Physiological Self-Regulation and Co-Regulation during Social Support Interactions

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INTRODUCTION

Self-Regulation & Co-regulation in Dyads

- How do close relationship partners contribute to well-being?
- Dyadic Relationships as Dynamical Systems: Partners regulate each others' emotions and physiology, which enables them to maintain/restore equilibrium in the face of difficulties (Butler & Randall, 2013; Sbarra & Hazan, 2008).
- Effects are likely context-dependent (Timmons, Margolin, & Saxbe, 2015).

Social Support Discussions

- Practical and emotional assistance, often given in times of distress or difficulty.
- May be a context that engenders stronger self- and co-regulation, as one partner's equilibrium is disrupted.

Research Aims & Hypotheses

- **Aim**: Investigate physiological self- and co-regulation during support vs. control discussions using Coupled Oscillator Models.
- **Hypotheses**: Social support (vs. control) discussions will give rise to stronger (a) self-regulation (frequency of oscillations and stabilization at equilibrium) and (b) co-regulation (cross-partner influence).
- **Exploratory Hypothesis**: Given gender differences in stress responses (e.g., Taylor et al., 2000) and support behaviors (e.g., Neff & Karney, 2005; Bodenmann et al., 2015), effects may differ by gender.

DYADIC LABORATORY EXPERIMENT

Participants: 101 couples (202 individuals)

- M_{Age} = 27 (SD = 6). M_{RelYrs} = 4 yrs (SD = 3)

Procedure:

Baseline Cardiovascular Physiology & Questionnaires	5-min Control Discussion (discuss joint goal)	*5-min Support Discussion (female partner receives support)	*5-min Support Discussion (male partner receives support)

**Order of discussions was counterbalanced across dyads*

Cardiovascular Measure: Inter-beat Interval (IBI)

- Reflects sympathetic and parasympathetic activity (higher IBI = less stress).
- Measured continuously, scored in 10-sec intervals.

DATA PREPARATION & ESTIMATION

Compute Derivatives

- Method: Generalized Local Linear Approximation (Boker et al., 2010)
- Embed = 5, τ = 1

Bayesian Multilevel Modeling with *brms* package in R (Bürkner, 2017)

- Noninformative (default) prior distributions
- Discussion type represented by two dummy variables, allowing for interactions with focal predictors
- Maximal random effects
- Data from 92 dyads available for analysis

References:

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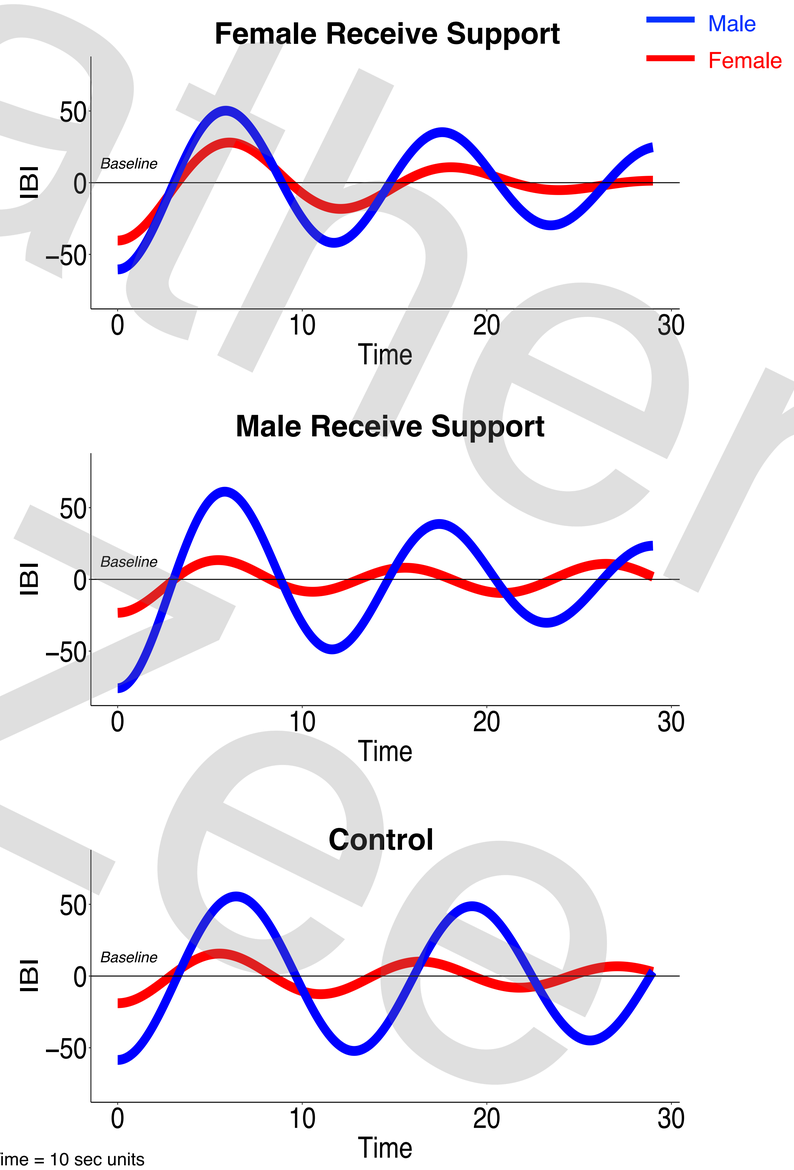
COUPLED OSCILLATOR MODEL

$$\ddot{x}_t = \eta x_t + \zeta \dot{x}_t + \eta y_t + \zeta \dot{y}_t + e_t$$

$$\ddot{y}_t = \eta y_t + \zeta \dot{y}_t + \eta x_t + \zeta \dot{x}_t + e_t$$

- x = Female, y = Male, t = Timepoint
- $\dot{x}$, $\dot{y}$ = First derivatives
- $\ddot{x}$, $\ddot{y}$ = Second derivatives
- η = Self-regulation (cycling)
- ζ = Self-regulation (damping)
- Co-regulation (cross-partner effects)

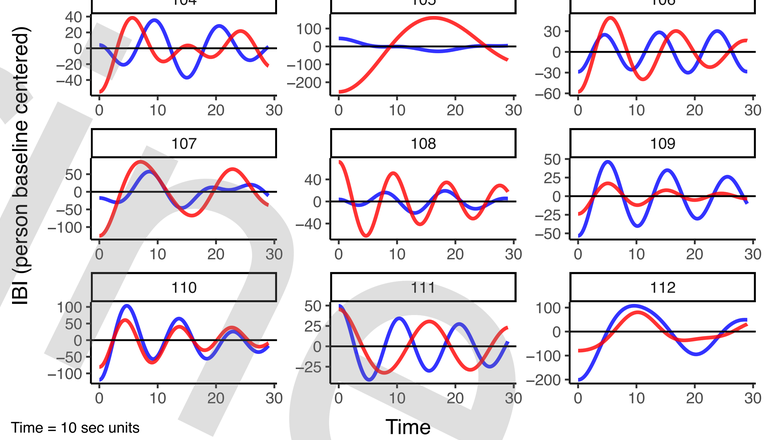
FIXED EFFECTS BY CONDITION



RESULTS SUMMARY

	Parameter	Female Receive Discussion	Male Receive Discussion	Control Discussion
Female	Self η (cycling)	-.25 [-.28, -.22]	-.25 [-.29, -.22]	-.33 [-.37, -.29]
	Self ζ (damping)	-.06 [-.11, -.01]	-.06 [-.11, -.01]	-.05 [-.11, .002]
	Partner η	-.02 [-.05, .01]	-.02 [-.06, .01]	.003 [-.03, .04]
	Partner ζ	-.03 [-.09, .02]	-.03 [-.09, .03]	-.005 [-.06, .06]
Male	Self η (cycling)	-.29 [-.32, -.25]	-.29 [-.33, -.25]	-.24 [-.28, -.20]
	Self ζ (damping)	-.06 [-.11, -.01]	-.08 [-.13, -.03]	-.02 [-.08, .03]
	Partner η	-.006 [-.04, .03]	-.01 [-.04, .02]	.002 [-.03, .04]
	Partner ζ	-.01 [-.06, .03]	.02 [-.04, .07]	.02 [-.03, .08]

BETWEEN-DYAD HETEROGENEITY



CONCLUSIONS

Summary & Implications

- **Self-Regulation**: Results suggest stronger cycling and damping for the average male partner but weaker cycling for the average female partner during support (vs. control) discussions.
- **Co-Regulation**: Weak evidence for cross-partner effects, but more pronounced for effects of male partner on female partner's responses during support.
- Noteworthy **between-dyad heterogeneity** in all effects.
- New insight into potential mechanism underlying links between relationships and health and differential benefits of relationships experienced by men vs. women.

Future Directions

- Examine self- and co-regulatory effects of support among older couples.
- Investigate longer-term implications for health and relationships.