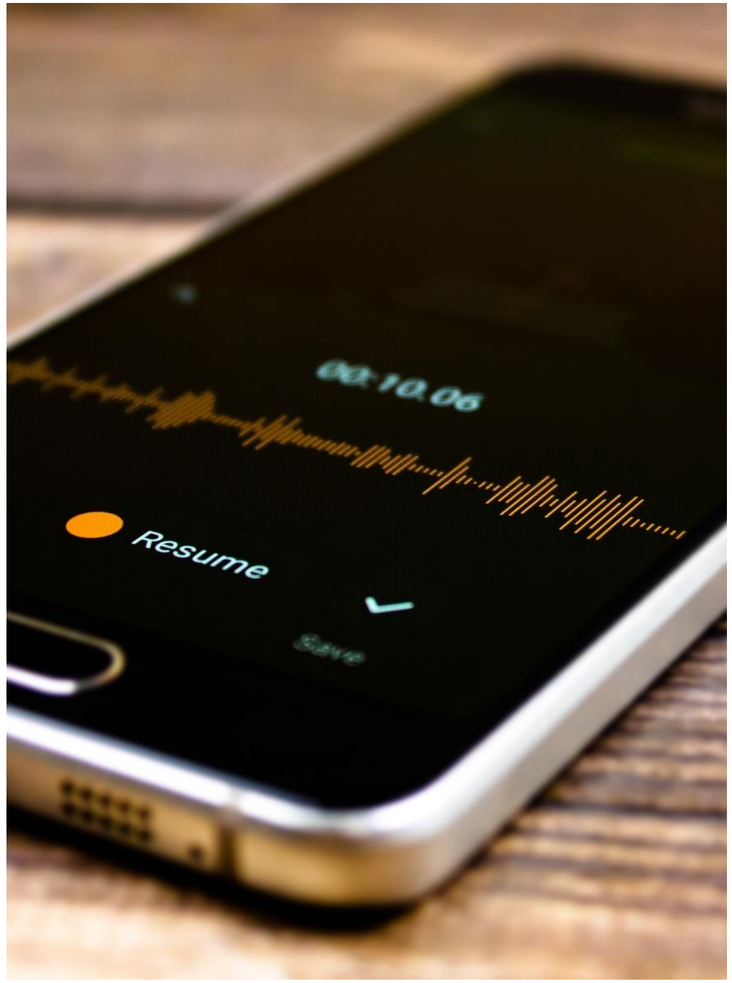
Longitudinal Analysis of Speaking Rate in Patients with Serious Mental Illness Using Daily Diaries and Dynamic Structural Equation Modeling



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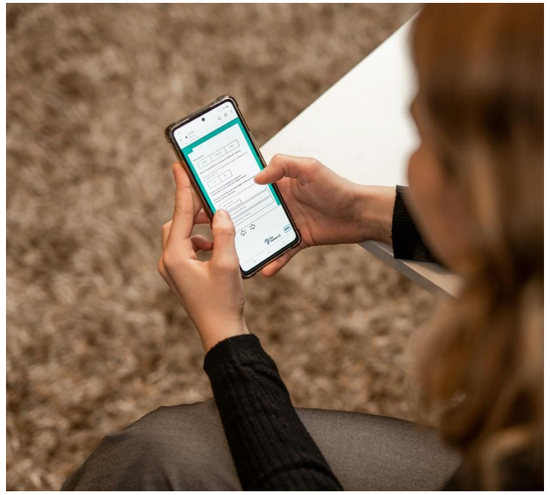
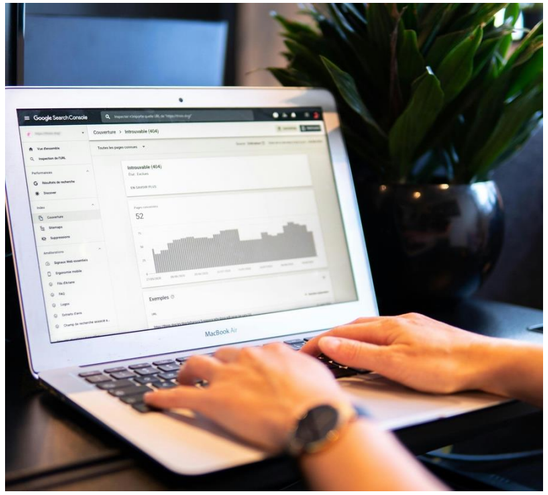
INTRODUCTION

- **Daily symptom fluctuations** are important to track in patients with bipolar, psychotic, and related disorders (i.e., serious mental illness)
- However, daily symptom tracking is **expensive and burdensome**, and often relies on **patient's self-report**
- **Behavioral measure** can complement limitations of self-report and possibly use alone
- Research on **dynamic relationship** between acoustic and symptoms is needed

M E T H O D S





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PARTICIPANTS

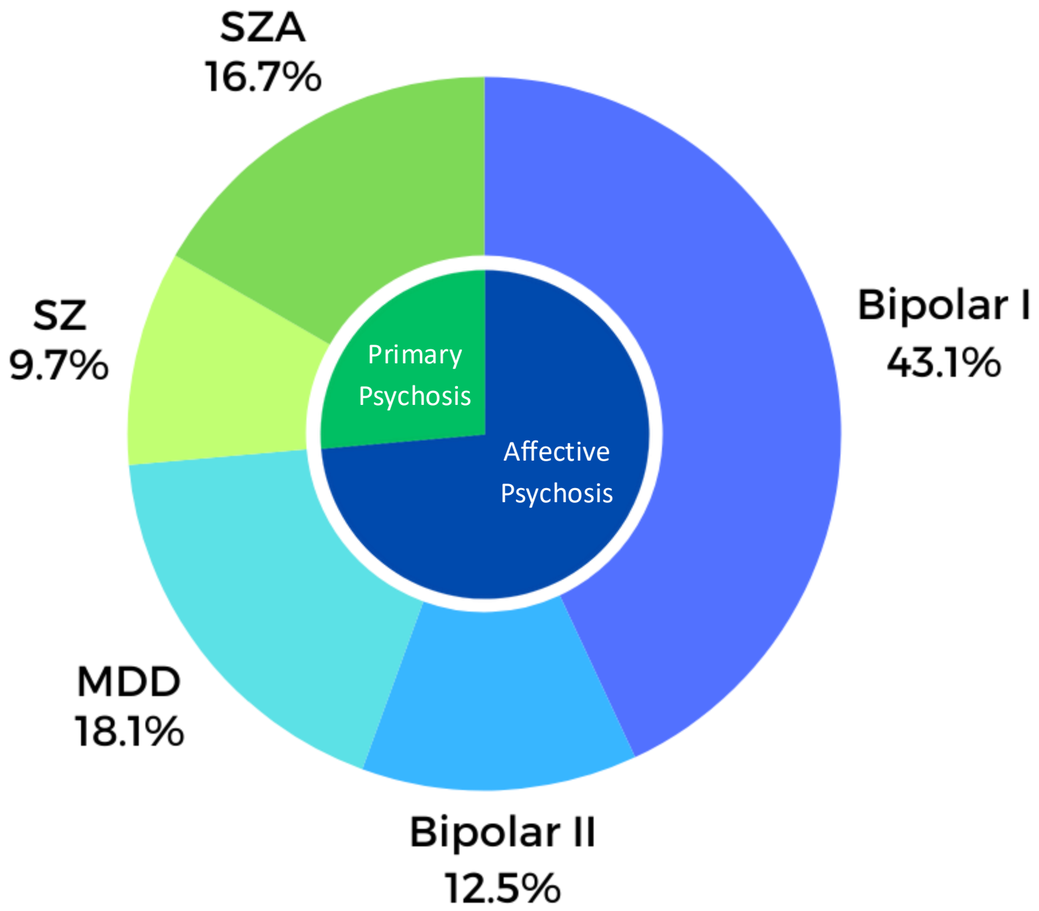
Outpatients

serious mental illness

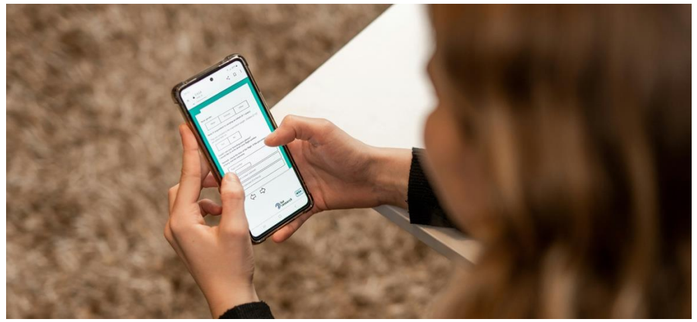
with psychosis

N = 70

PRIMARY DIAGNOSES



MEASURE



Daily Measure

- Affect (n = 16)
- Social (n = 3)
- Physical (n = 10)
- Stress and Anxiety (n = 2)
- Psychosis (n = 3)

Total N of Observations = 10,266

N/participant
Q1 = 146
Q2 (median) = 363
Q3 = 557

Daily Audio Diary

- Freely recorded
- “How was your day?”
- Extract speaking rate using openSMILE
- N of f0 onsets per second

ANALYSIS

1 **Decompose variance** into within/between-person level (i.e., within-person deviation)

2 Run **factor analysis** for daily affect and symptoms at the within-person level

3 Conduct **DSEM** to capture **dynamic** relationships between factors and speaking rate

R E S U L T S

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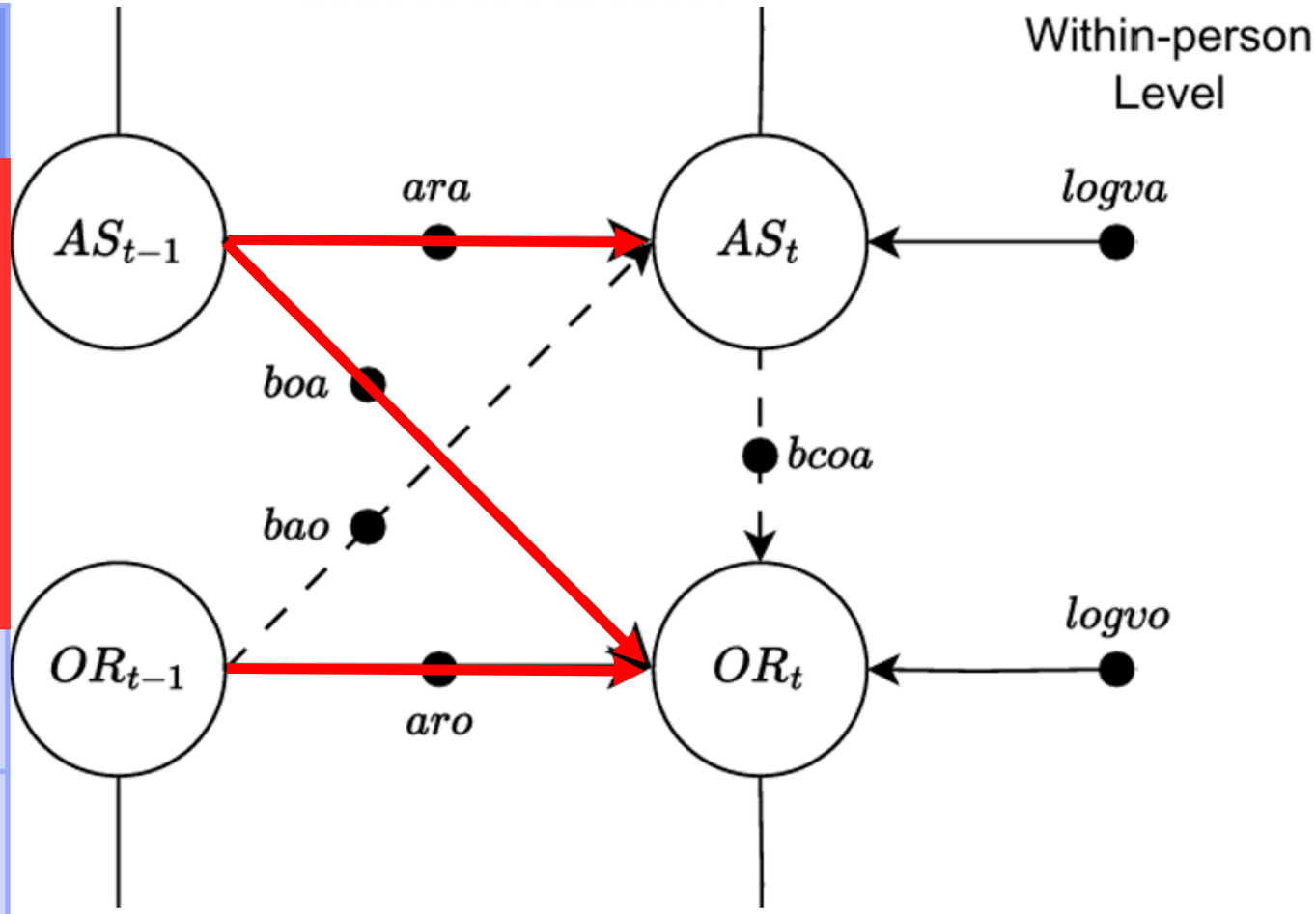
6 FACTOR WITHIN PERSON LEVEL

Anxious Stress	Stressed, Anxious, Happy, Manage Stress
Negative Arousal	Heart racing, Breathing
Distress	Lonely, Ashamed, Upset, Afraid
Irritability	Irritable, Hostile
Positive Arousal	Happy, Manage Stress, Energetic, Alert, Inspired, Determined, Outgoing
Social Activity	Outgoing, Social in person, Lonely

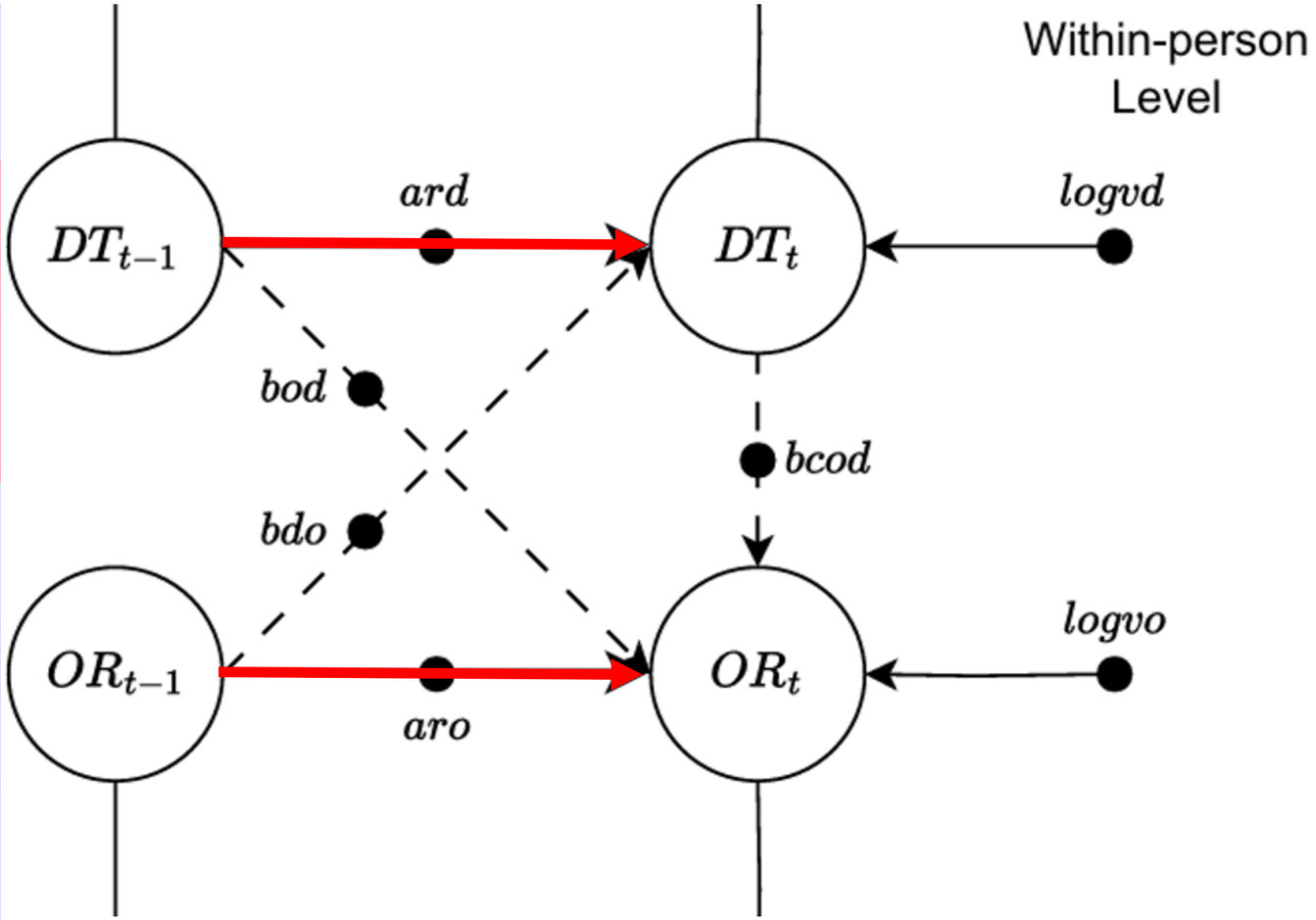
DSEM - Anxious Stress

Parameters	Estimate	Bayesian p-value
AS → AS	0.432	<.000*
OR → OR	0.197	<.000*
AS → OR	-0.078	0.012*
OR → AS	0.004	0.322
AS → OR (concurrent)	0.053	0.121



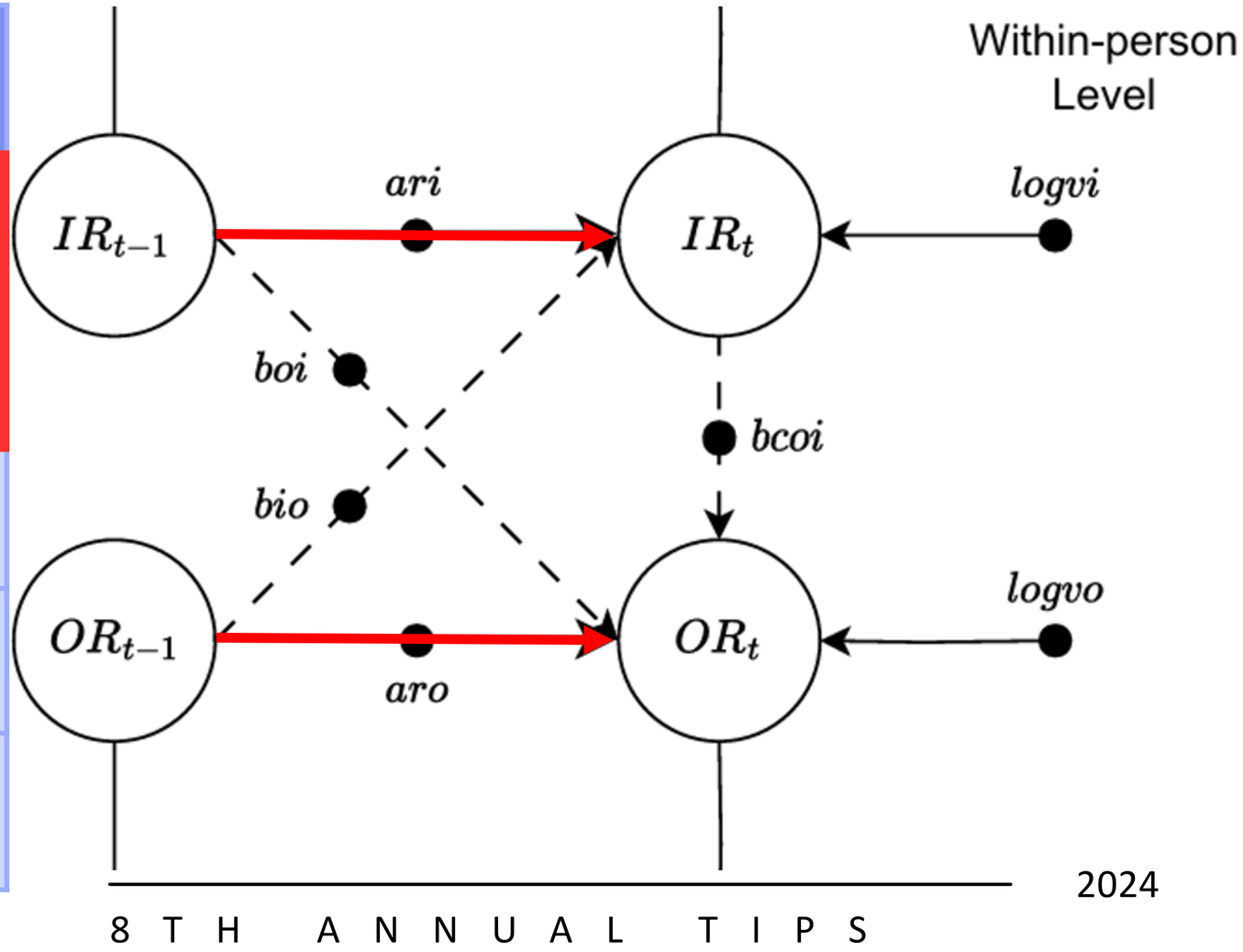
DSEM - Distress

Parameters	Estimate	Bayesian p-value
DT → DT	0.196	<.000*
OR → OR	0.197	<.000*
DT → OR	-0.082	0.103
OR → DT	0.003	0.333
DT → OT (concurrent)	0.068	0.134



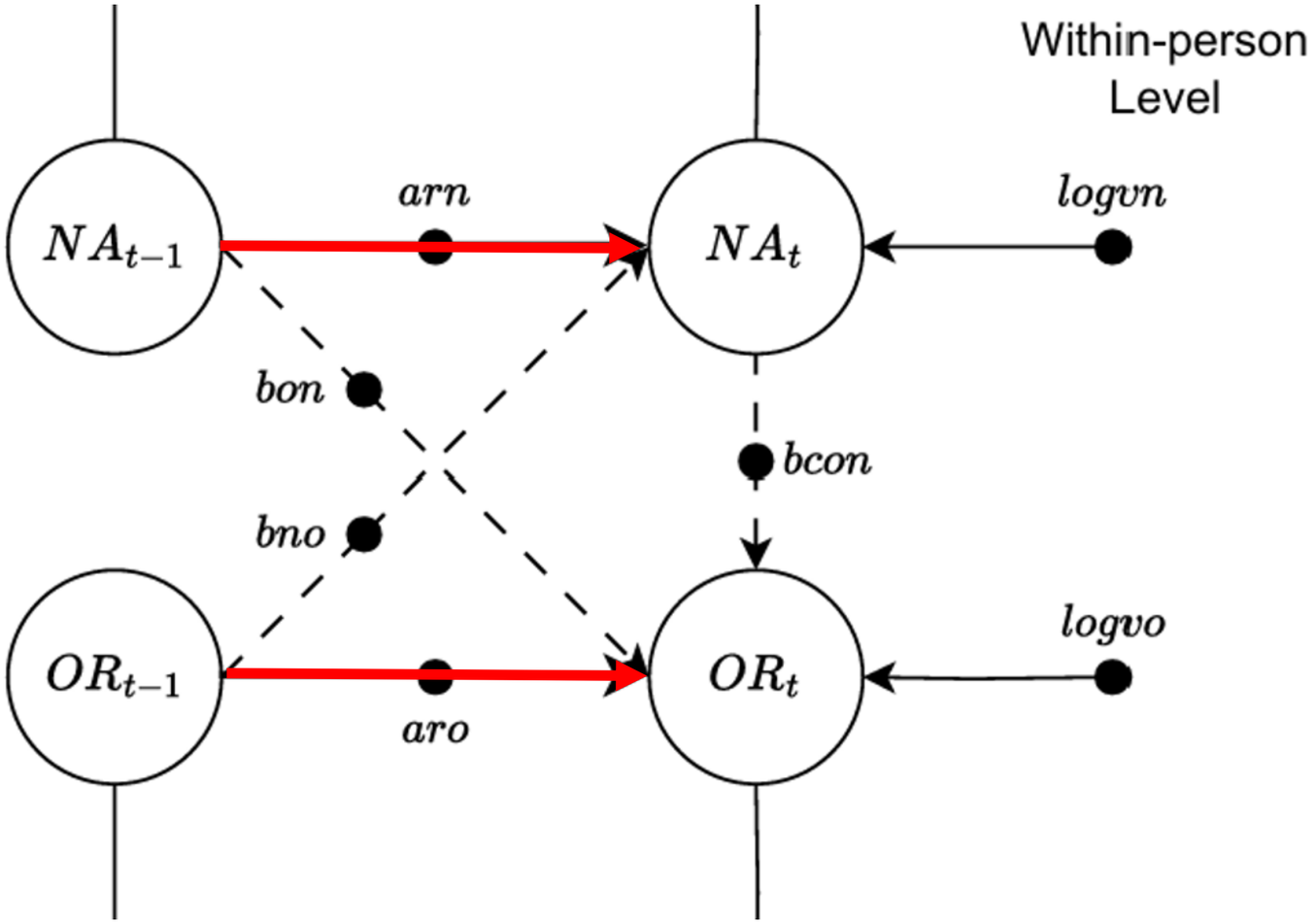
DSEM - Irritability

Parameters	Estimate	Bayesian p-value
IR → IR	0.336	<.000*
IR → OR	0.200	<.000*
IR → OR	0.002	0.103
OR → IR	0.000	0.333
IR → OR (concurrent)	-0.006	0.134



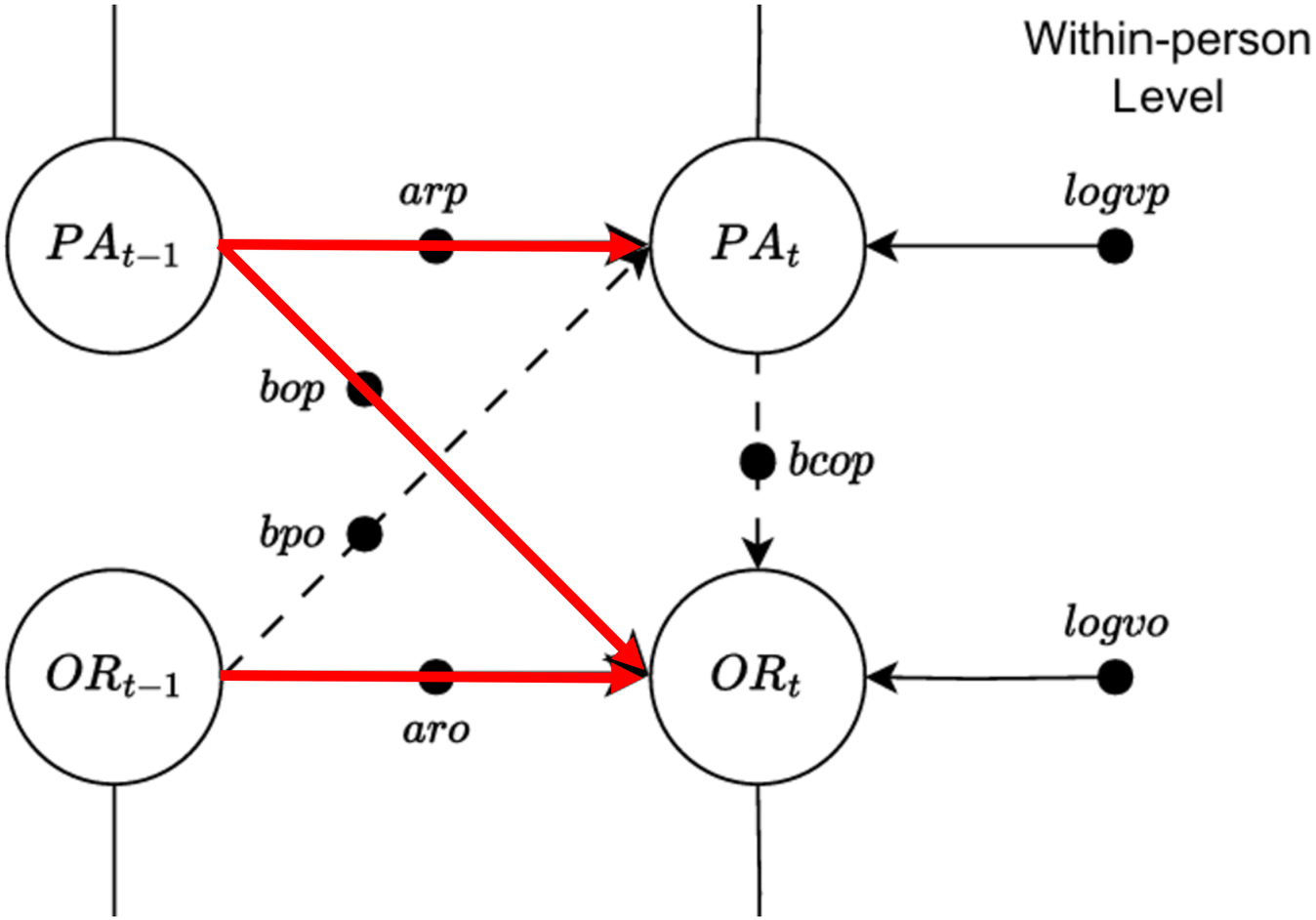
DSEM - Negative Arousal

Parameters	Estimate	Bayesian p-value
NA → NA	0.389	<.000*
OR → OR	0.203	<.000*
NA → OR	-0.983	0.118
OR → NA	-0.002	0.343
NA → OR (concurrent)	0.053	0.221



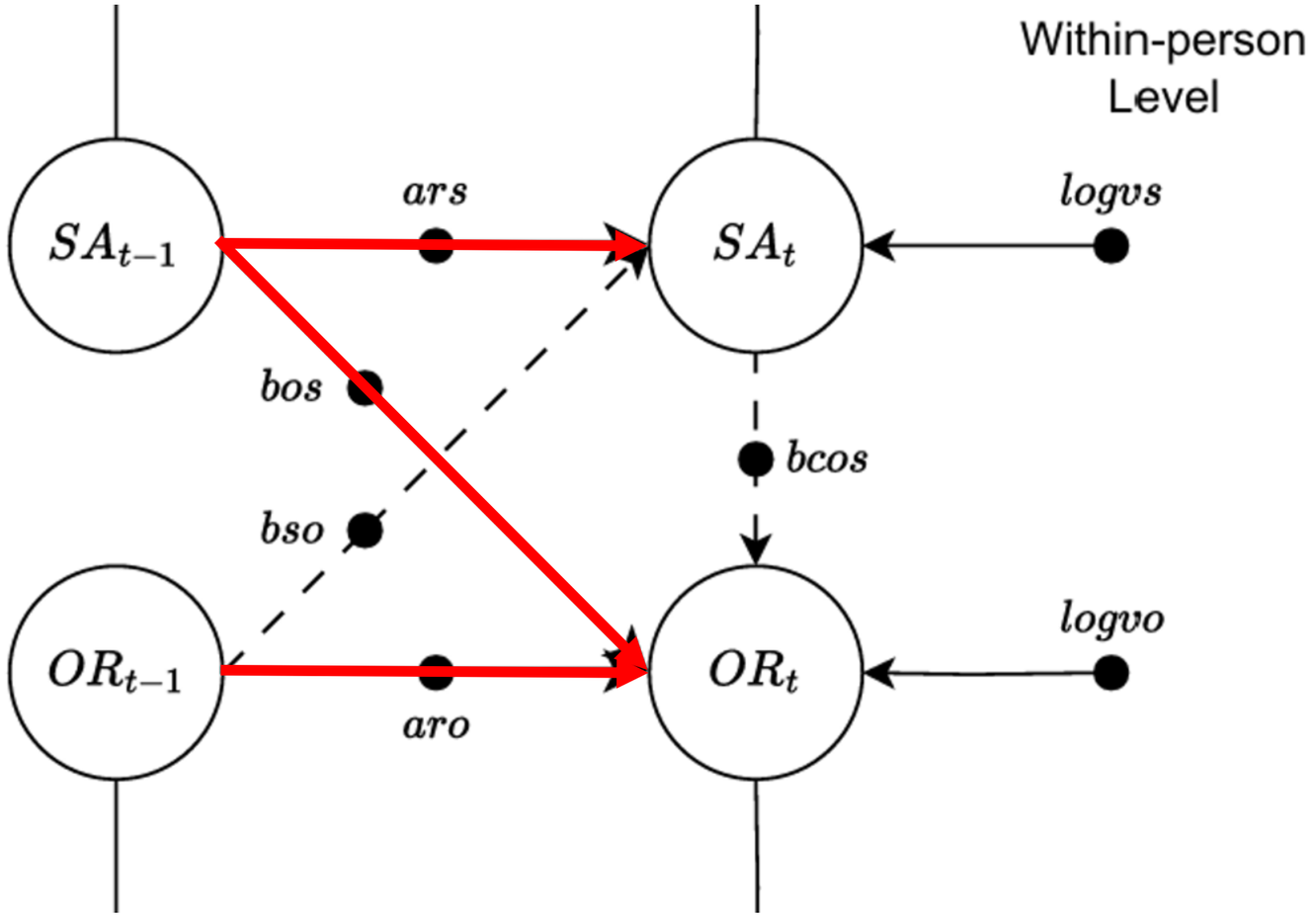
DSEM - Positive Arousal

Parameters	Estimate	Bayesian p-value
PA → PA	0.426	<.000*
OR → OR	0.194	<.000*
PA → OR	0.127	.013*
OR → PA	0.001	0.429
PA → OR (concurrent)	-0.085	0.071



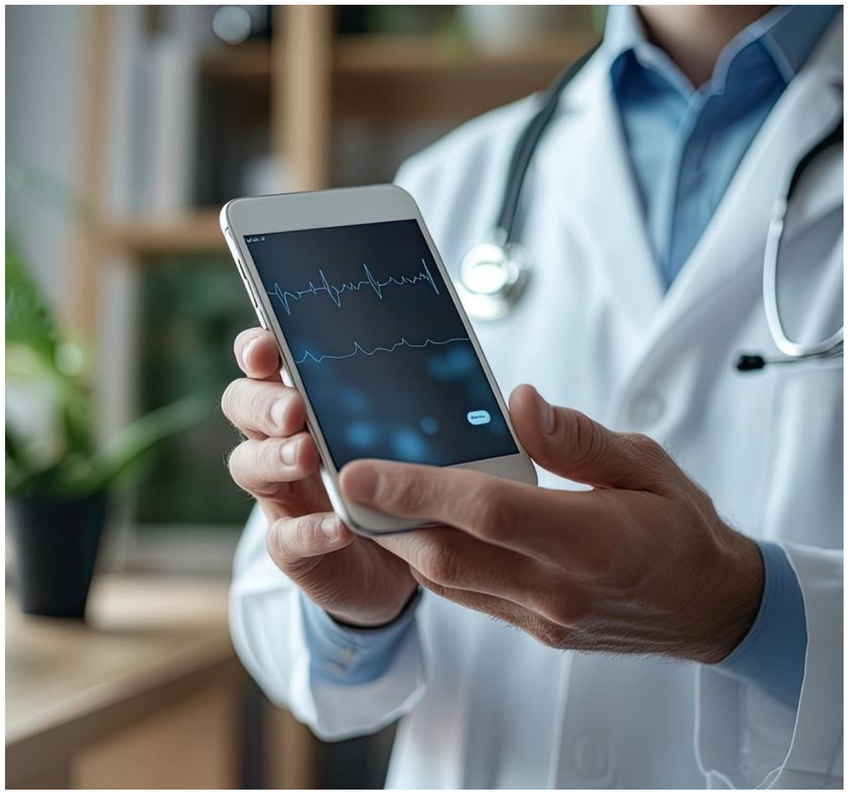
DSEM - Social Activity

Parameters	Estimate	Bayesian p-value
SA → SA	0.333	<.000*
OR → OR	0.191	<.000*
SA → OR	0.299	.008*
OR → SA	0.006	0.429
SA → OR (concurrent)	-0.055	0.146



CONCLUSION

- Fluctuation in positive arousal, social activity, anxious stress affected speaking rate the next day, suggesting symptom fluctuations
- Speaking rate can be a promising behavioral marker for tracking daily symptom fluctuations among outpatients with serious mental illness.
- More research on dynamic relationships is needed



THANK YOU

QUESTIONS?

Special Thanks to:

- The Functional Neuroimaging & Bioinformatics Lab (Dr. Baker's Lab)
- Jeffrey Girard (University of Kansas)

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