## Socially Jetlagged and Late for School

**Chronotypes**, Achievement and **Truancy** among 15-Year-Old Students in PISA 2018

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### Agenda

- What is a Chronotype?
- Main research Questions
- Variables and Data
- Results
- Discussion

#### Circadian rhythms in biological systems

- Life on Earth is adapted to the rotation of our planet resulting in an 24 hour circadian rhythm
- Specifically, humans have an internal, biological clock which has an genetic foundation (The Nobel Assembly at Karolinska Institutet, 2017)
- Our well-being is affected when there is a mismatch between our external environment and this internal biological clock

#### Chronotypes and Social Jet Lag

- The term chronotype refers to biologically determined (Adan et al., 2012; Roenneberg & Merrow, 2002), **interindividual differences** in the preferred time of sleep and active waking phases in humans
- Social settings (e.g. school and job) demand fixed daily schedules for sleep and wake phases
- Overarching tendency: The socially prescribed schedules tend to prefer the so-called "larks" (morning types) to the "owls" (evening types)
- Wittmann et al. (2006) introduced the concept of "**social jet lag**" in connection with the mismatch between socially predetermined and individual, biologically determined, circadian rhythms

#### Main research Questions

- What can we learn about the prevalence of social jet lag among 15-year old students?
- Is there a relation between **social jet lag** and **truancy** as well as other educational outcome variables?
- To what extent can truancy be predicted by both student achievement and their social jet lag, beyond relevant control variables?

#### Sample & Data

- German PISA Students
- Age: 15 years
- *n* = 5451 students in 223 schools
- Assessed within the international PISA Study 2018 (Reiss et al., 2019)

#### **Operationalization – Variables**

- social jet lag (CHRONOSJL)
  - Adapted version of the Munich Chronotype Questionnaire (MCTQ) (Roenneberg, Wirz-Justice, & Merrow, 2003)
  - Sleep behavior on school days vs. free days (weekends)
  - Mid sleep on school days (MSS); mid sleep on free days (MSF)
  - Social jet lag: CHRONOSJL = | MSF MSS | capturing cumulative sleep deficit
- **Students' Truancy** (TRUANCY) *Dependent Variable* 
  - formative index comprising three items: "in the past two full school weeks ...
    - ... skip a whole day of school?
    - ... skip single lessons?
    - ... arrive late for school?
  - 4 point response scale ranging from "never" to "five times or more"

#### Covariates and controls

- Students' index of economic, social and cultural status (ESCS)
  - Formative index comprising socio-economic status, parental educational attainment and possessions of cultural assets (Avvisati, 2020)
- Students' PISA Reading literacy (PVREAD)
- Students' Intelligence (BEFKIWLE)
  - Subscale Figural Intelligence of the Berliner Test zur Erfassung fluider und kristalliner Intelligenz (Wilhelm et al., 2014)
- Students' Grade in subject German (NOTENDE6ordered)
  - Ordinal Scale of school grades 6 = worst Grade; 1 = best Grade

#### Descriptives for – Circadian variables



#### Results – bivariate associations

Table 2. Pearson correlations between the predictor variables and criterion used in the linear regression.

	1	2	3	4	5	6
1TRUANCY		0.135	-0.108	-0.293	0.136	-0.168
2 CHRONOSJL	0.025		-0.087	-0.153	0.091	-0.103
3 ESCS	0.020	0.018		0.388	-0.219	0.250
4 PVREAD	0.024	0.025	0.016		-0.379	0.549
5NOTENDE6ordered	0.023	0.020	0.017	0.019		-0.217
6 BEFKIWLE	0.018	0.020	0.016	0.014	0.021	

Notes. German PSA 2018 sub-sample, n = 5451; Correlation coefficients above the diagonal; respective **Standard errors SE below the diagonal**; all correlations significant (p < .001).

### Results – Regressions Table 3. Linear regression analyses predicting students' truancy splitted by Schooltype.

Dependent Variable: Students truancy (*TRUANCY*)

	<b>GYMI</b> = 1; non-"Gymnasium" school forms ( $n = 3409$ )														
			Model A			Model B						Model C			
	β	$SE_{\beta}$	t	df	р	β	$SE_{\beta}$	t	df	р	β	$SE_{\beta}$	t	df	р
CS	-0.0738	0.0235	-3.1400	74.3400	0.0024	-0.0702	0.0232	-3.0300	70.4400	0.0034	-0.0057	0.0223	-0.2600	89.9700	0.7955
IRONOSJL						0.1237	0.0325	3.8100	27.7900	0.0007	0.0985	0.0288	3.4200	37.9700	0.001
READ											-0.2593	0.0341	-7.6000	29.3900	0.000
DTENDE6ordered											0.0235	0.0324	0.7200	30.2000	0.4771
EFKIWLE											-0.0122	0.0238	-0.5100	103.0600	0.611
						GYN	<b>II</b> = 2; "	Gymnasiu	<b>um" (</b> <i>n</i> = 2	2042)					
			Model A		Model B						Model C				
	β	$SE_{\beta}$	t	df	р	β	$SE_{\beta}$	t	df	р	β	$SE_{\beta}$	t	df	р
CS	-0.0244	0.0342	-0.7200	38.6100	0.4759	-0.0185	0.0342	-0.5400	36.9000	0.5924	0.0316	0.0372	0.8500	29.5800	0.4022
IRONOSJL						0.0921	0.0383	2.4000	31.1100	0.0226	0.0769	0.0367	2.1000	31.0200	0.0440
IRONOSJL /READ						0.0921	0.0383	2.4000	31.1100	0.0226	0.0769 -0.1808	0.0367 0.0432	2.1000 -4.1900	31.0200 33.1500	0.0440
HRONOSJL VREAD OTENDE6ordered						0.0921	0.0383	2.4000	31.1100	0.0226	0.0769 -0.1808 0.0353	0.0367 0.0432 0.0426	2.1000 -4.1900 0.8300	<ul><li>31.0200</li><li>33.1500</li><li>19.3900</li></ul>	<b>0.044</b> <b>0.000</b> 0.416

Model B - GYMI=1:  $R^2 = 0.0214$  (SE  $R^2 = 0.0098$ , t = 2.19, df = 24.93 p = 0.0381); Model B - GYMI=2:  $R^2 = 0.0102$  (SE  $R^2 = 0.0067$ , t = 1.52, df = 36.62 p = 0.1371);

Model C - GYMI=1:  $R^2 = 0.0923$  (SE  $R^2 = 0.0180$ , t = 5.12, df = 22.65 p = 0.0000); Model C - GYMI=2:  $R^2 = 0.0495$  (SE  $R^2 = 0.0138$ , t = 3.59, df = 55.66 p = 0.0006).

#### Discussion

- Normally distributed social jet lag ... but noticeable "left shift" of distribution
- Nearly all German students suffer from social jetlag!
  average social jet lag: 2 hours and 49 minutes
- Substantial correlations between
  - Truancy ~ social jet lag
  - Reading competency ~ social jet lag
- Social jet lag turns out to be an substantial predictor for truancy beyond student achievement, socio economic status and other relevant control variables

# Thank you for listening!

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