Students' sleep and academic performance

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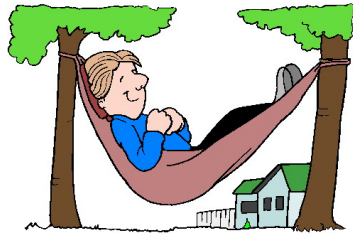
Data Science Incubator, Fall 2014

Hypothesis: Poor academic performance in college students correlates with poor sleep behaviors

Course: Biological Clocks and Rhythms, Spring 2014
72 students, seniors
Data recorded over: 6 days, including 1 weekend.

- **Sleep parameters:**
- chronotype
- social jetlag
- variability of sleep onset, duration, offset etc

- **Performance:** grades (midterms, quizzes etc)

-**Purposes:** Research, teaching and public health goals.
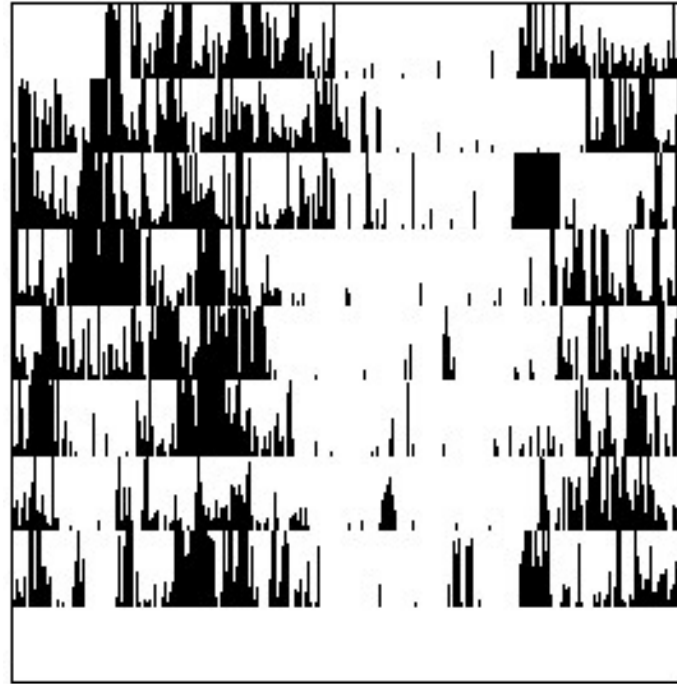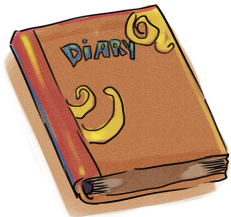
Datasets and Scientific Questions
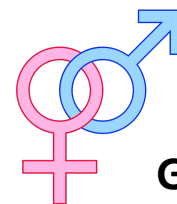
Data from:

1) **Actiwatch** → **Example:**

2) **Sleep Diary**

3) LARK VS OWL

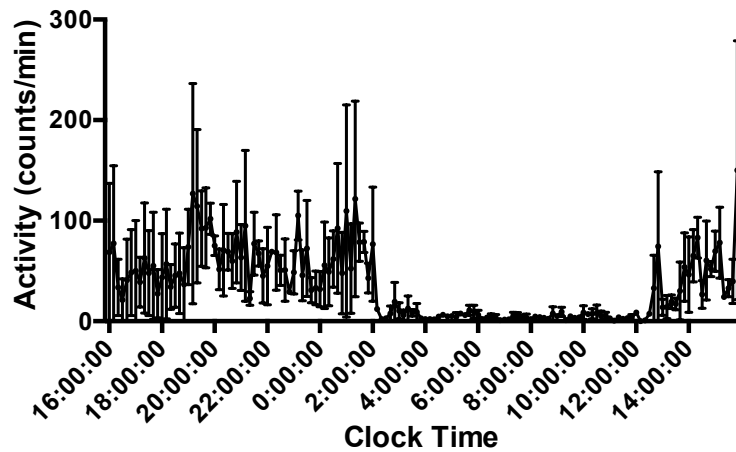**Chronotype questionnaires**

Correlated to:
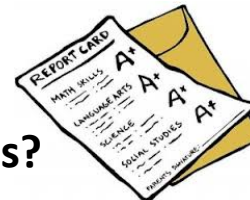
Grades?   **Gender?**

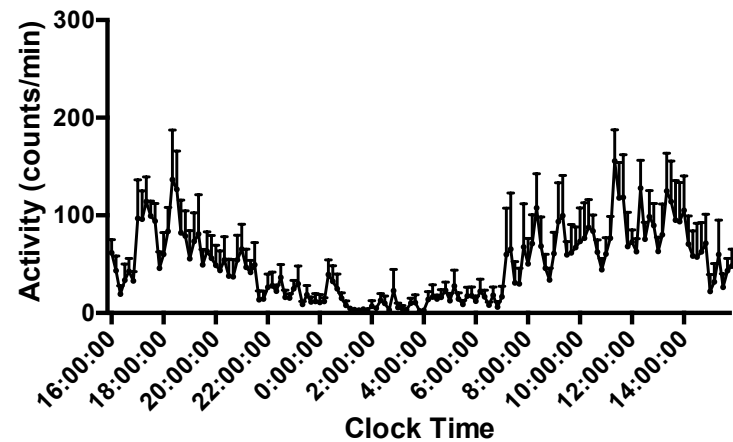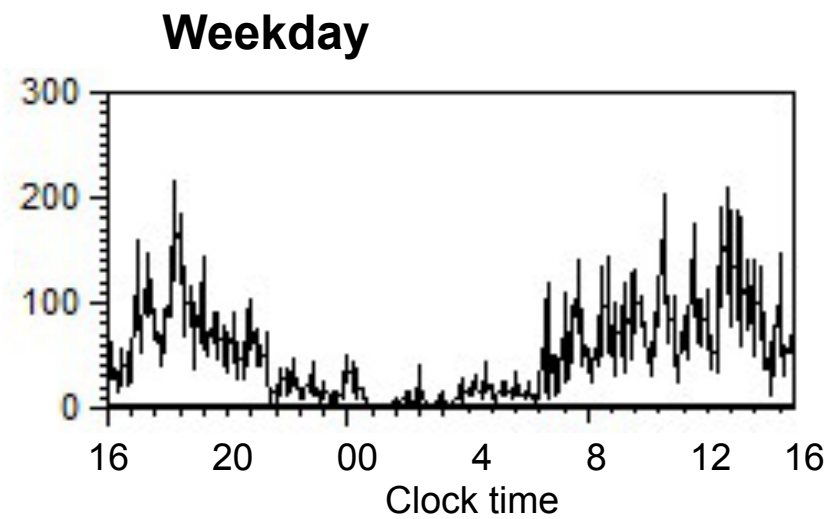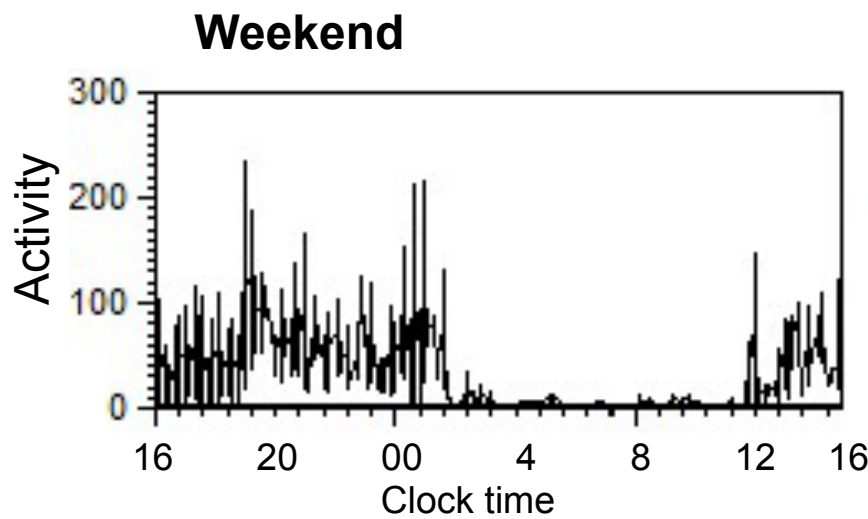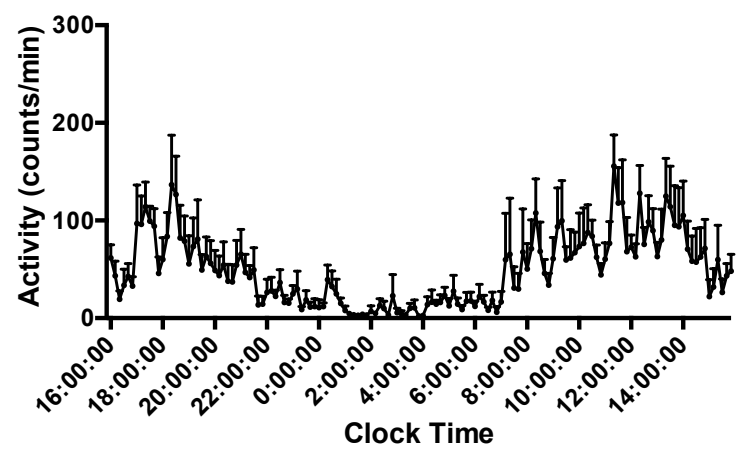# Example of individual student's actograms
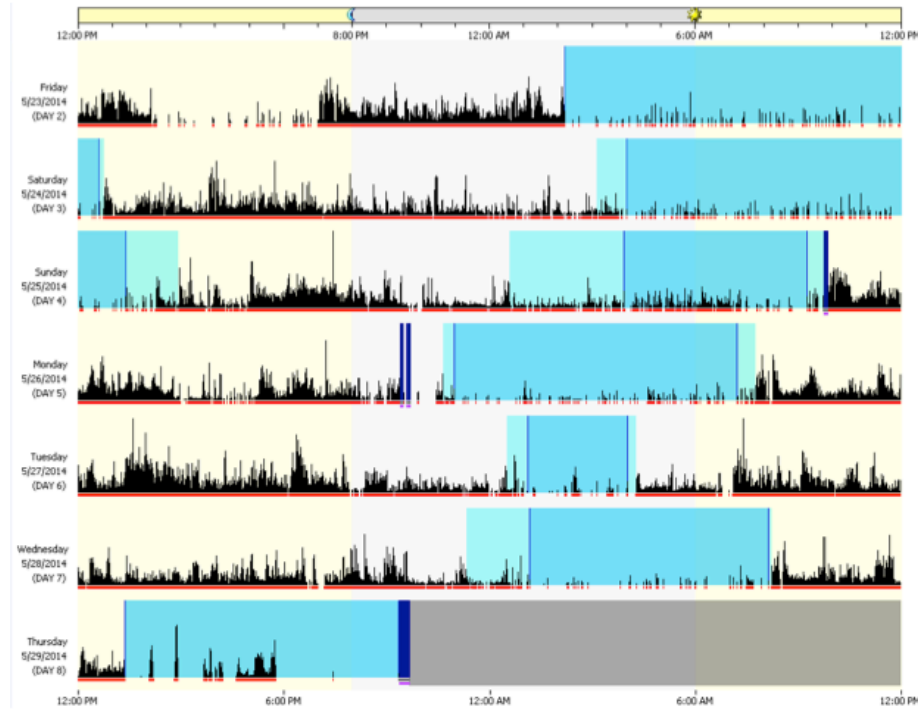
Weekend

Weekday

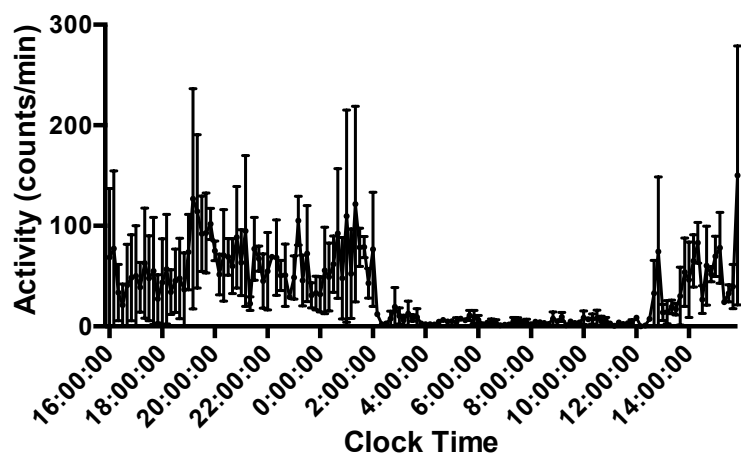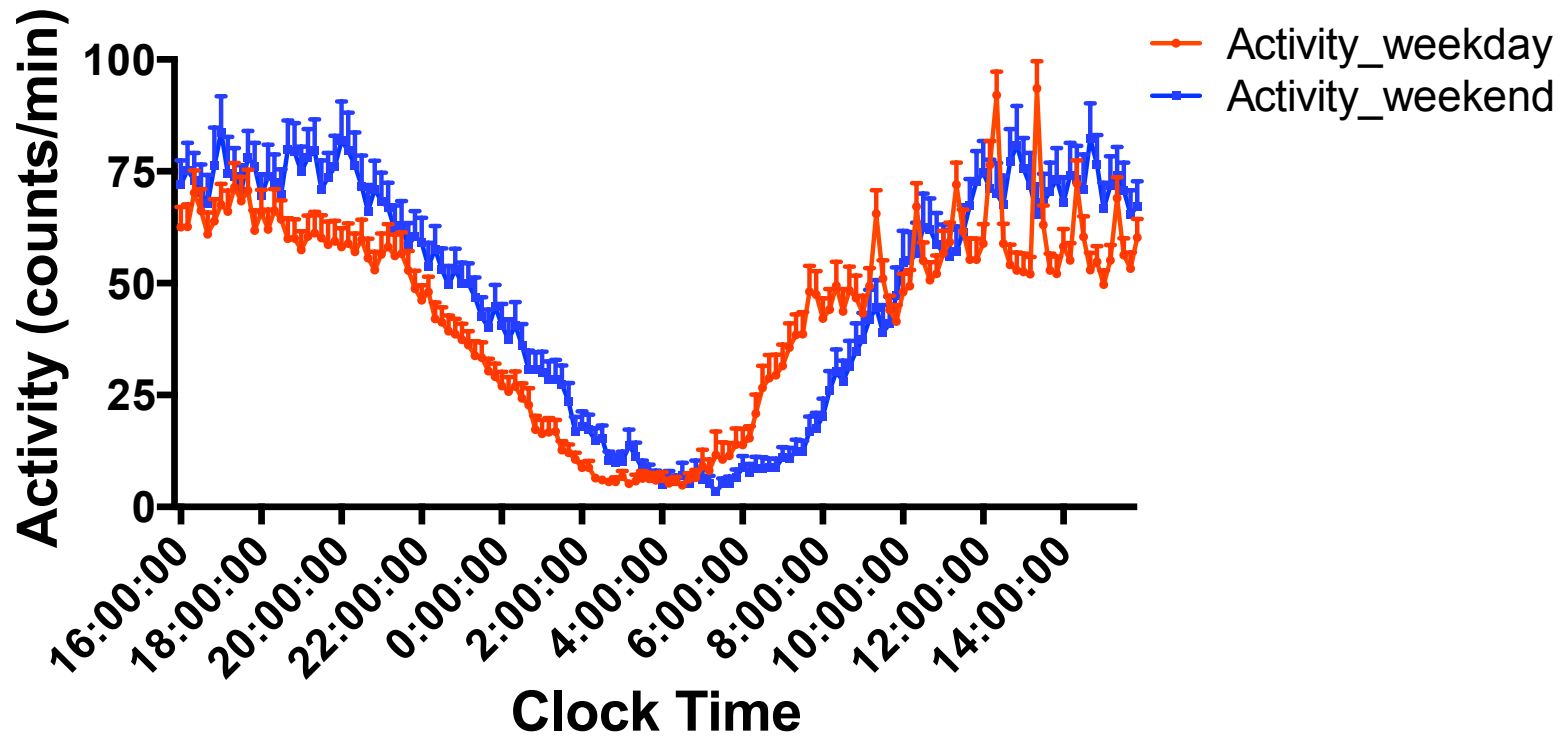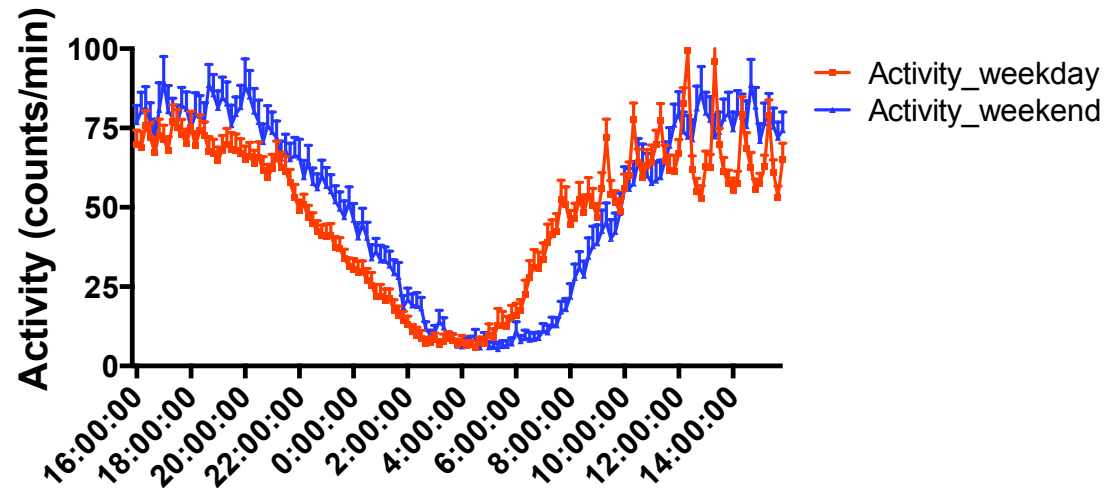# Individual student's actograms: Incubator results match with manually-processed data

During weekend, students go to bed later, wake up later and sleep more than during weekdays

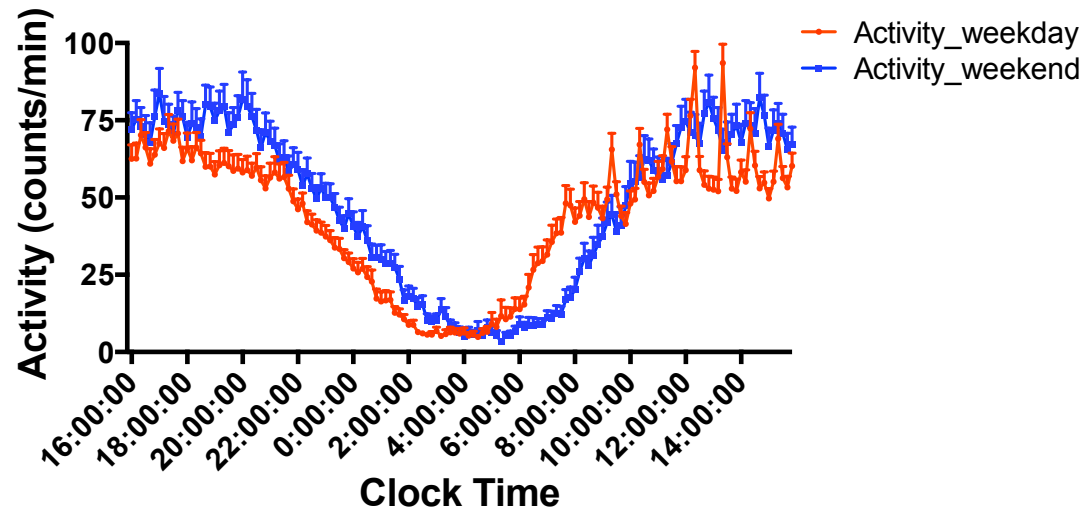**Entire class average waveforms: Incubator results match with manually-processed data**

Manual

Incubator

Clock Time

Activity (counts/min)

- Activity_weekday
- Activity_weekend
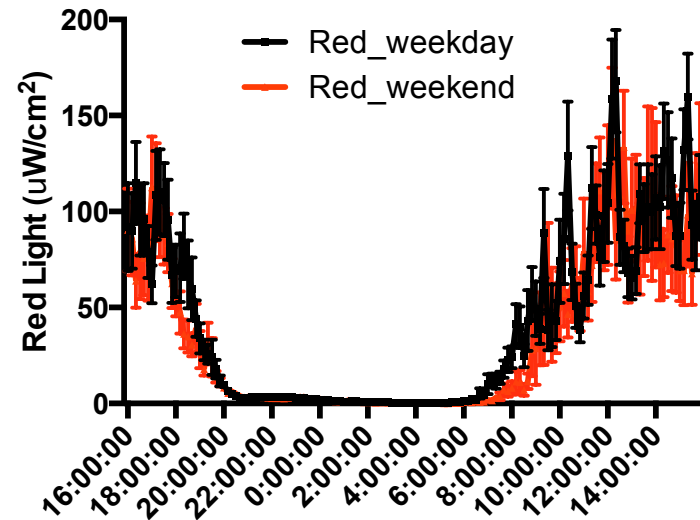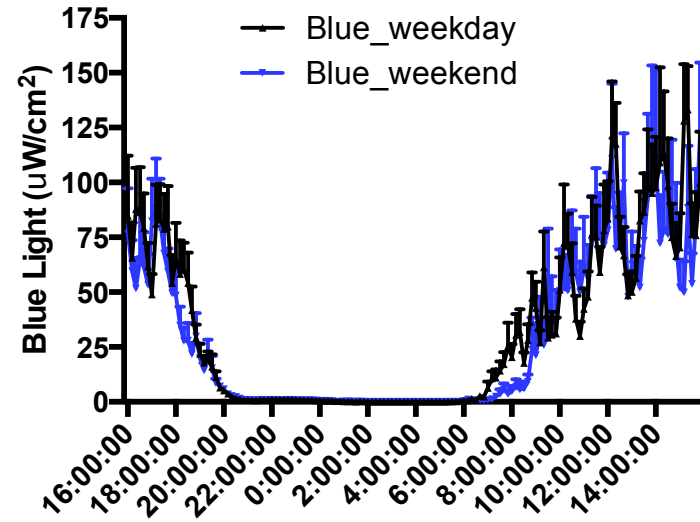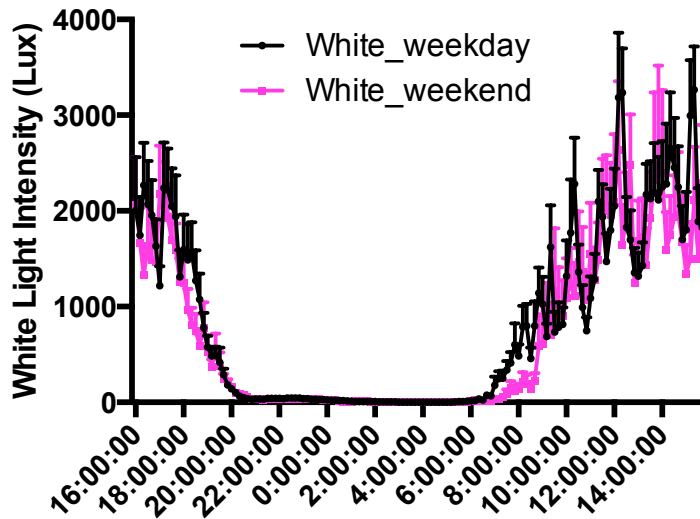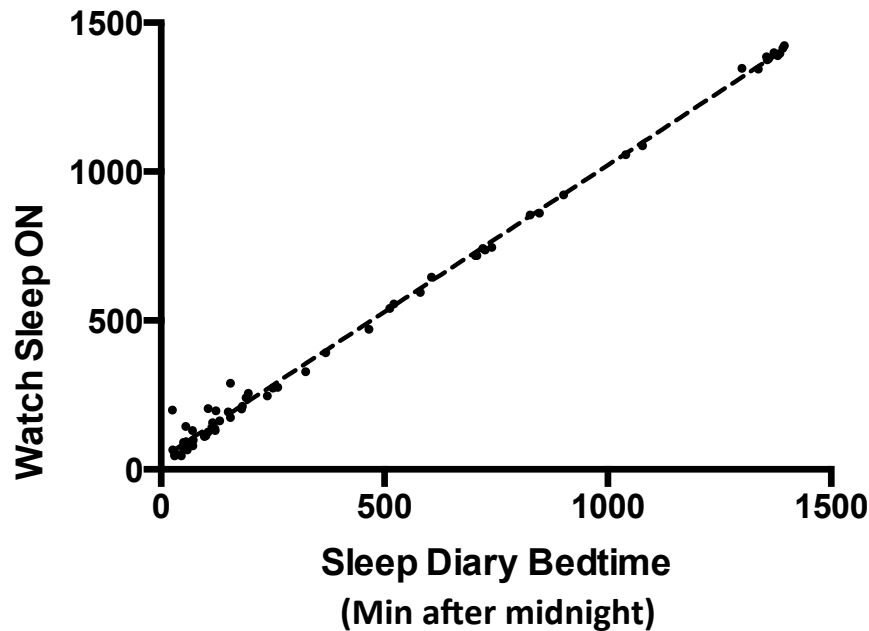
On weekend, students' exposure to light in the morning is delayed
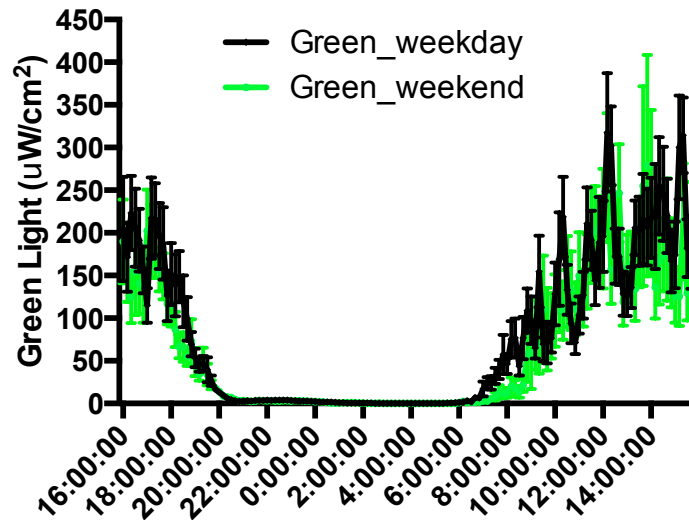
Although self-reported, diary information correlates for the most part with actiwatch data

Diary vs. Watch Sleeptime (on)

Watch Sleep ON

Sleep Diary Bedtime
(Min after midnight)

Diary vs. Watch Waketime (off)

Watch Sleep Off

Sleep Diary Waketime
(Min after midnight)
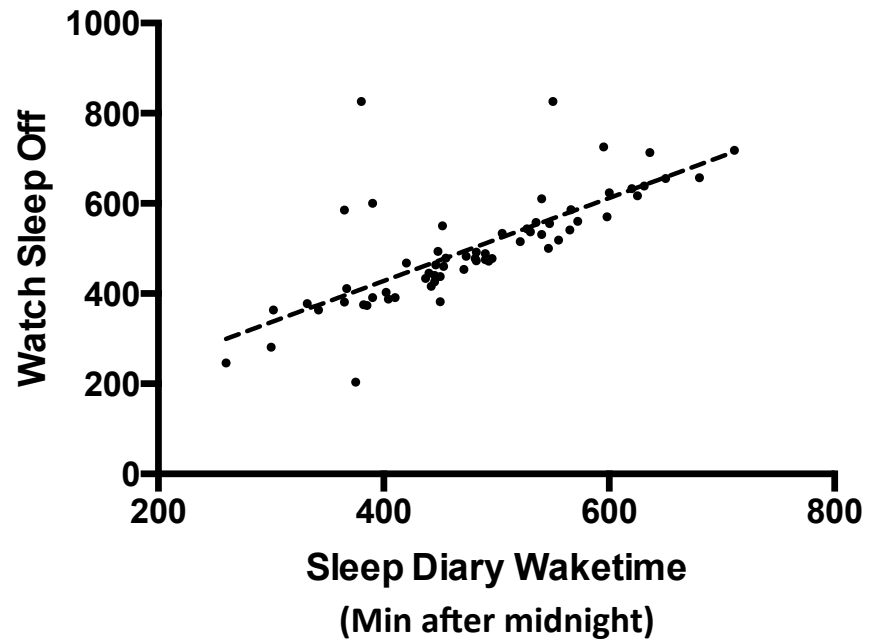
P < 0.0001

Wake time SD and Rise time SD (from Sleep Diary) correlate with grades: higher variations correlated high higher grades

Wake time SD vs. Grades

Grades

- Midterm Final Grade
- Final Quarter Grade
- Midterm Final Grade
- Final Quiz Grade

Sleep Offset S.D.
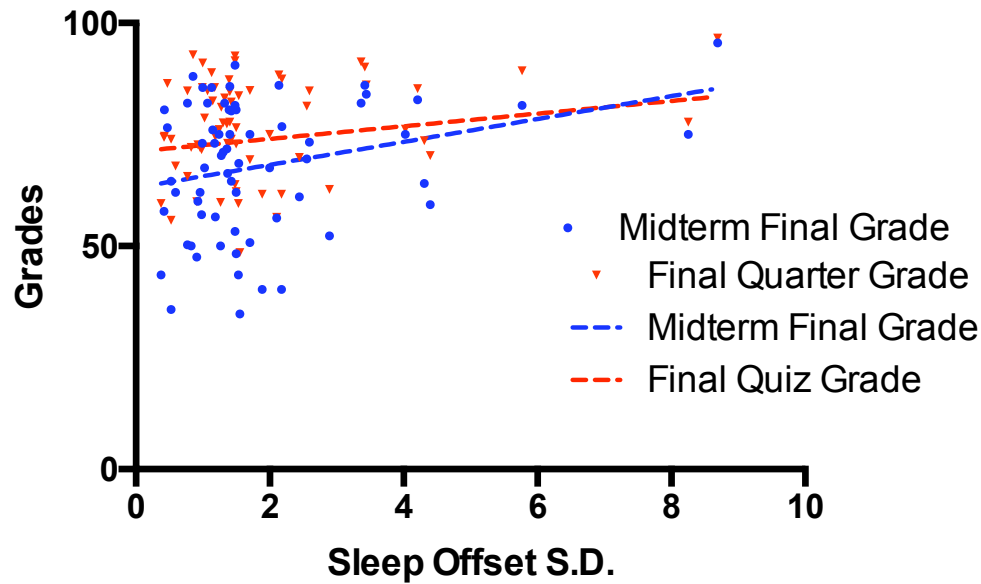
Midterm Final Grade: P = 0.0249
Final Quarter Grade: P = 0.0490

Rise Time SD vs. Grades

Grades

- Midterm Final Grade
- Midterm Final Grade

Rise Time Stdev
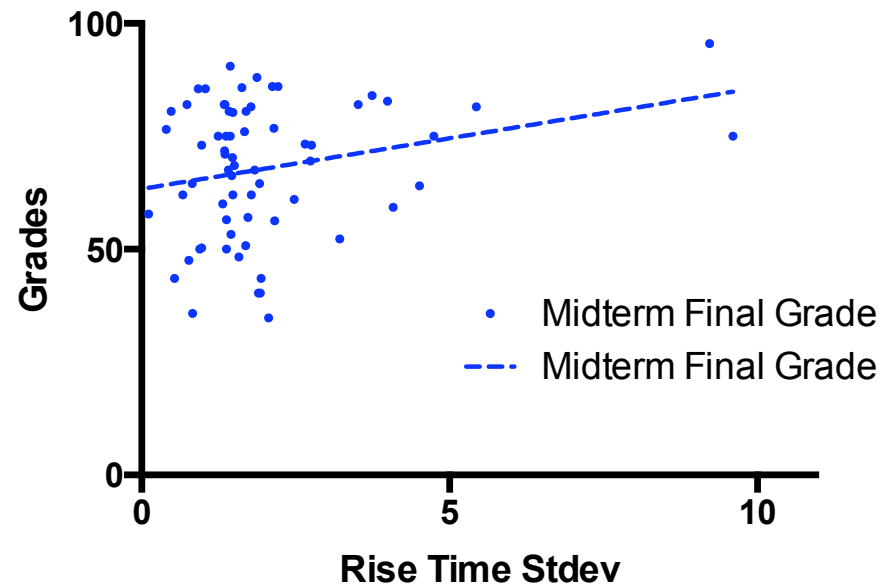
P = 0.0396

Collected data agrees with results from literature:
Late types tend to have bigger social jetlags
Chronotype questionnaires scores correlate with each other
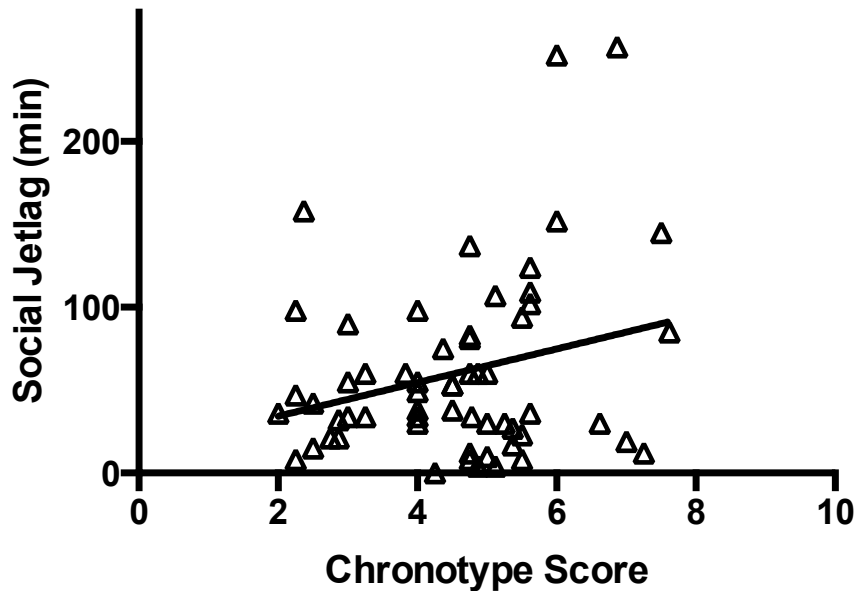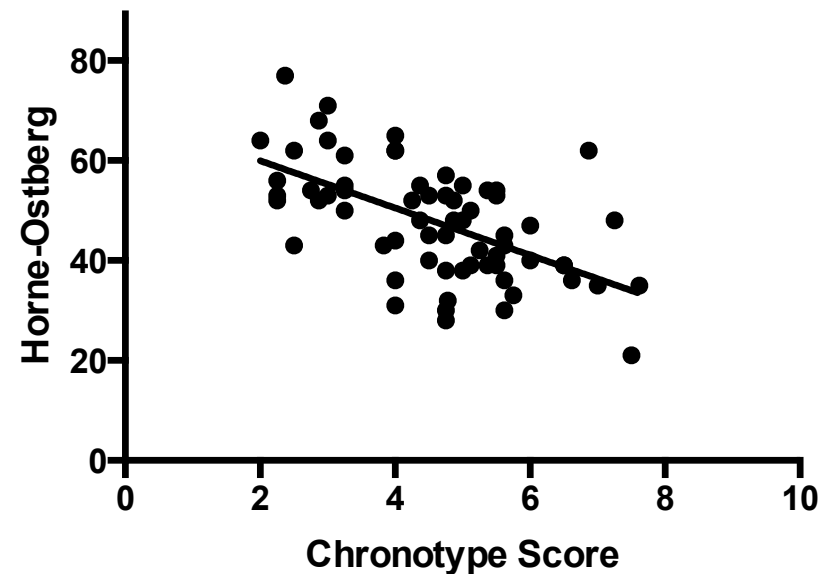

Chronotype score vs. Social Jetlag

P = 0.0449

Chronotype vs. Horne-Ostberg scores

P < 0.0001

Summary

<u>Conclusions:</u>

• Most sleep parameters did not correlated with performance. Bigger N needed for definite conclusions.

• Some correlations agree with literature data: later chronotypes have bigger social jetlags and females tend to be earlier types.

•Students go to bed later, wake-up later and sleep more on weekends.

•On Weekend, student's exposure to light is delayed in the morning.

<u>Future directions:</u>
- Obtain bigger N.
-Add demographic data (ethnic, socio-cultural, living on/off campus data etc) to correlate with sleep patterns and performance.

Acknowledgements

- Horacio de la Iglesia (PI)

- de la Iglesia lab

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- eScience team:

 - specially Bill Howe and Dan Halperin

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