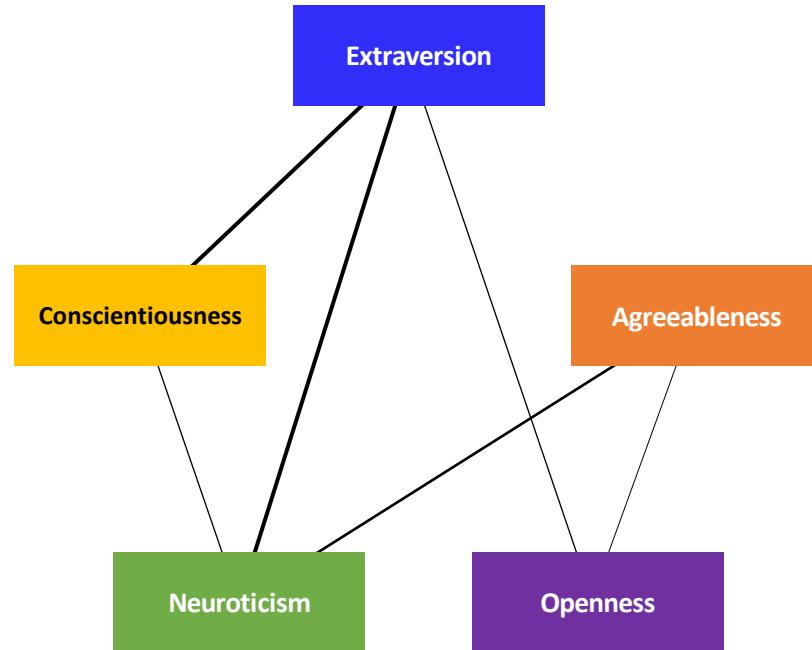
***“No trait operates alone”***

Allport, 1937, p. 330



***“No trait operates alone”***

Allport, 1937, p. 330



Description

Prediction

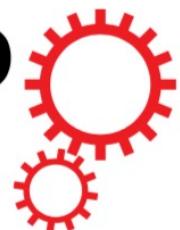
Explanation

Between Person

Within-Person

Idiographic

# SCIENTIFIC REPORTS



OPEN

## Testing for the Presence of Correlation Changes in a Multivariate Time Series: A Permutation Based Approach

Jedelyn Cabrieto<sup>1</sup>, Francis Tuerlinckx<sup>1</sup>, Peter Kuppens<sup>1</sup>, Borbála Hunyadi<sup>2,3</sup> & Eva Ceulemans<sup>1</sup>

Received: 23 August 2017

Accepted: 11 December 2017

Published online: 15 January 2018

## Description

Between Person

## Prediction

Within-Person

## Explanation

Idiographic

### Fraley Longitudinal Project

**E** Extraverted, enthusiastic

Reserved, quiet (-)

**A** Critical, quarrelsome (-)

Sympathetic, warm

**C** Dependable, self-disciplined

Disorganized, careless (-)

**N** Anxious, easily upset

Calm, emotionally stable (-)

**O** Open to new experiences, complex

Conventional, uncreative (-)

N = 388 participants (total N = 21,790)  
60 possible assessments

### Personality

Baseline



60 weeks

### Life Events

Preregistration: <https://osf.io/mfn8w/>

**1**

Moving Window Correlations

**2**

Gaussian Similarity between all possible phases for different k

**3**

Calculate average within-phase Variance of Gaussian Similarity

**4**

Repeat steps 1 and 2 for 1000 permuted data sets

**5**

Perform the variance test

**6**

Perform the variance drop test

**7**

Declare significance if either the variance or variance drop tests passes

**8**

Keep k of minimum penalized average within-phase variance

$$Gk(\mathbf{R}_i, \mathbf{R}_j) = \exp\left(-\frac{\|\mathbf{R}_i - \mathbf{R}_j\|^2}{2h_R^2}\right)$$

$$\mathbf{R}_i = \begin{bmatrix} w_{i,1} \\ w_{i,2} \\ \vdots \\ w_{i,\frac{V(V-1)}{2}} \end{bmatrix}$$

$$\hat{R}(\tau_1, \tau_2, \dots, \tau_K) = \frac{1}{n} \sum_{p=1}^{K+1} \hat{V}_p, \tau_1, \tau_2, \dots, \tau_K$$

$$\hat{V}_{p,\tau_1,\tau_2,\dots,\tau_K} = (\tau_p - \tau_{p-1}) - \frac{1}{\tau_p - \tau_{p-1}} \sum_{i=\tau_{p-1}+1}^{\tau_p} \sum_{j=\tau_{p-1}+1}^{\tau_p} Gk(\mathbf{R}_i, \mathbf{R}_j)$$

$$p_{variancetest} = \frac{\#(\hat{R}_{min,K=0,perm} > \hat{R}_{min,K=0})}{B}$$

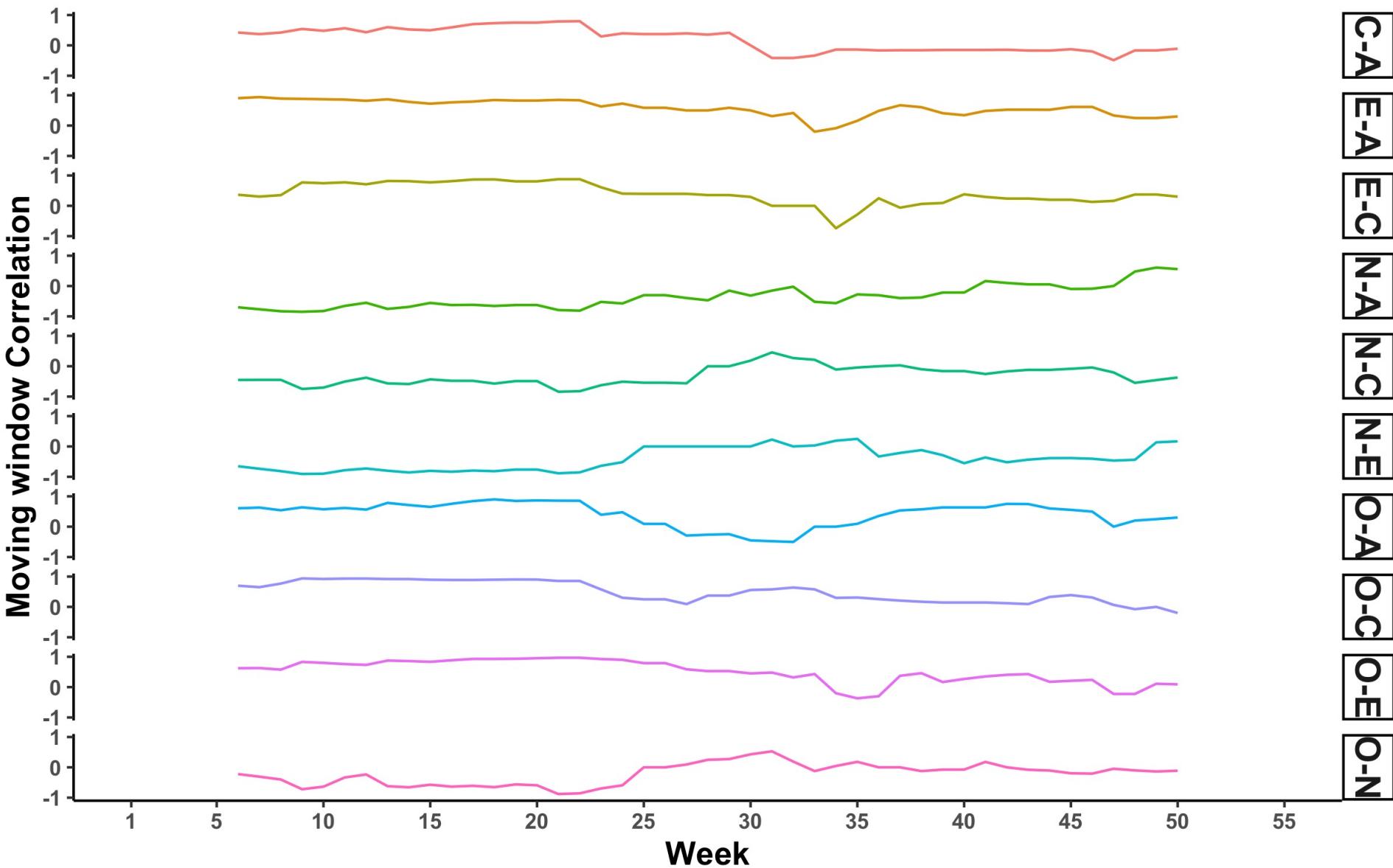
$$p_{variancedrop} = \frac{\#(\max variance drop_{perm} > \max variance drop)}{B}$$

$$pen_K = C \frac{V_{max}}{n} (K+1) [1 + \log(\frac{n}{K+1})]$$

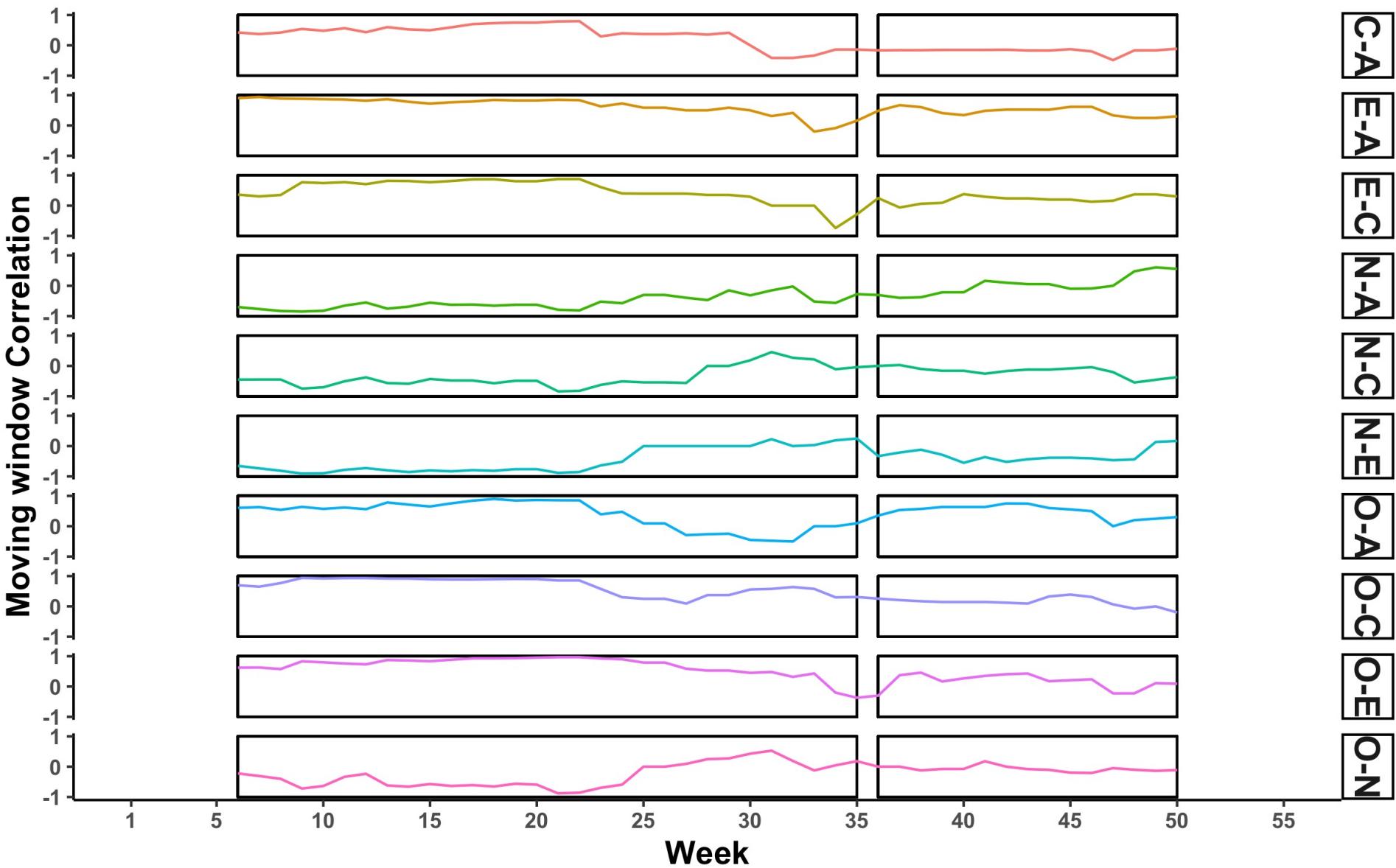
$$\hat{K} = \arg \min \hat{R}_{min,K} + pen_K,$$

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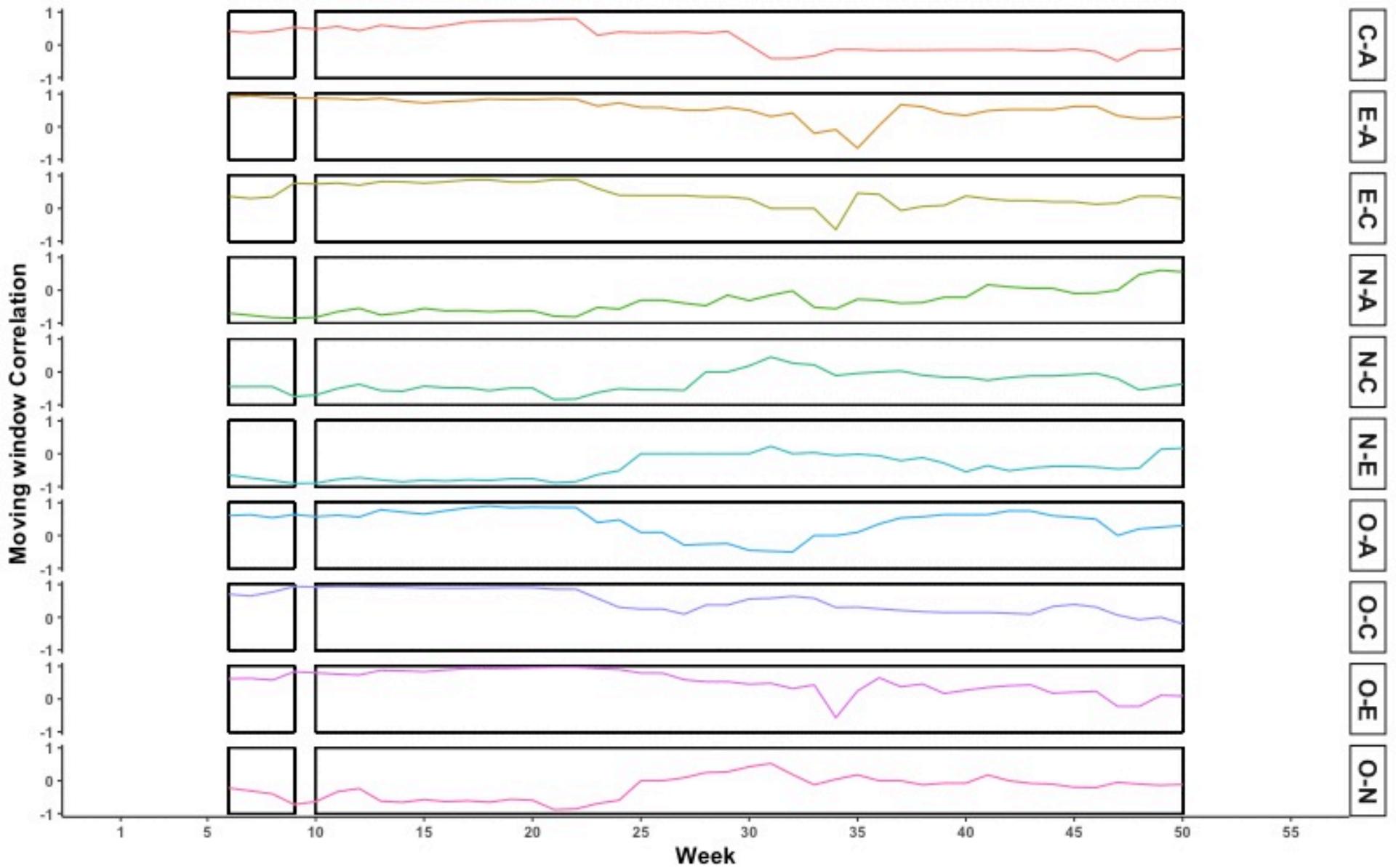
# Phases: $k = 0$



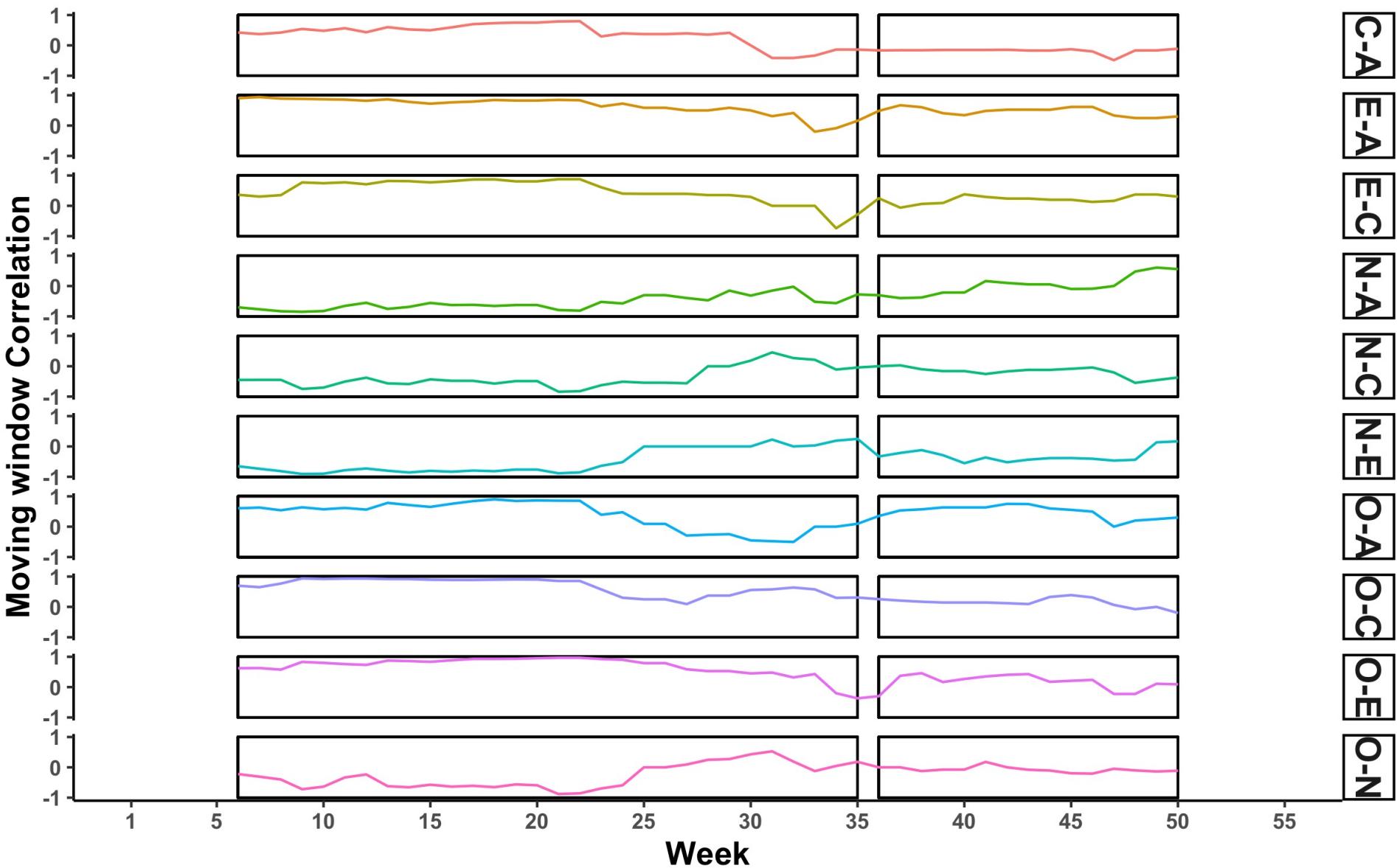
# Phases: $k = 1$



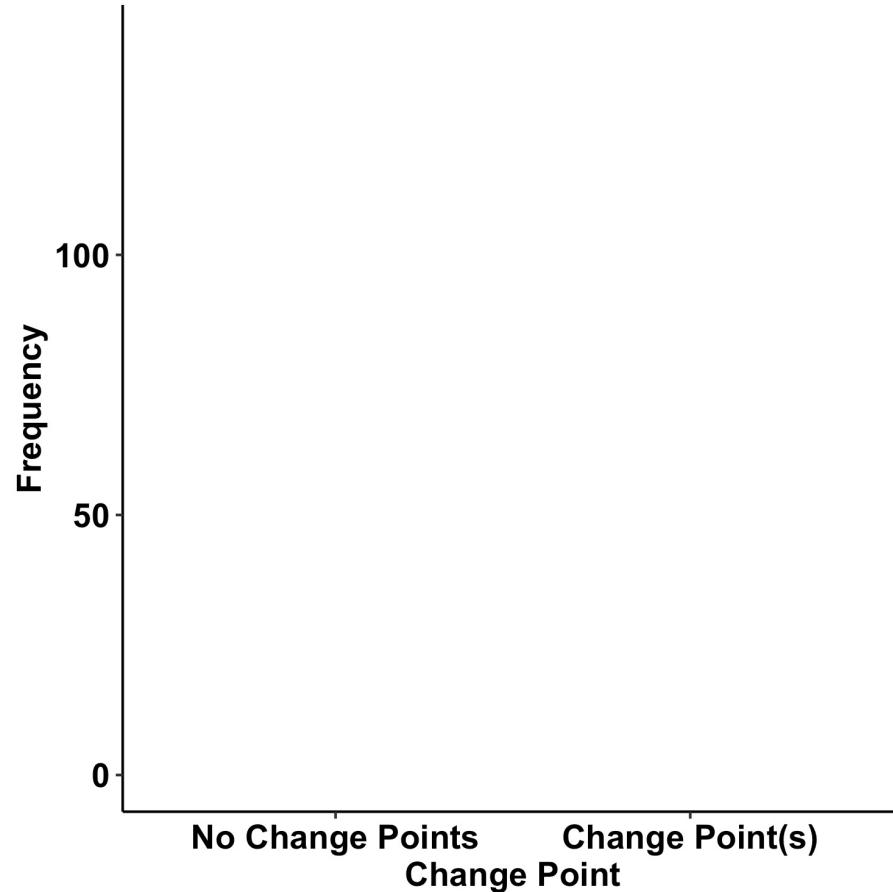
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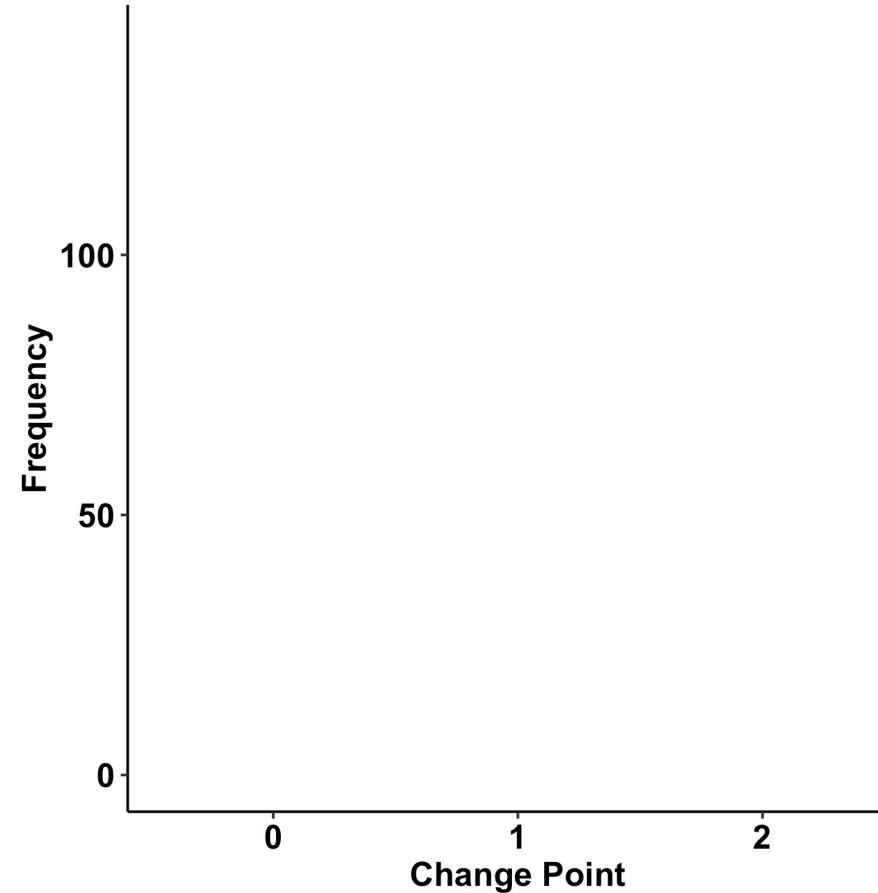
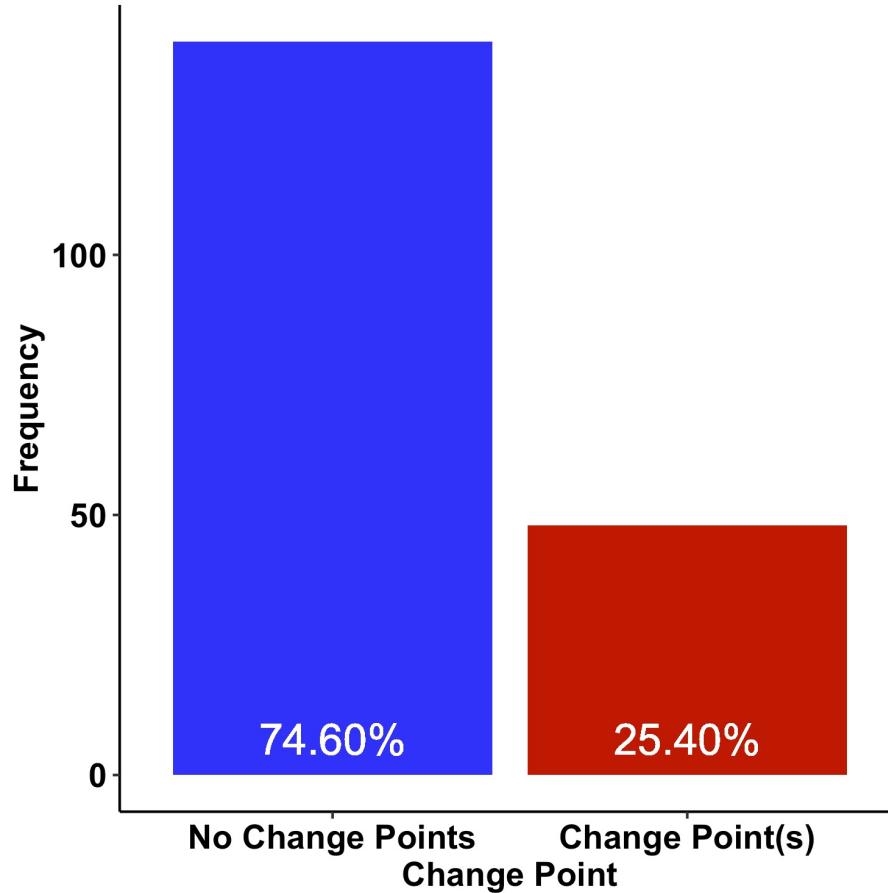
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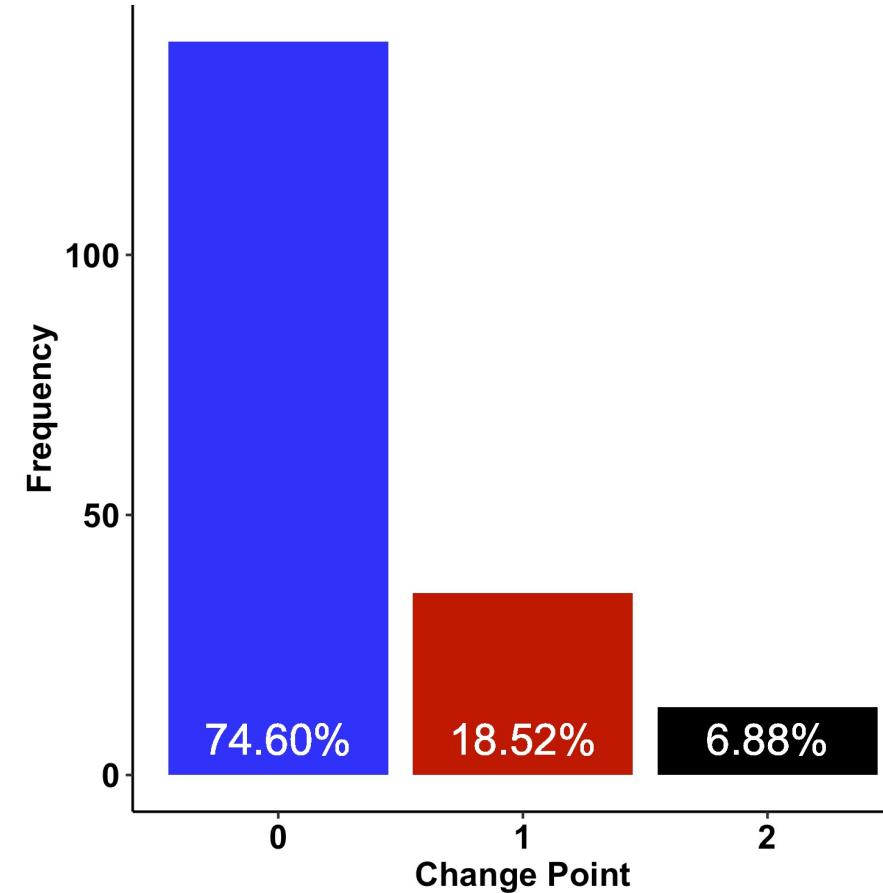
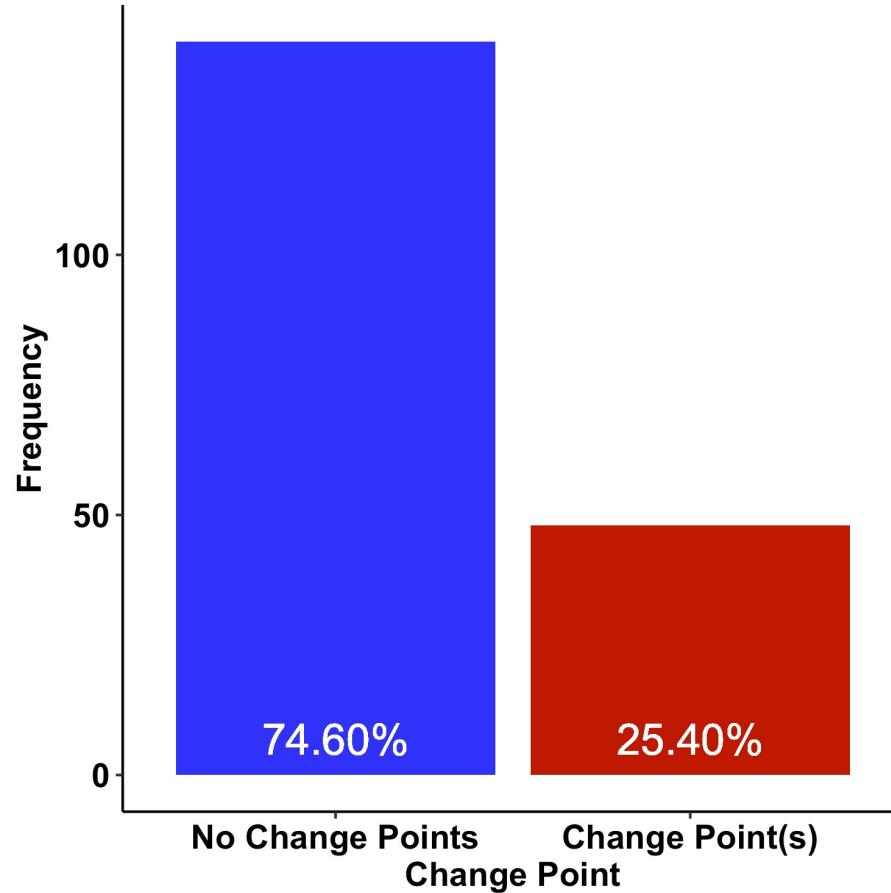
# Did people show correlational changes?



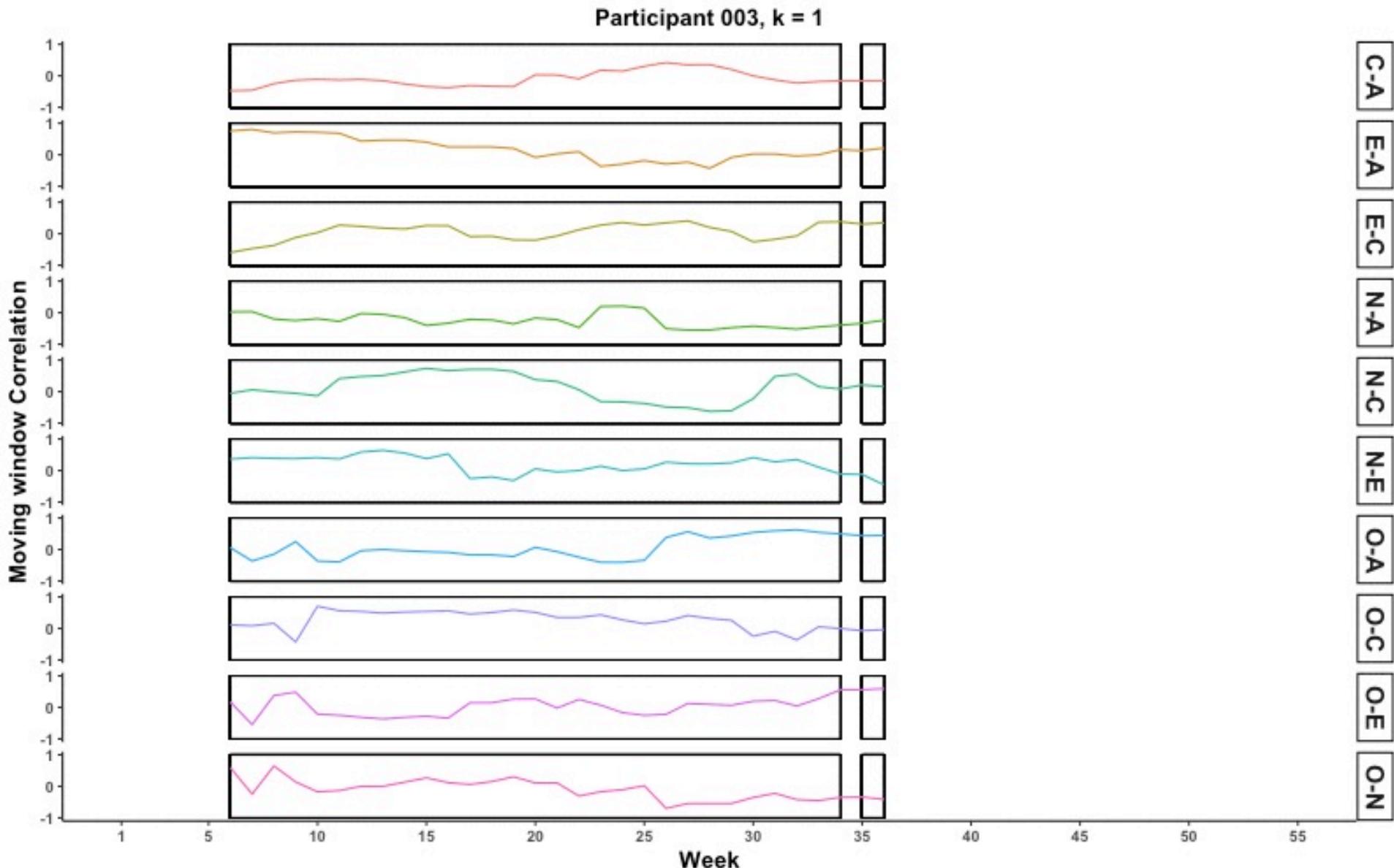
# Did people show correlational changes?



# Did people show correlational changes?



# Did people show correlational changes?





Description

Between Person

Prediction

Within-Person

Explanation

Idiographic

Description

Prediction

Explanation

Between Person

Within-Person

Idiographic

# Measures

## Personality & Affect

Full BFI-2,  
administered with 75%  
planned missingness

Subset of the PANAS-X  
(items redundant with  
the BFI-2 removed)

5-point Likert-like scale  
from 1 "disagree strongly"  
to 5 "agree strongly."

Binary indicators of  
procrastination & loneliness

0 = no, 1 = yes

## Situations

Binary indicators  
generated by  
undergraduate  
research assistants

0 = no, 1 = yes

**Ultra-brief DIAMONDS  
scale**

3-point scale from 1 "not  
at all" to 3 "totally."

## Outcomes

lead 1 (previous  
features predict  
future outcomes)

## Time

Derived from time  
stamps:

1. Time of day  
(morning, midday,  
evening, night)

2. Day of week

0 = no, 1 = yes

3. Linear, Quadratic,  
& Cubic Trends

4. 1 & 2 period sine  
and cosine

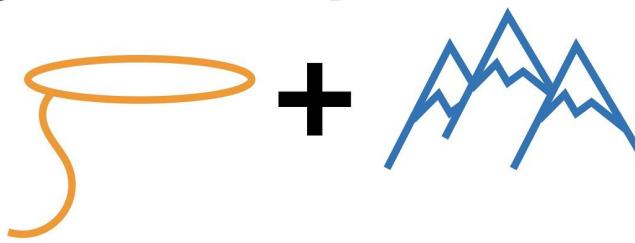
Beck & Jackson (under  
revision, *Psych Science*)

# Analytic Plan

- Classification Accuracy
- Area under the receiver operating curve (AUC)

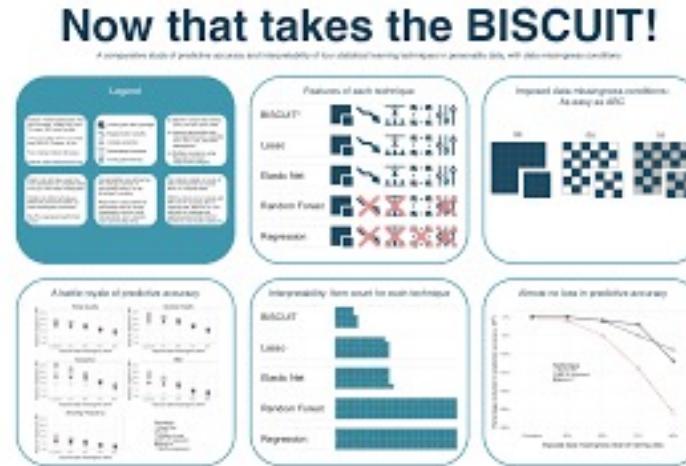
## 3 machine learning classification methods:

### Elastic Net



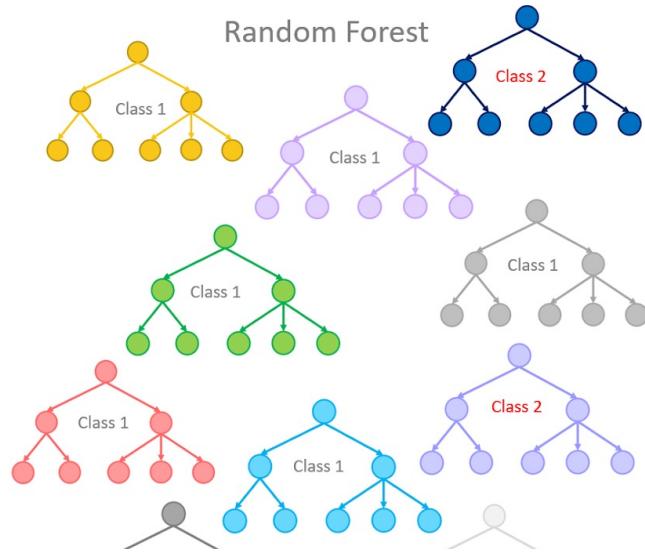
Tuning  $\lambda$  and mixture  
(10 values each)

### BISCWIT



Tuning number of items  
(number possible)

### Random Forest



Tuning mtry (# predictors sampled) and min\_n (min n to split further)

**Rolling origin forecast validation:** 1/3 of data as initial set, five obs validation set, skip = 1, which resulted in 10-15 rolling origin "folds."

Description	Prediction	Explanation
Between Person	Within-Person	Idiographic

Description

Prediction

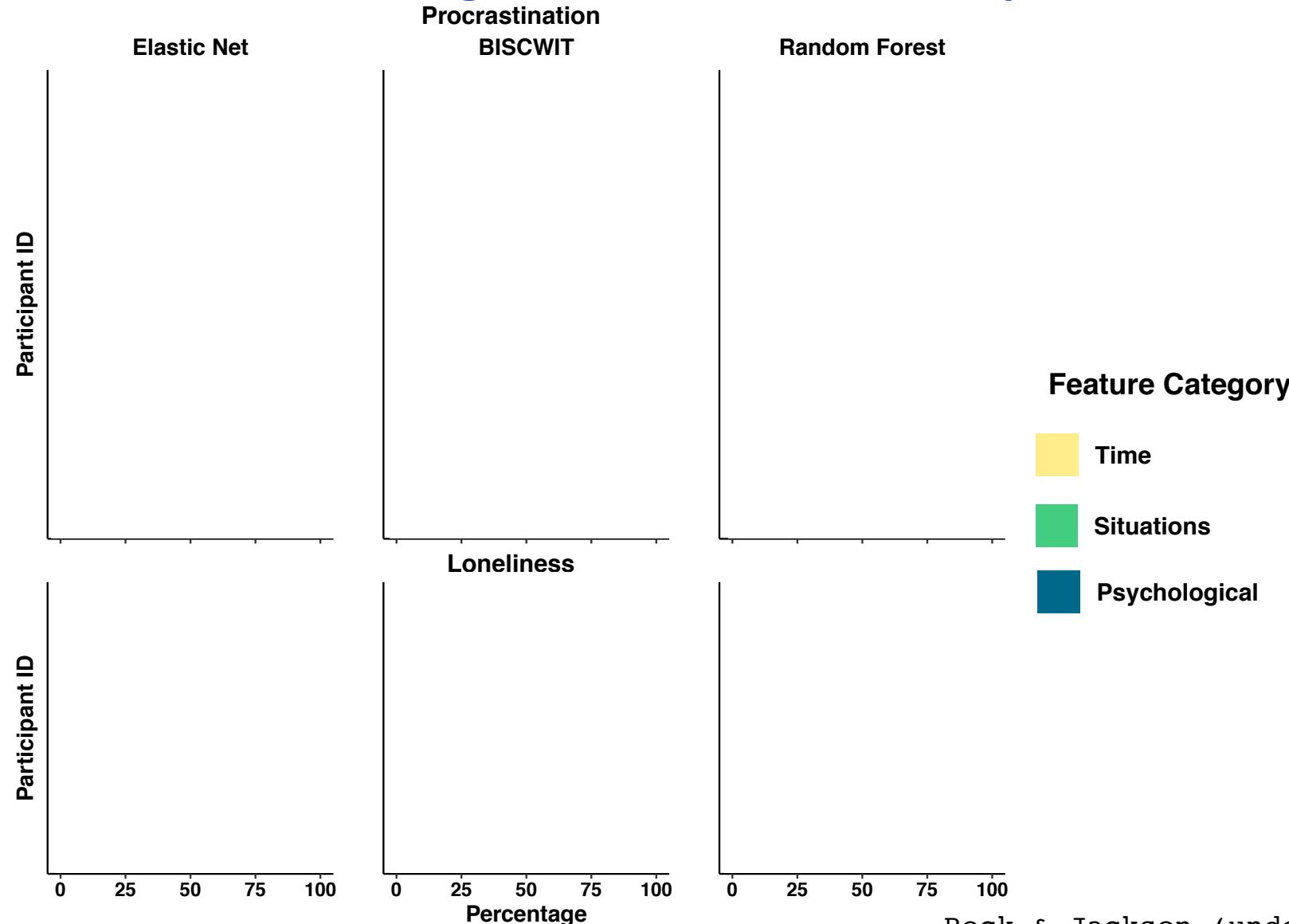
Explanation

Between Person

Within-Person

Idiographic

## Do certain categories of features out-predict others?



Description

Prediction

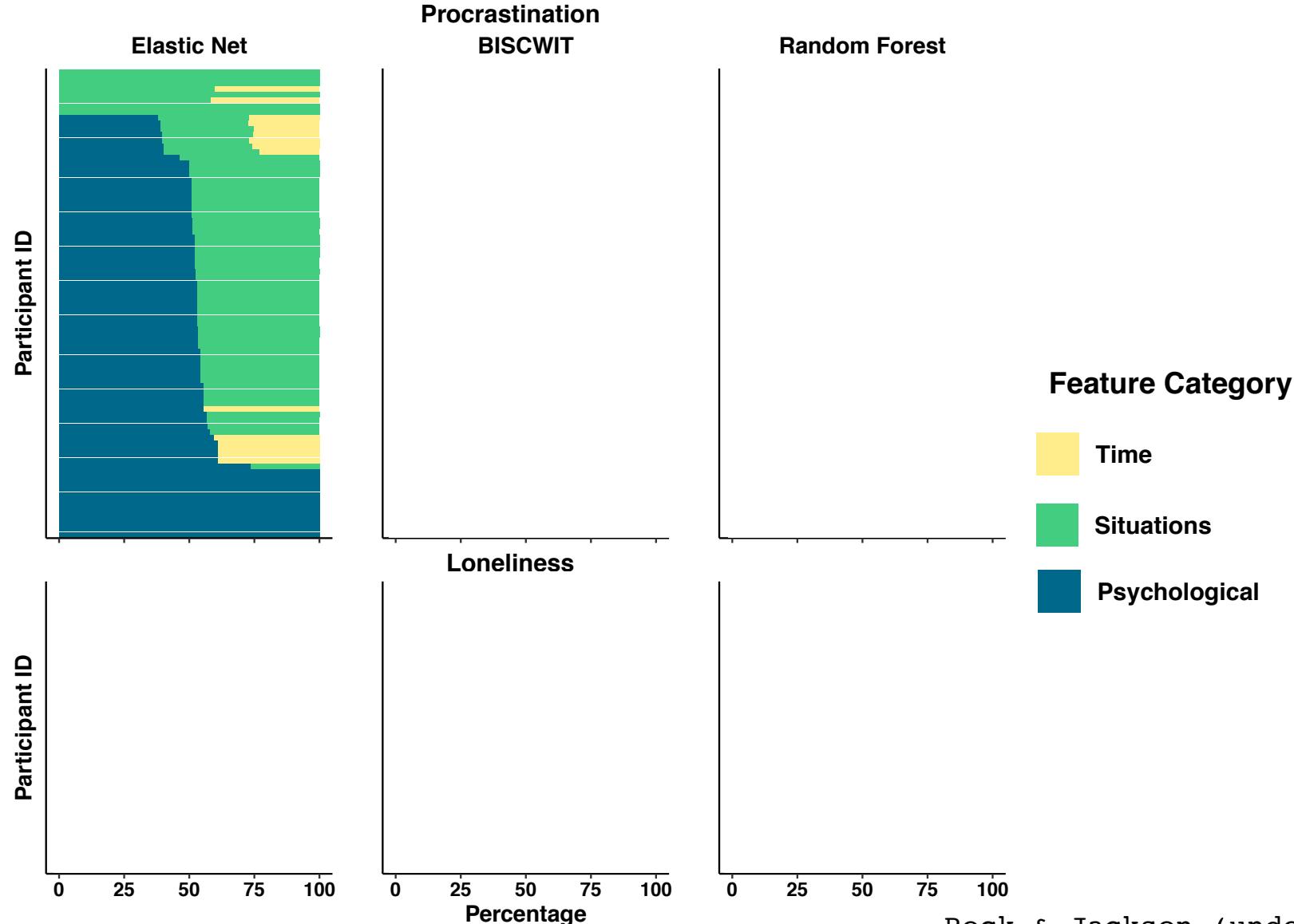
Explanation

Between Person

Within-Person

Idiographic

## Do certain categories of features out-predict others?



Description

Prediction

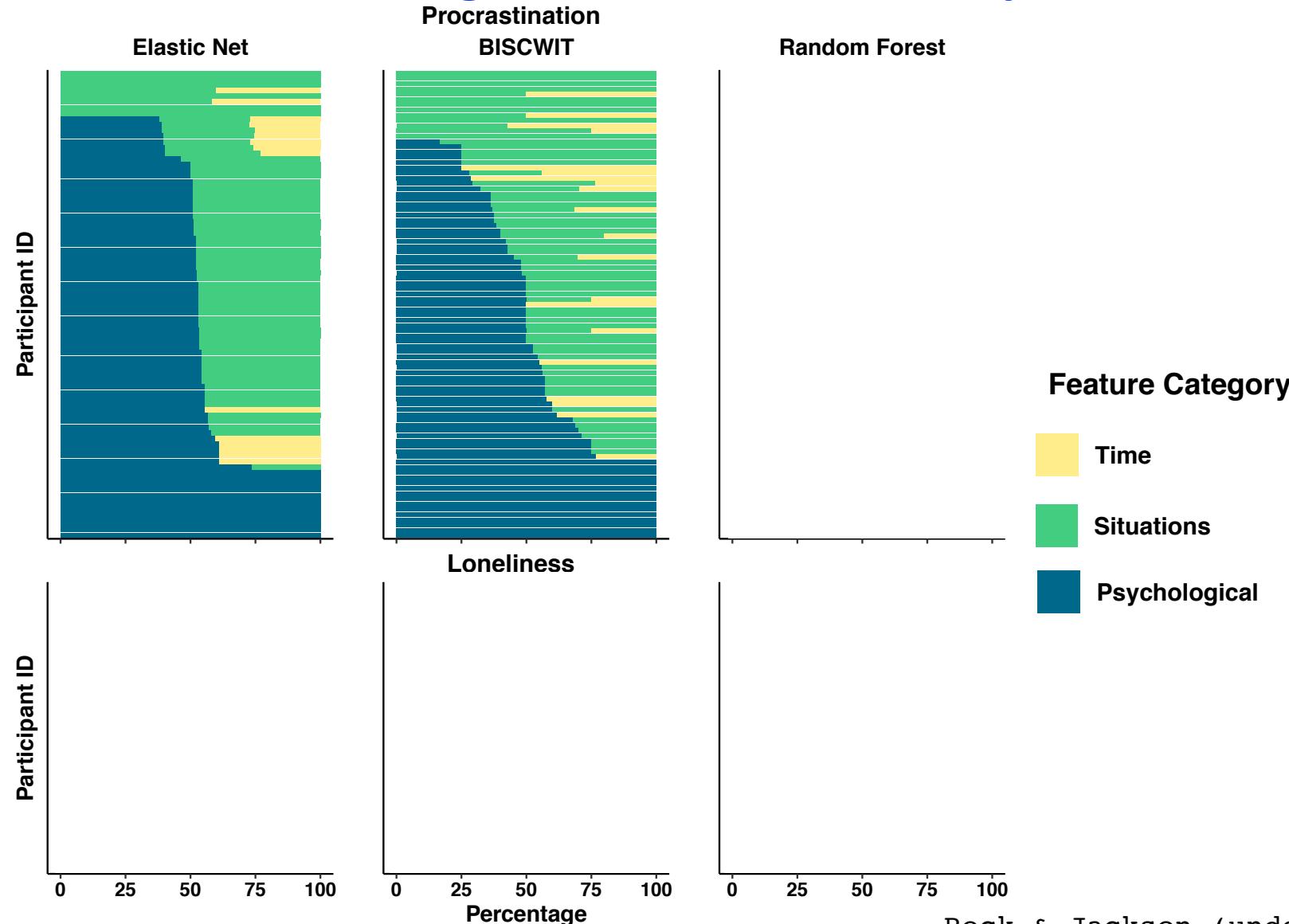
Explanation

Between Person

Within-Person

Idiographic

## Do certain categories of features out-predict others?



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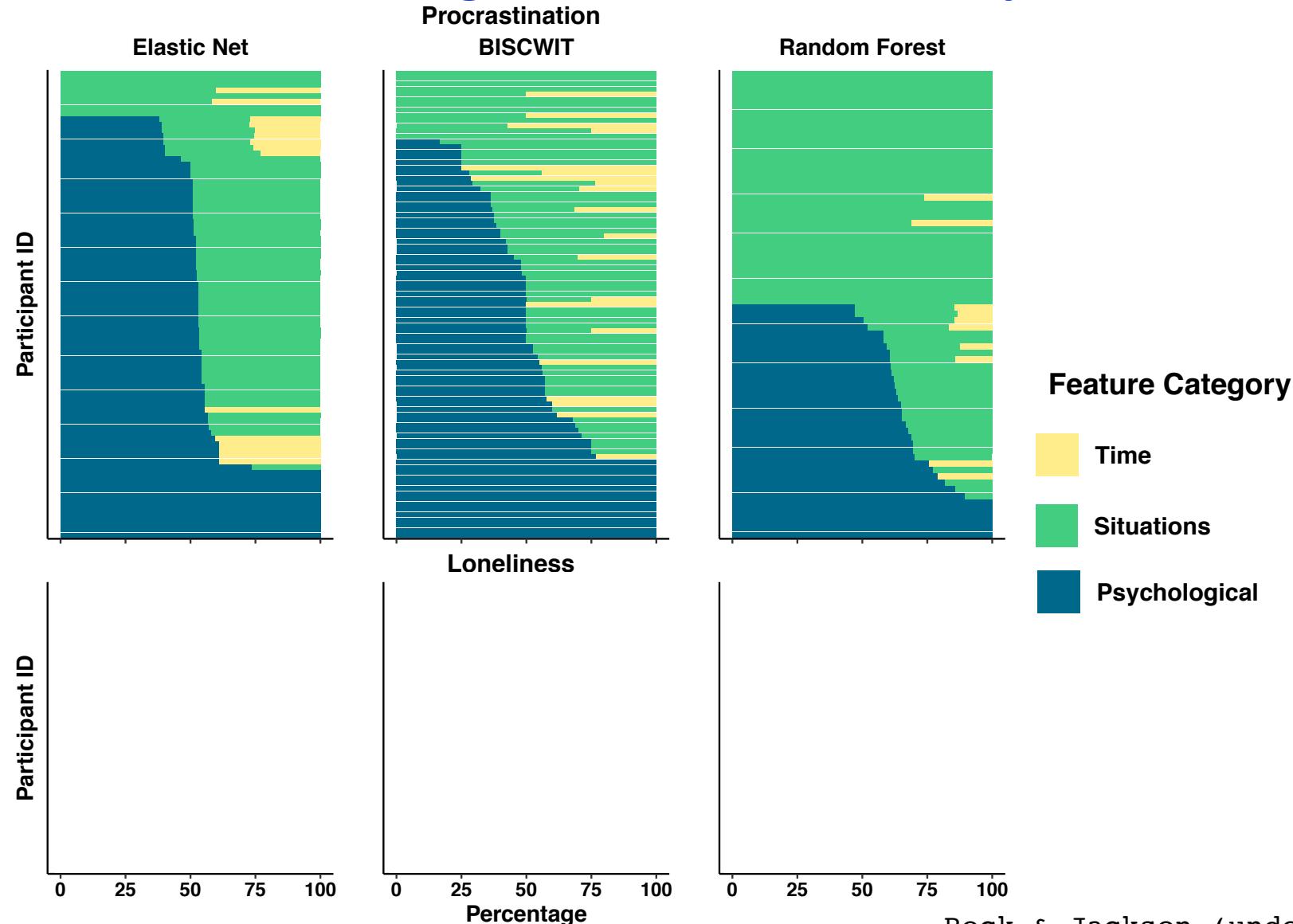
Explanation

Between Person

Within-Person

Idiographic

## Do certain categories of features out-predict others?



Description

Prediction

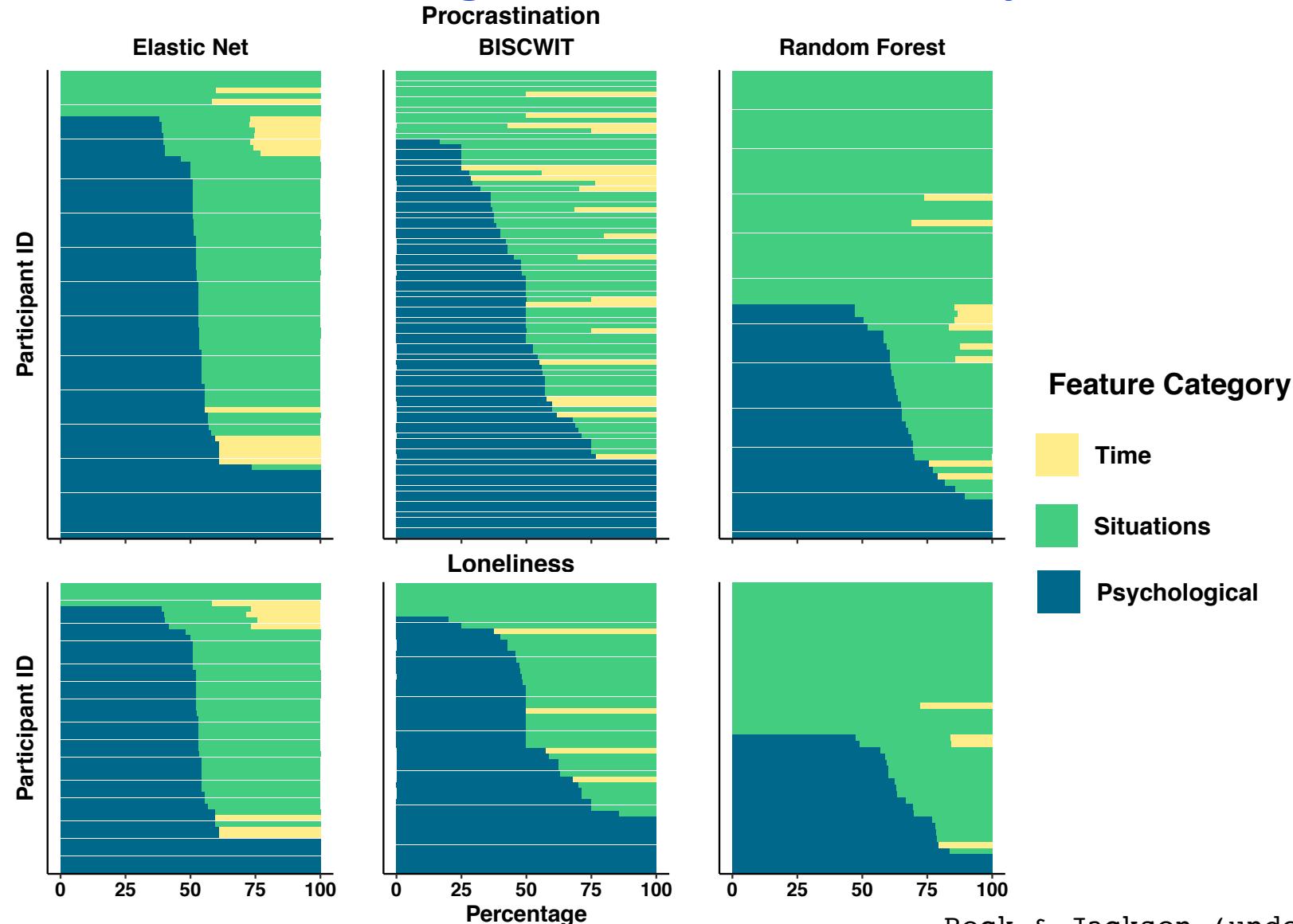
Explanation

Between Person

Within-Person

Idiographic

## Do certain categories of features out-predict others?



Description

Prediction

Explanation

Between Person

Within-Person

Idiographic

**Which features play the strongest roles?**

## Description

## Prediction

## Explanation

## Between Person

## Within-Person

## Idiographic

P01: Extraversion: Sociability  
 P02: Extraversion: Assertiveness  
 P03: Extraversion: Energy Level  
 P04: Agreeableness: Compassion  
 P05: Agreeableness: Respectfulness  
 P06: Agreeableness: Trust  
 P07: Conscientiousness: Organization  
 P08: Conscientiousness: Productiveness  
 P09: Conscientiousness: Responsibility  
 P10: Neuroticism: Anxiety  
 P11: Neuroticism: Depression  
 P12: Neuroticism: Emotional Volatility  
 P13: Openness: Intellectual Curiosity  
 P14: Openness: Aesthetic Sensitivity  
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 P16: Negative: Angry  
 P17: Negative: Afraid  
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# Which features play the strongest roles?

## Procrastination

## Loneliness

% Participants



% Participants



## Model

- Elastic Net
- BISCWIT
- Random Forest

Beck & Jackson (under revision, *Psych Science*)

## Description

## Prediction

## Explanation

## Between Person

## Within-Person

## Idiographic

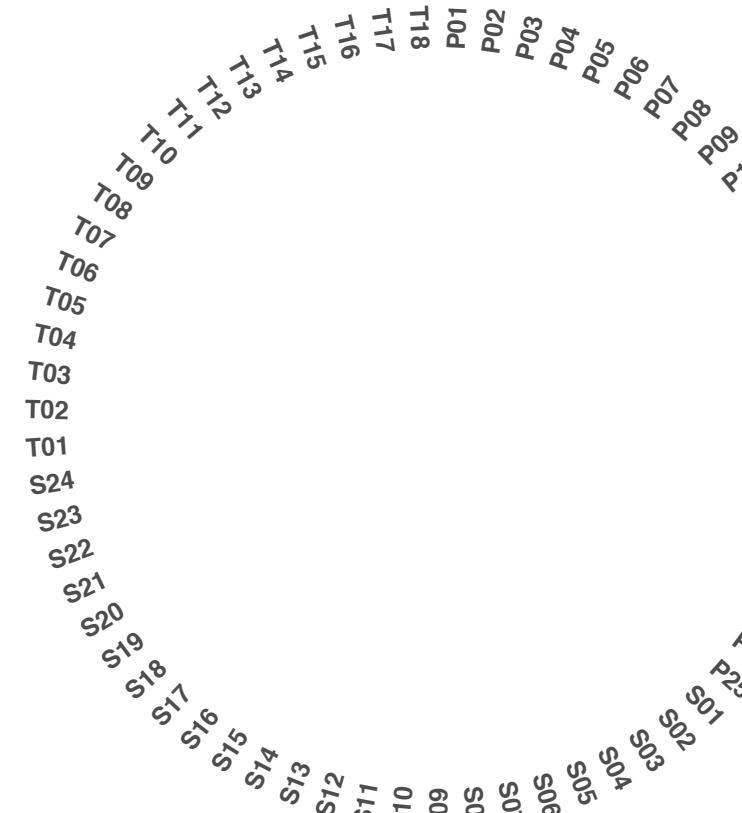
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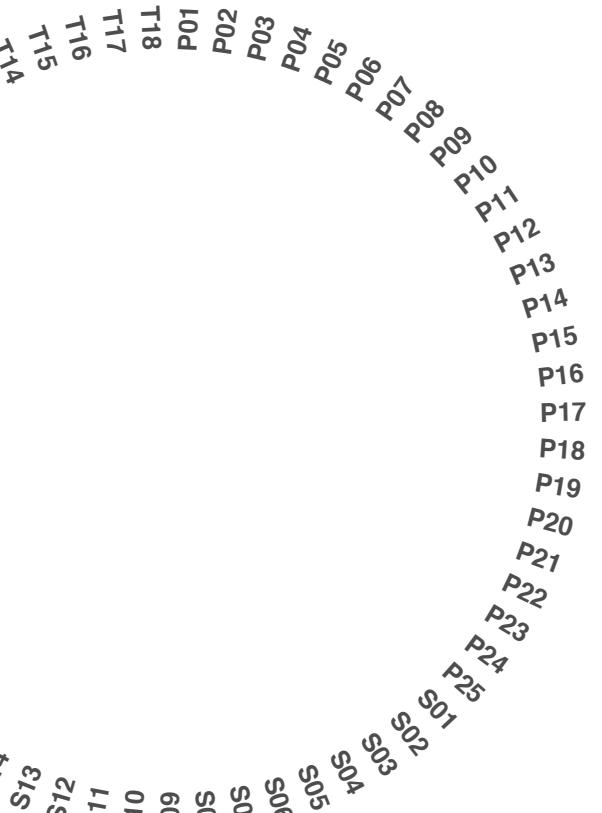


% Participants

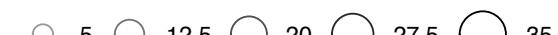


Model

- Elastic Net
- BISCWIT
- Random Forest



% Participants


 Beck & Jackson (under revision, *Psych Science*)

## Description

## Prediction

## Explanation

## Between Person

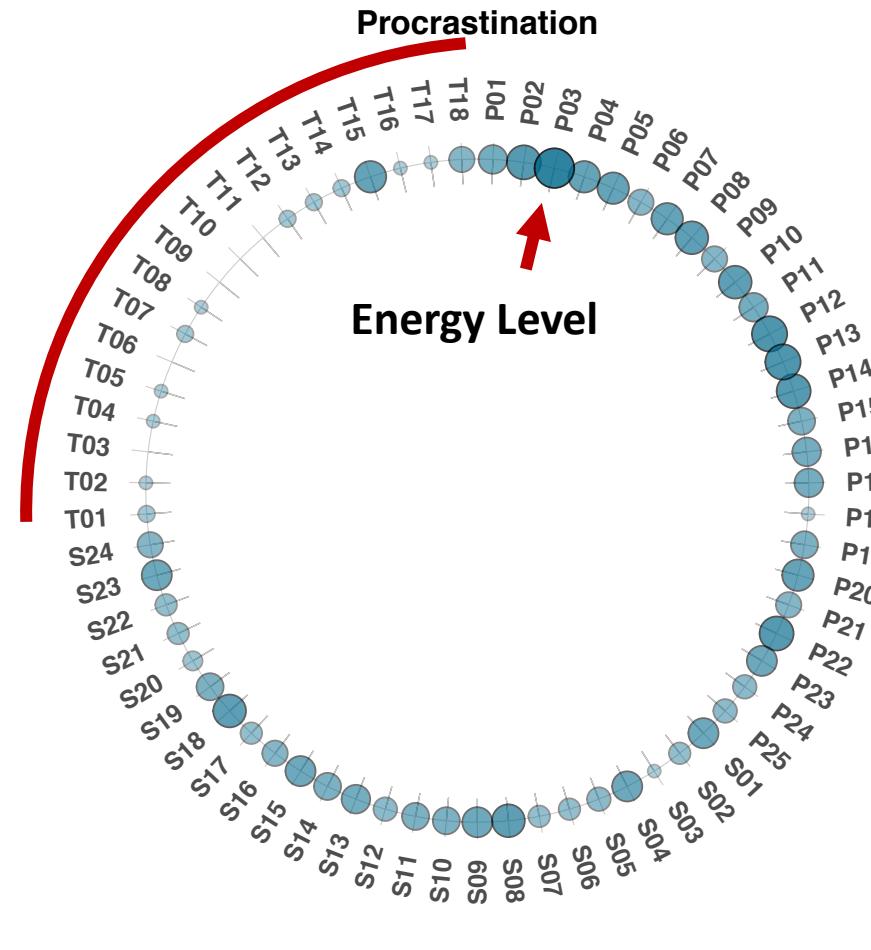
## Within-Person

## Idiographic

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# Which features play the strongest roles?

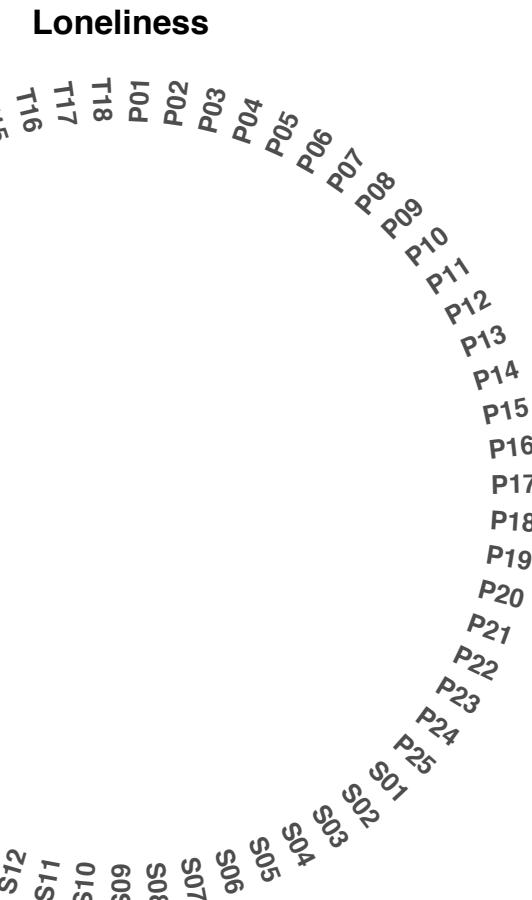


% Participants

○ 5 ○ 10 ○ 15 ○ 20 ○ 25

Model

● Elastic Net ● BISCWIT ● Random Forest



% Participants

○ 5 ○ 12.5 ○ 20 ○ 27.5 ○ 35

Beck & Jackson (under revision, *Psych Science*)

## Description

## Prediction

## Explanation

## Between Person

## Within-Person

## Idiographic

# Which features play the strongest roles?

## Procrastination

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S45:

S46: On the internet

S47:

S48: Watching TV

## Description

### Between Person

## Prediction

### Within-Person

## Explanation

### Idiographic

# Which features play the strongest roles?

## Procrastination

Internet  
Use

Sociality

% Participants

○ 5 ○ 10 ○ 15 ○ 20 ○ 25

Model

● Elastic Net ● BISCWIT ● Random Forest

## Loneliness

% Participants

○ 5 ○ 12.5 ○ 20 ○ 27.5 ○ 35

Beck & Jackson (under  
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## Description

### Between Person

## Prediction

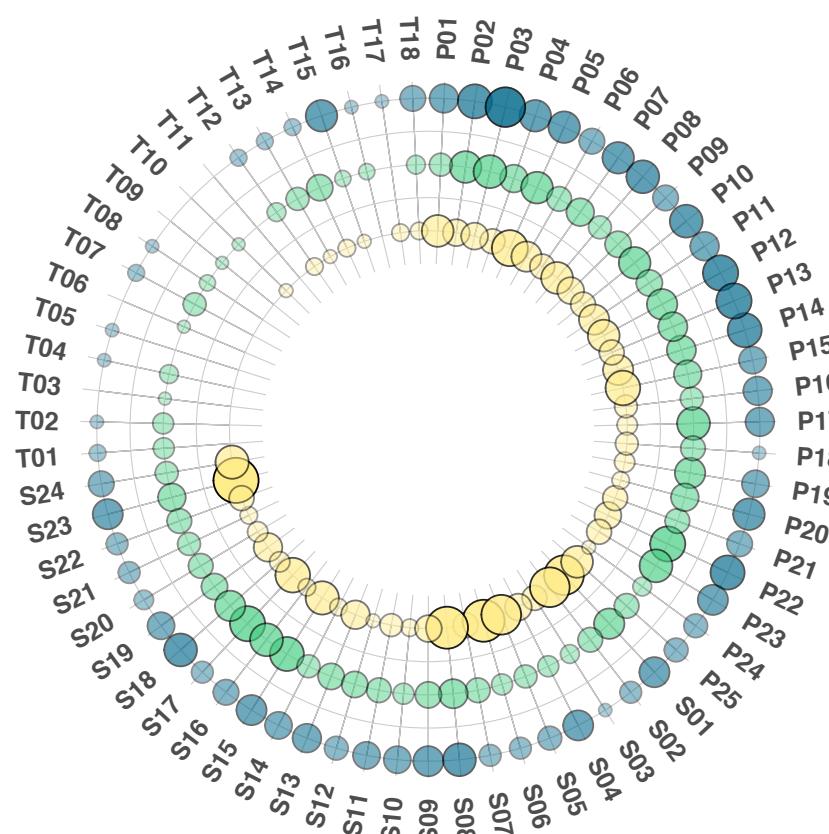
### Within-Person

## Explanation

### Idiographic

# Which features play the strongest roles?

## Procrastination



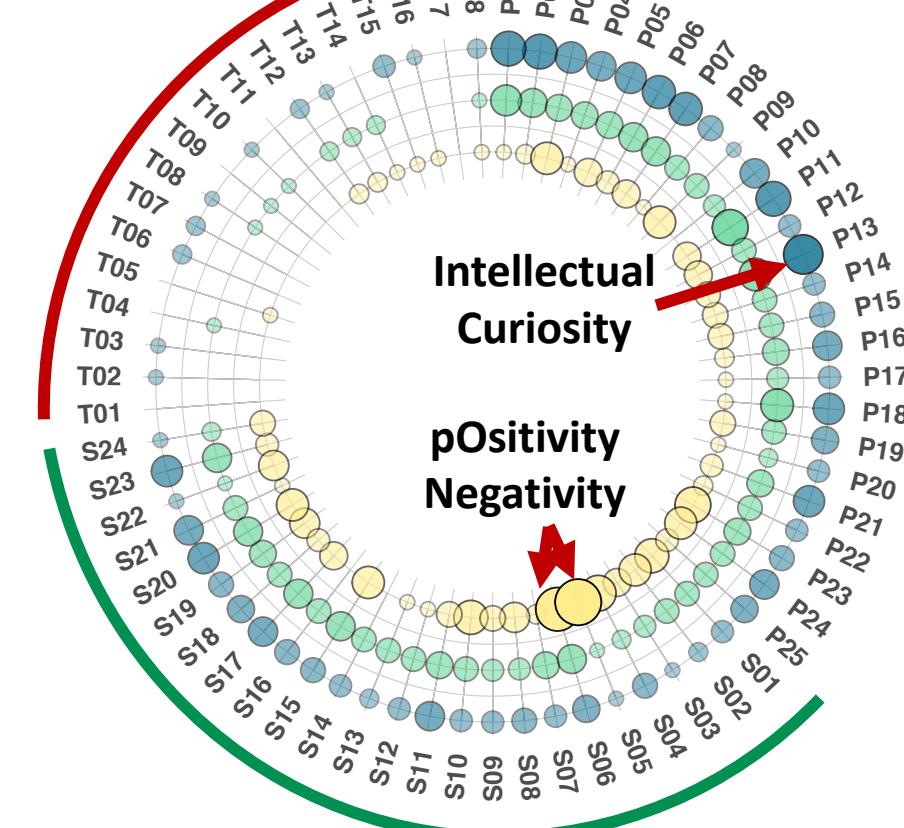
% Participants



## Model

- Elastic Net
- BISCWIT
- Random Forest

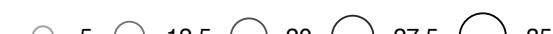
## Loneliness



## Intellectual Curiosity

## pOsitivity Negativity

% Participants



Description	Prediction	Explanation
Between Person	Within-Person	Idiographic

**Structural changes in personality can be seen and understood at the level of a person**

**Person-specific personality structures are quite stable and consistent over time**

**Psychological and situational phenomena are indeed important for behavior, but the degree differs across people and behaviors**

# Acknowledgements

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## Analytic Tools

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## Data Sources

BHPS (and US)

GSOEP

HILDA

HRS

LISS

MIDUS

NLSY

SHP

WLS (G&S)

SATSA

OCTO-TWIN

WUSM-MAP

EAS

ROS

MAP

MARS

LASA

BASE-I

BASE-II

SHARE