COVID-19'S EFFECT ON THE RHYTHMS OF SMILING ON SOCIAL MEDIA

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INTRODUCTION

- Smiling is a salient, common, and impactful socio-affective signal
- Photos posted to social media are a rich source of data for studies of smiling (large, frequent, global)
- Social behavior and affect are known to have temporal rhythms (e.g., daily, weekly, and seasonal)
- We planned to analyze temporal rhythms of smiling on Instagram
- *Then something happened in 2020…*

INTRODUCTION

- The COVID-19 pandemic was highly disruptive to many aspects of life
- Fear, uncertainty, loneliness, and loss were widespread negative emotions
- Social distancing and face masks changed social communication
- Lockdowns and work-from-home policies altered temporal rhythms
- We measured smiling on social media to study temporal rhythms before and during the pandemic

HYPOTHESES

HYPOTHESIS 1

At baseline, smiling will be *higher during weekend* days and show a seasonal cycle that *peaks during summer* months

HYPOTHESIS 2

Smiling will *decrease* during COVID's first year and then *partially return to baseline* during COVID's second year

HYPOTHESIS 3

COVID's first year will show a *dampened weekend* effect and *partially return to baseline* during COVID's second year

HYPOTHESIS 4

COVID's first year will show a *dampened seasonal* amplitude and *partially return to baseline* during COVID's second year

DATA AND MEASURES

Where did the data come from? How did we measure smiling?

SOURCE & COUNTS

Partnered with **Whalar** (an international influencer management company)

- 1,905,424 images publicly uploaded
- 5,469 influencers on Instagram
  - 77.3% female, 21.2% male, 1.4% other
  - Age 18-64 (M=29.34, SD = 5.98)
- 76 countries of origin for influencers
  - 48.5% USA, 26.5% UK, 25% other
- 921 days from May 2019 – Oct 2021
  - All data were missing during Apr 2020

MEASURES

- Smile intensity was estimated using the OpenFace 2.0 toolkit (CV + ML system)

- Validated by 5 crowd-workers and 1 expert (subsample of 300 images)

Correlation	OpenFace	Positive	Smile
CW: Positive	0.79		
CW: Smile	0.78	0.94	
Expert: FACS	0.87	0.97	0.94

MODELING APPROACH

How can we parameterize a model to test our hypotheses?

COMPARING TEMPORAL RHYTHMS

SEASONAL PERIODIC EFFECTS

$$\text{Amplitude} = \sin\left(t \times \frac{2\pi}{365}\right)$$

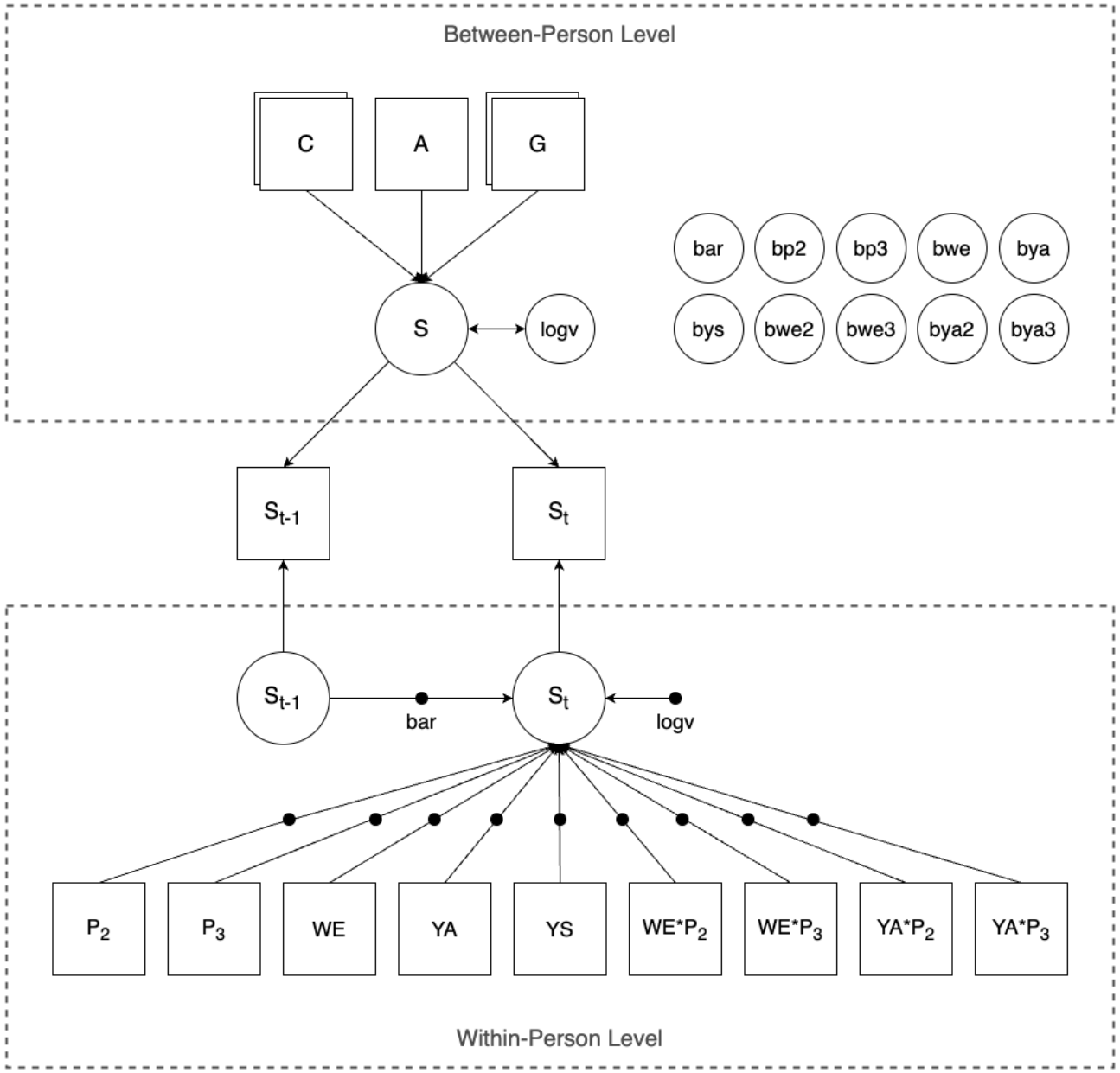
How large is the peak of the seasonal cycle?

$$\text{Phase Shift} = \cos\left(t \times \frac{2\pi}{365}\right)$$

When (in the year) does the cycle start?

- Add amplitude and phase shift parameters
- Add a dummy code for weekend day
- Add dummy codes for study period
  (1 = Baseline, 2 = First Year, 3 = Second Year)
- Add interactions with period dummy codes
- *Does the weekend effect differ by period?*
- *Does seasonal amplitude differ by period?*
- *Does seasonal phase shift differ by period?*

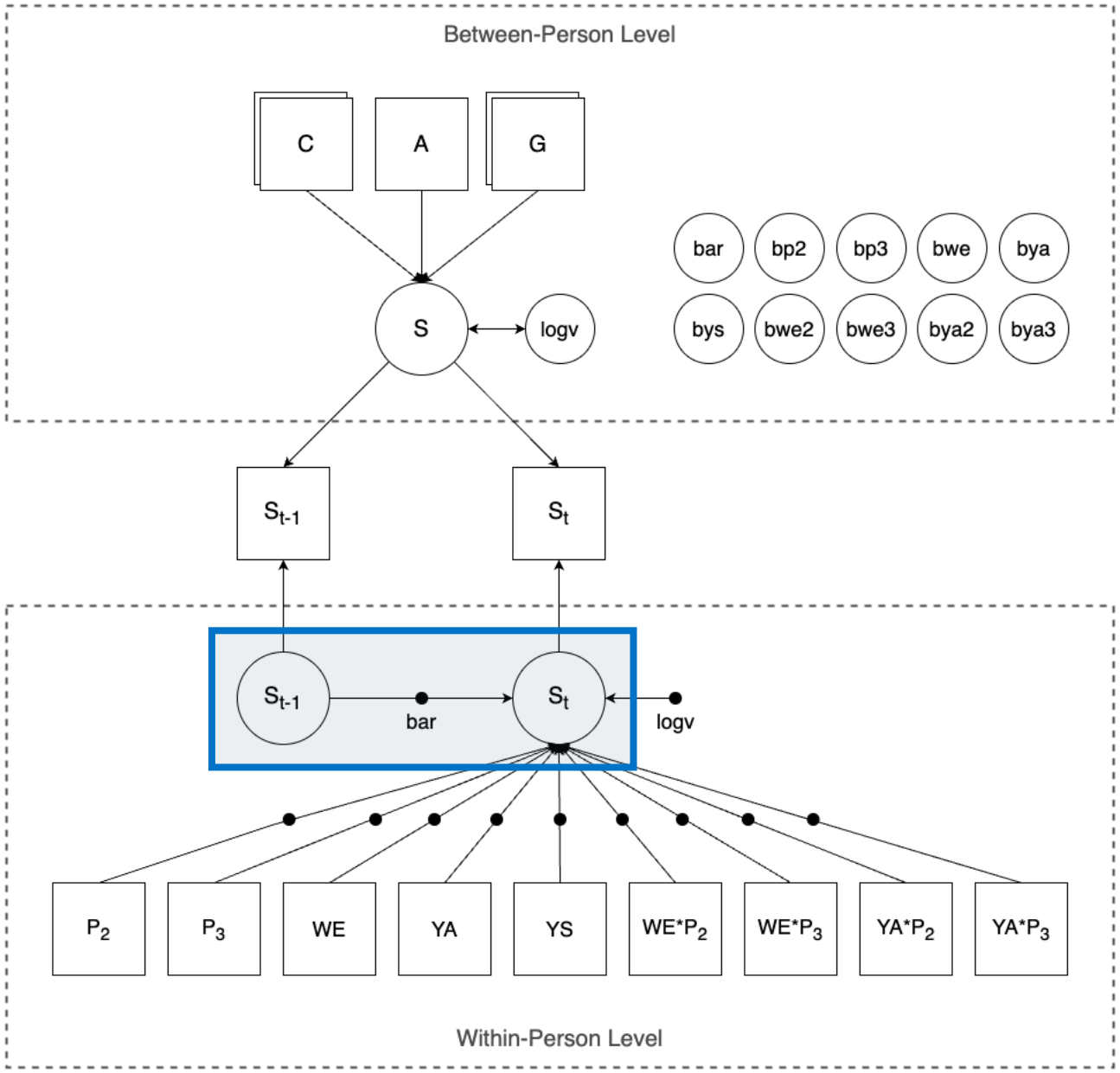
MODERATION BY PERIOD



DSEM PATH DIAGRAM

Dynamic Structural Equation Modeling

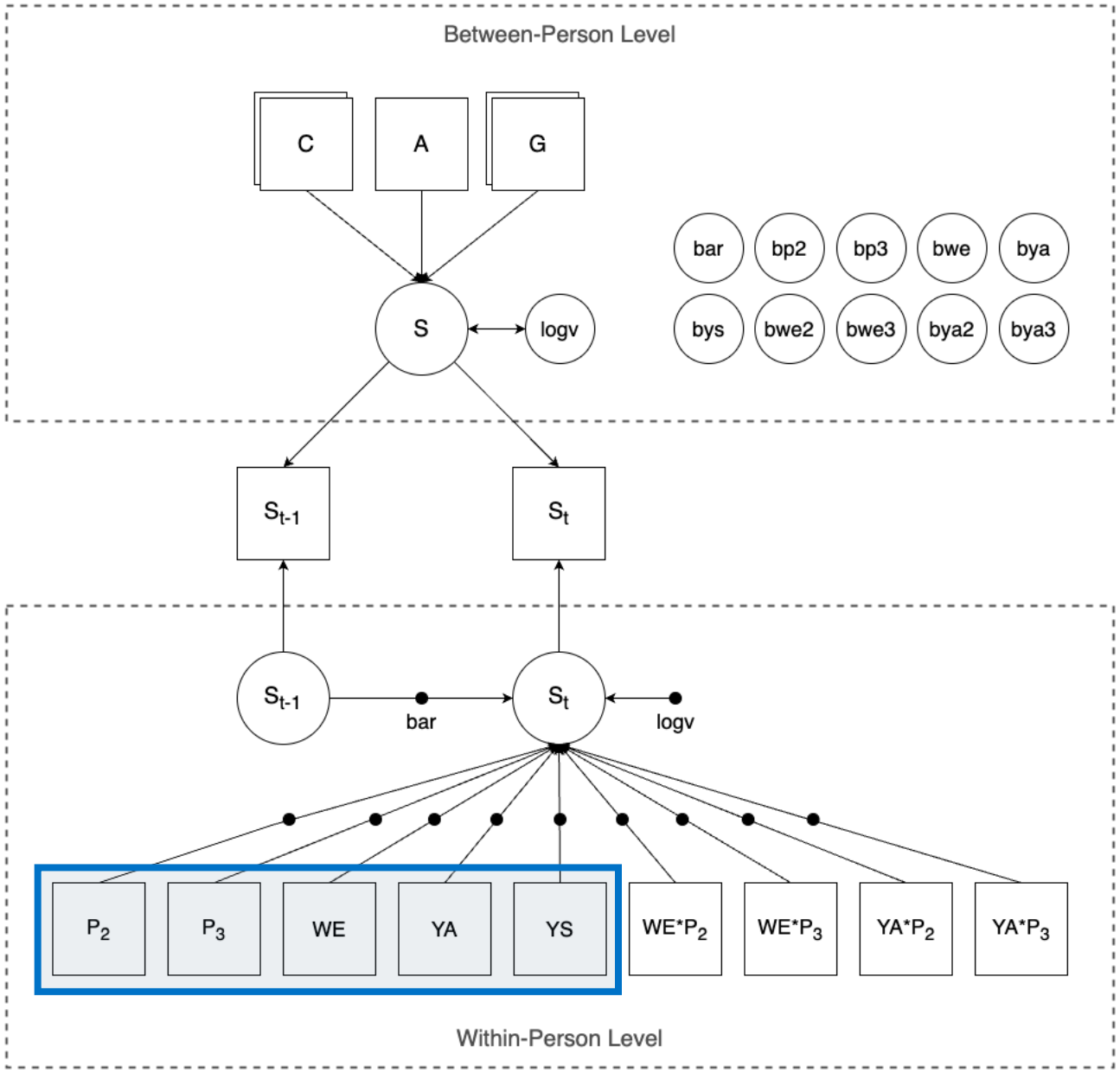
- Built for intensive longitudinal data
- Combines MLM, SEM, TSA, TVEM
- Jointly models participants' time series



DSEM PATH DIAGRAM

Latent within-person autoregression

Is smiling today related to smiling yesterday?

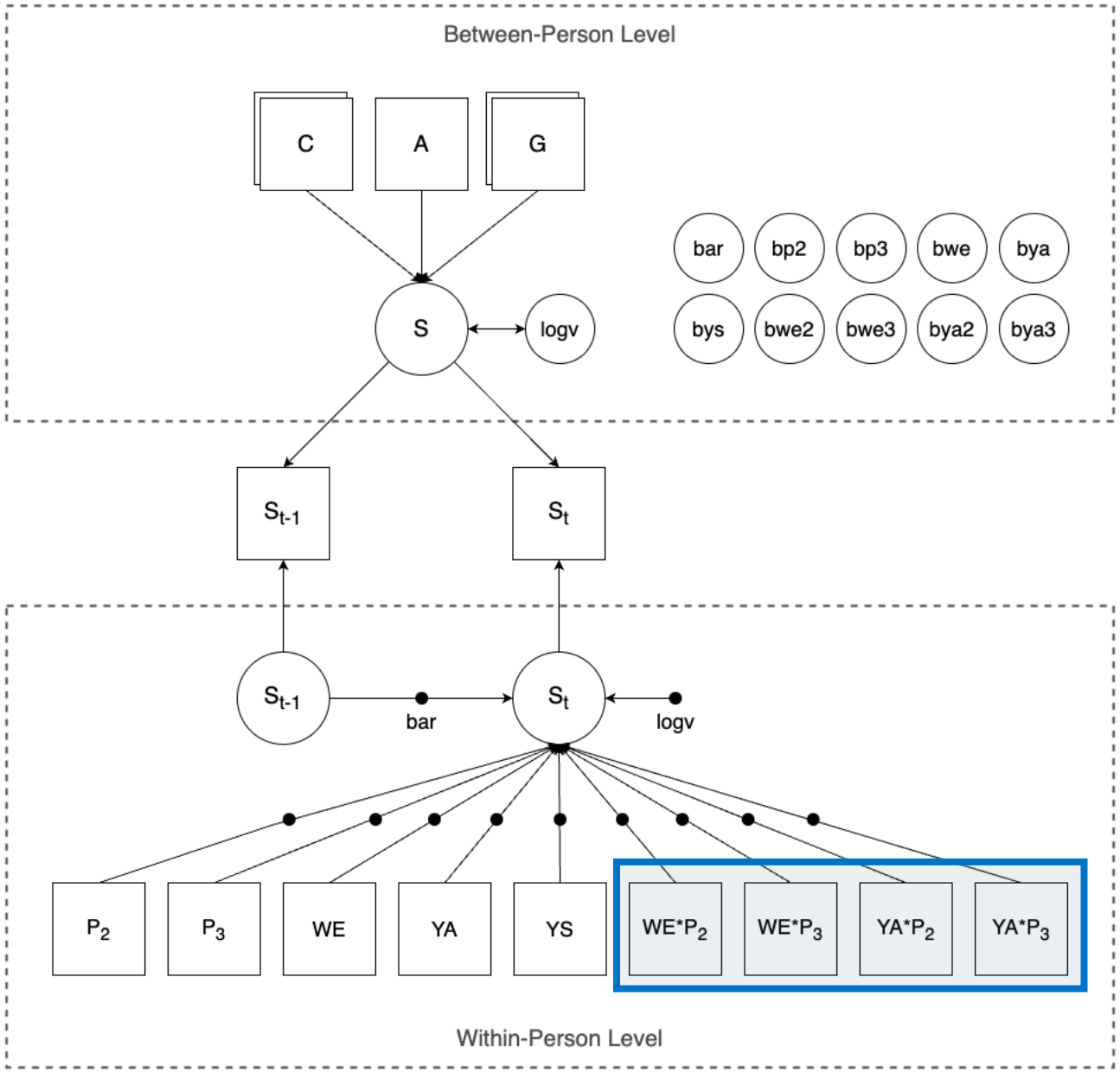


DSEM PATH DIAGRAM

Within-person temporal effects

Differences between periods

Weekend and seasonal effects

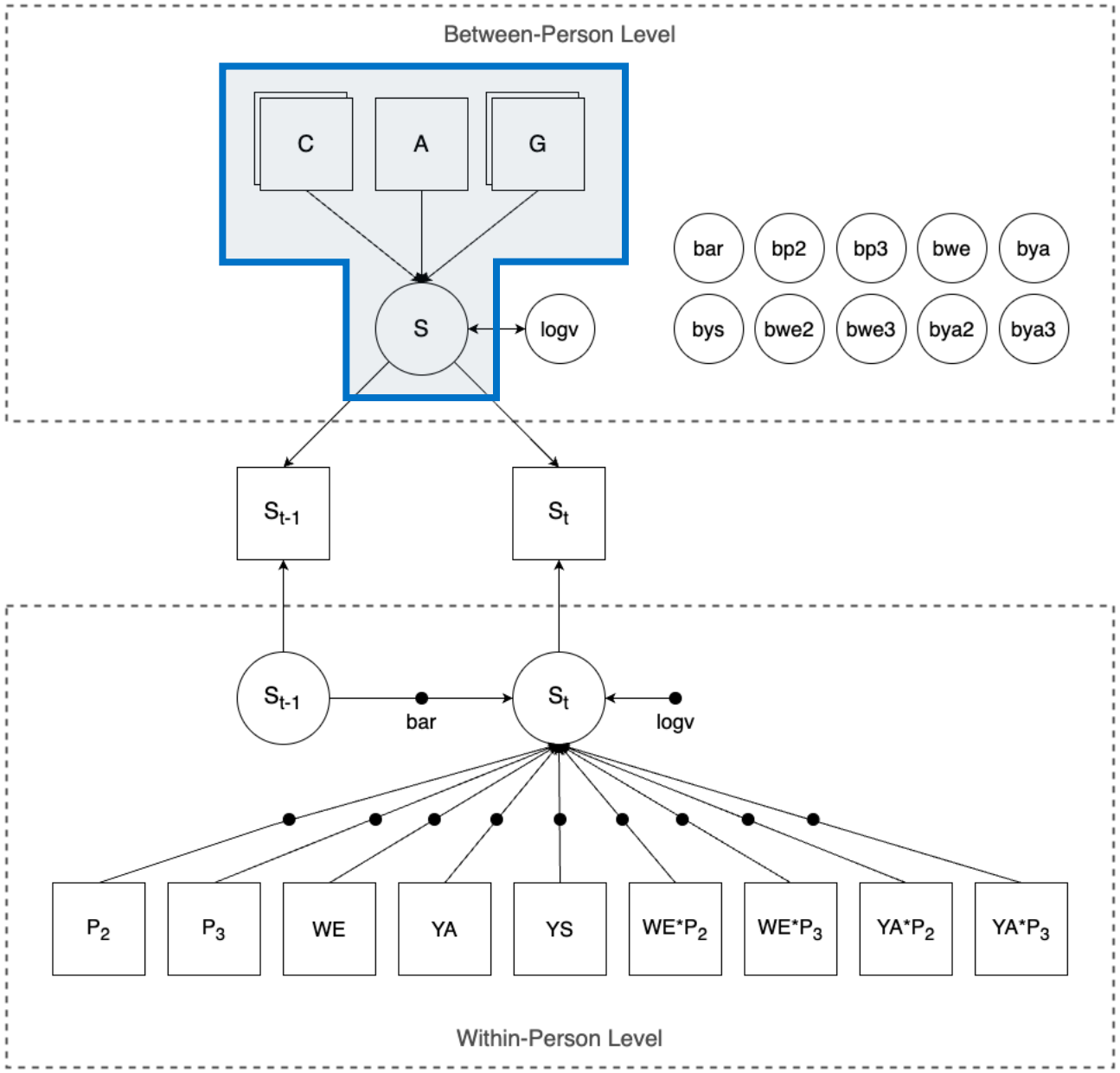


DSEM PATH DIAGRAM

Moderation by period

Does the weekend effect vary by period?

Do the seasonal effects vary by period?



DSEM PATH DIAGRAM

Latent between-person regression

Does average smiling differ by country?

Does average smiling differ by age?

Does average smiling differ by gender?

RESULTS

What did our model find?

FIXED EFFECTS

Parameter	Est.	p	Sig.
Intercept	20.65	<.001	***
Age	0.73	<.001	***
Sex: Male	−4.03	<.001	***
Sex: Other	−2.11	<.001	***
Autoregression	0.03	<.001	***
Period 2	−0.11	.038	*
Period 3	0.32	<.001	***
Weekend	0.75	<.001	***
Yearly Amplitude	0.33	<.001	***
Yearly Phase Shift	0.00	.456	

H1

	Est	p	Sig.
Weekend × Period 2	−0.14	.027	*
Weekend × Period 3	0.25	<.001	***
Amplitude × Period 2	−0.02	.400	
Amplitude × Period 3	0.52	<.001	***

FIXED EFFECTS

Parameter	Est.	p	Sig.
Intercept	20.65	<.001	***
Age	0.73	<.001	***
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Yearly Phase Shift	0.00	.456	

H2

	Est	p	Sig.
Weekend × Period 2	−0.14	.027	*
Weekend × Period 3	0.25	<.001	***
Amplitude × Period 2	−0.02	.400	
Amplitude × Period 3	0.52	<.001	***

FIXED EFFECTS

Parameter	Est.	p	Sig.
Intercept	20.65	<.001	***
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Amplitude × Period 2	−0.02	.400	
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H3

FIXED EFFECTS

Parameter	Est.	p	Sig.
Intercept	20.65	<.001	***
Age	0.73	<.001	***
Sex: Male	−4.03	<.001	***
Sex: Other	−2.11	<.001	***
Autoregression	0.03	<.001	***
Period 2	−0.11	.038	*
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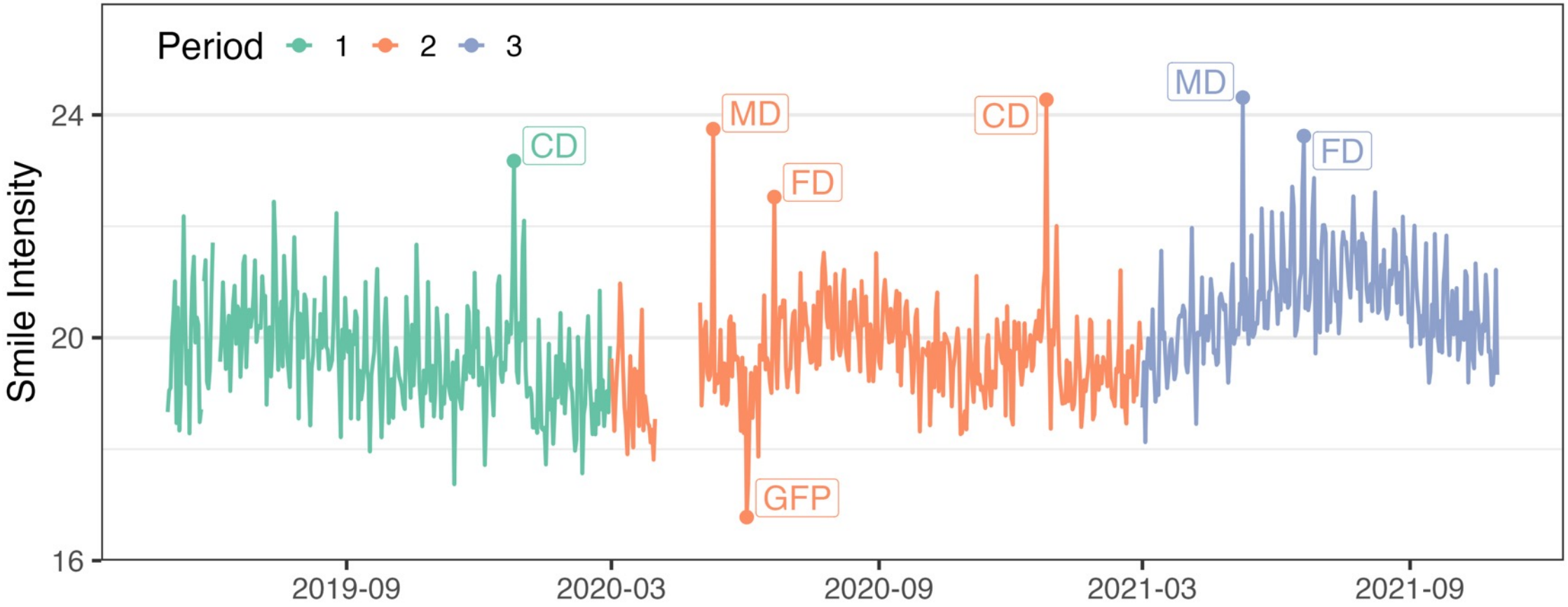
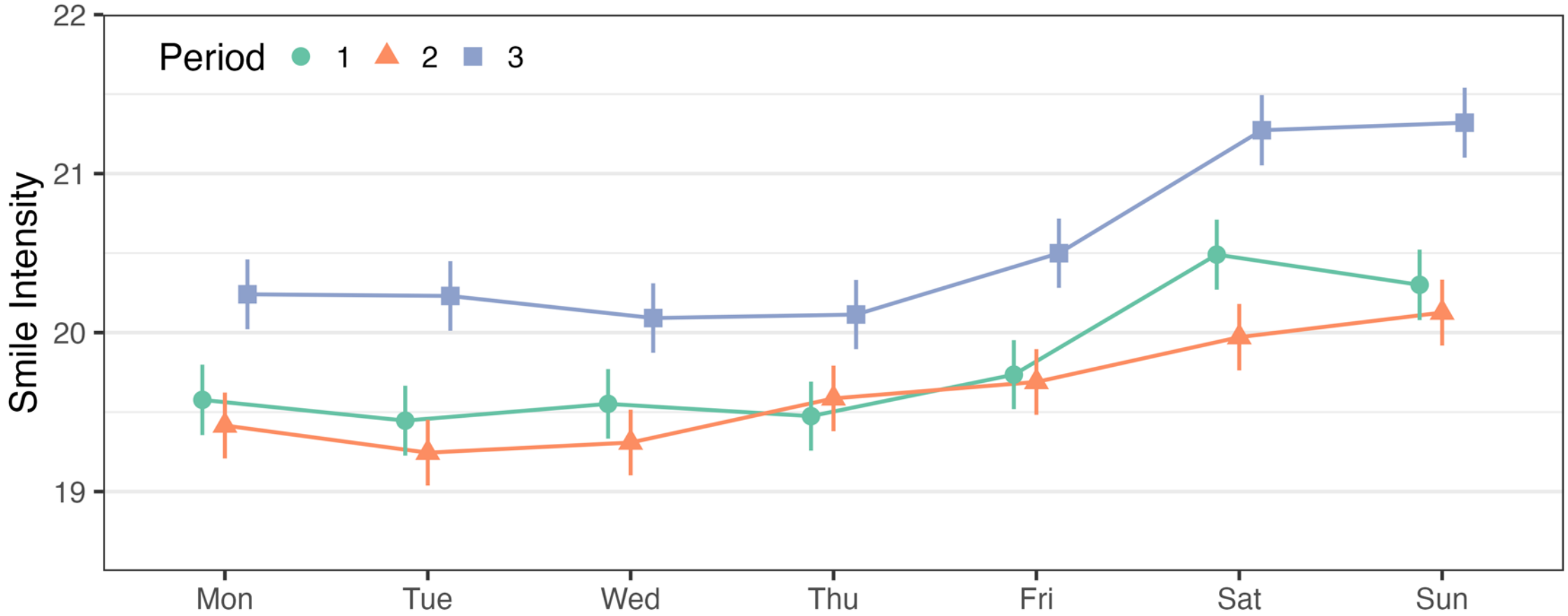
H4

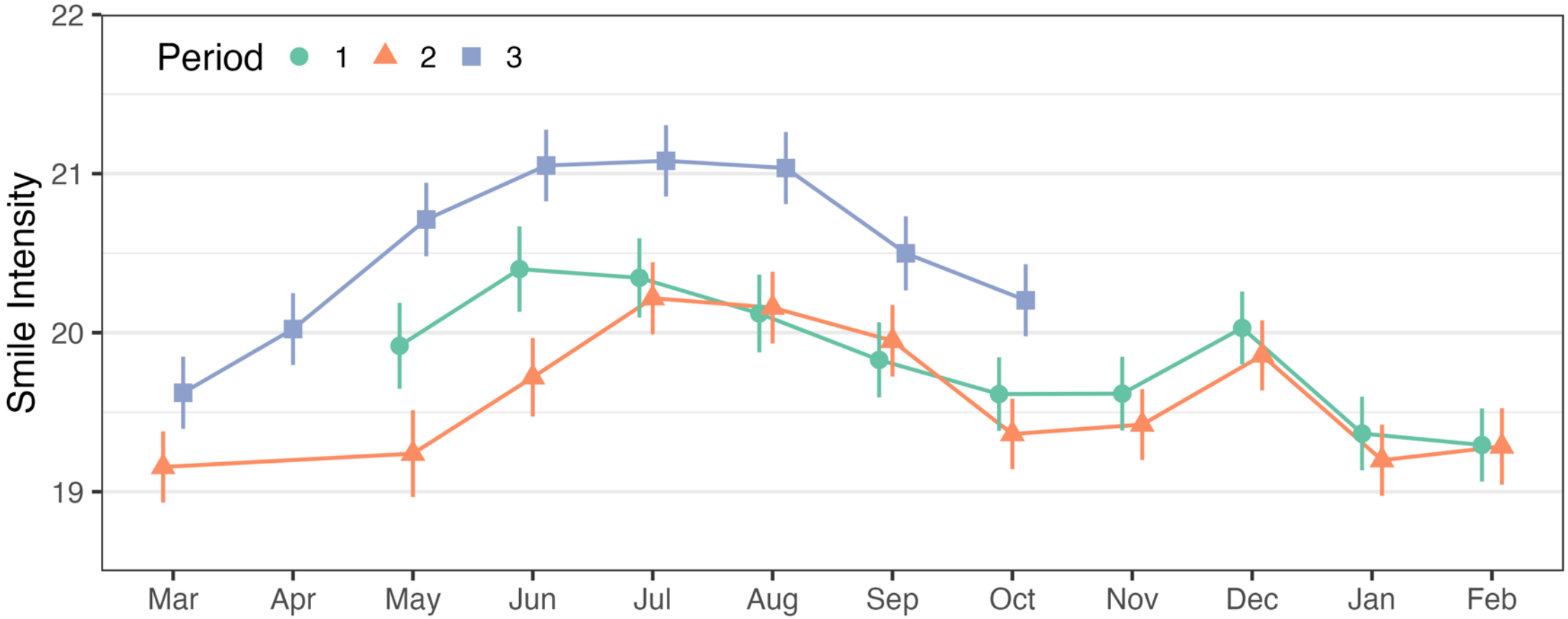
DAILY AVERAGES ACROSS PERIODS



WEEKDAY AVERAGES BY PERIOD



MONTH AVERAGE BY PERIOD



DISCUSSION

What does it all mean?

CONCLUSIONS

- The baseline (pre-COVID) year showed *weekend* and *seasonal* effects on social media smiling
- COVID year 1 showed *lower smiling* and a *dampened weekend* effect
- COVID year 2 showed *higher smiling* and an *amplified weekend* and an *amplified seasonal* effect
- These results are consistent with a “rebound” effect as lockdowns ended
- Socio-affective rhythms are sensitive to shifts in environmental context

RESEARCH TEAM

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Helped in conceptualizing the project, conducting literature reviews, and writing the paper.

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Helped in conceptualizing the project, processing the image data, and writing the paper.

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Helped access and collect the data, provided expertise on Instagram and influencers.

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Helped access and collect the data, provided expertise on Instagram and influencers.

THANK YOU

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