



AMERICAN
PSYCHIATRIC
ASSOCIATION
ANNUAL MEETING
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Sleep in the NCANDA cohort

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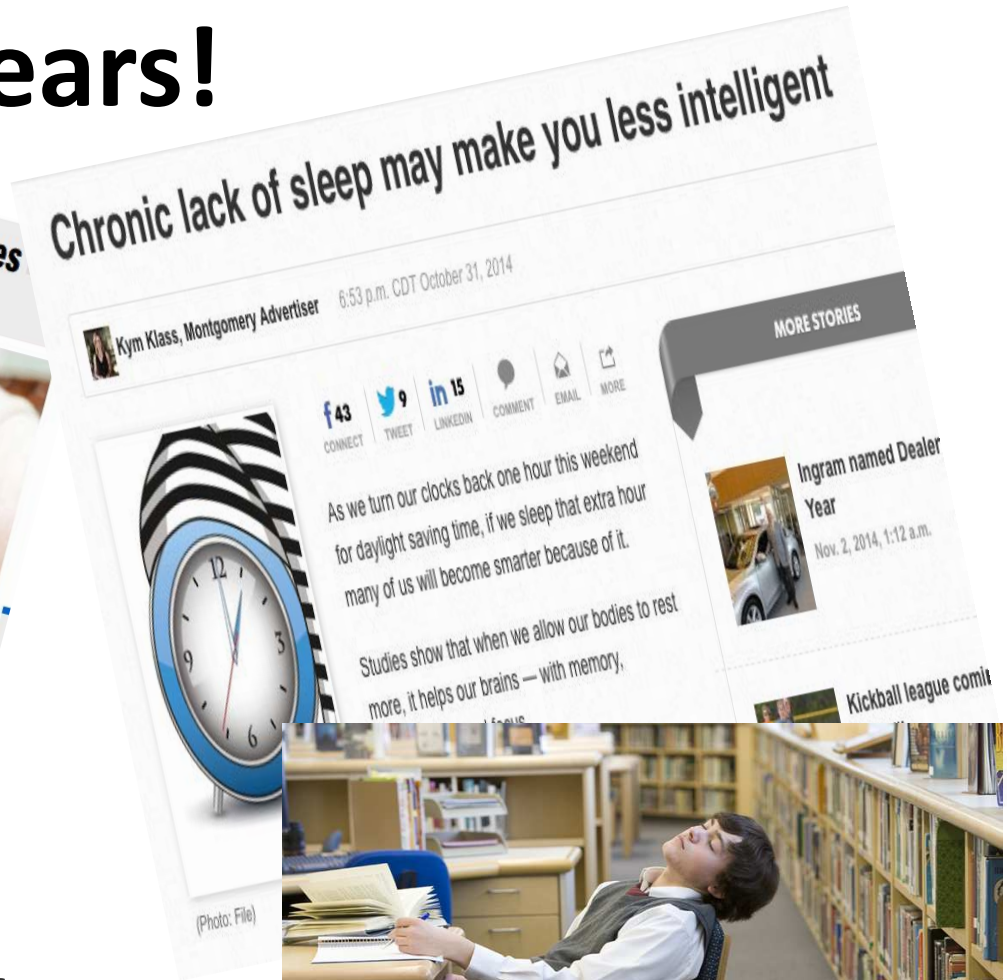
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and*

*Brain Function Research Group, University of the
Witwatersrand, South Africa*

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Sleep is critical in the teenage years!



DAILY BREEZE

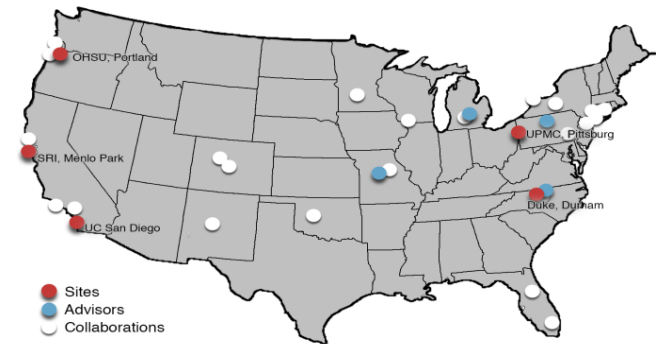
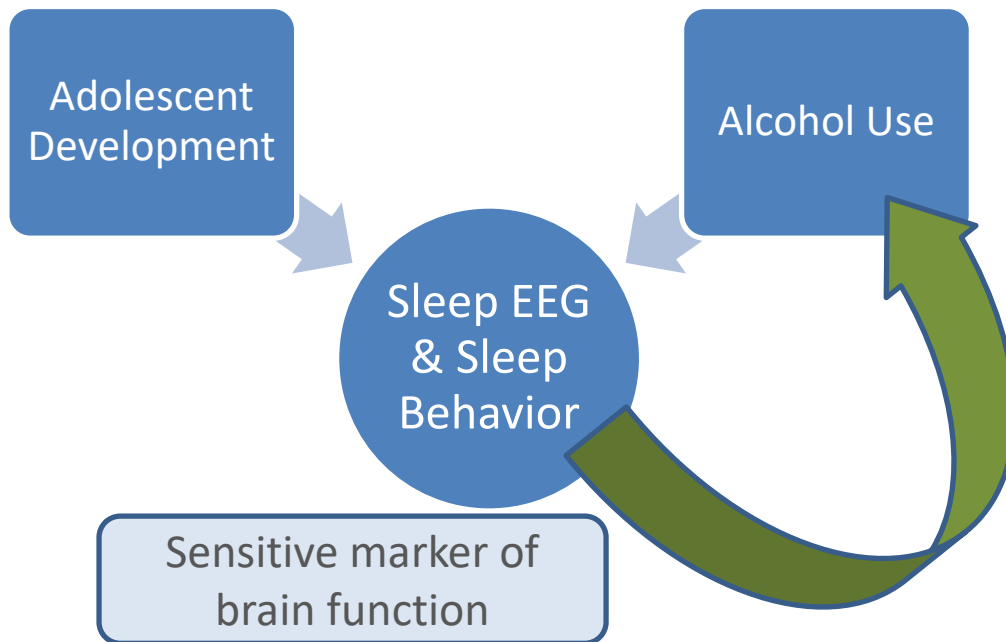
EDUCATION

Does the school bell ring too early for sleepy students?

Sleepy Teens 4.5 Times Likely to Commit Crimes By Age 29: Study
February 23, 2017 10:50 AM

Why Consider Sleep?

1. Examine the developmental trajectory of functional sleep measures and how they are impacted by alcohol exposure.
2. Examine sleep behavior as a predictor of hazardous alcohol drinking in adolescents.



Sleep Project:
SRI International
University of Pittsburgh

NCANDA sleep project: what we are learning

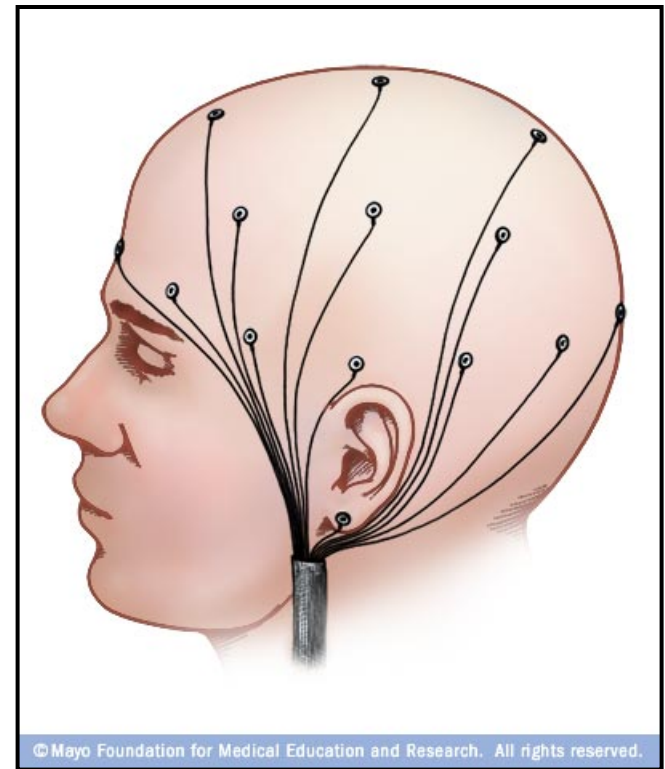


- Normal age-related differences in sleep architecture and EEG across adolescence (*Baker et al., Sleep 2016*)
- Links between sleep and brain structure (*Goldstone et al., under review, 2017*)
- Longitudinal changes in sleep architecture: impact of alcohol use
- Sleep behaviors as predictors of heavy alcohol use (*Hasler et al., Alcohol Clin Exp Res., 2017*)

Recording sleep with polysomnography

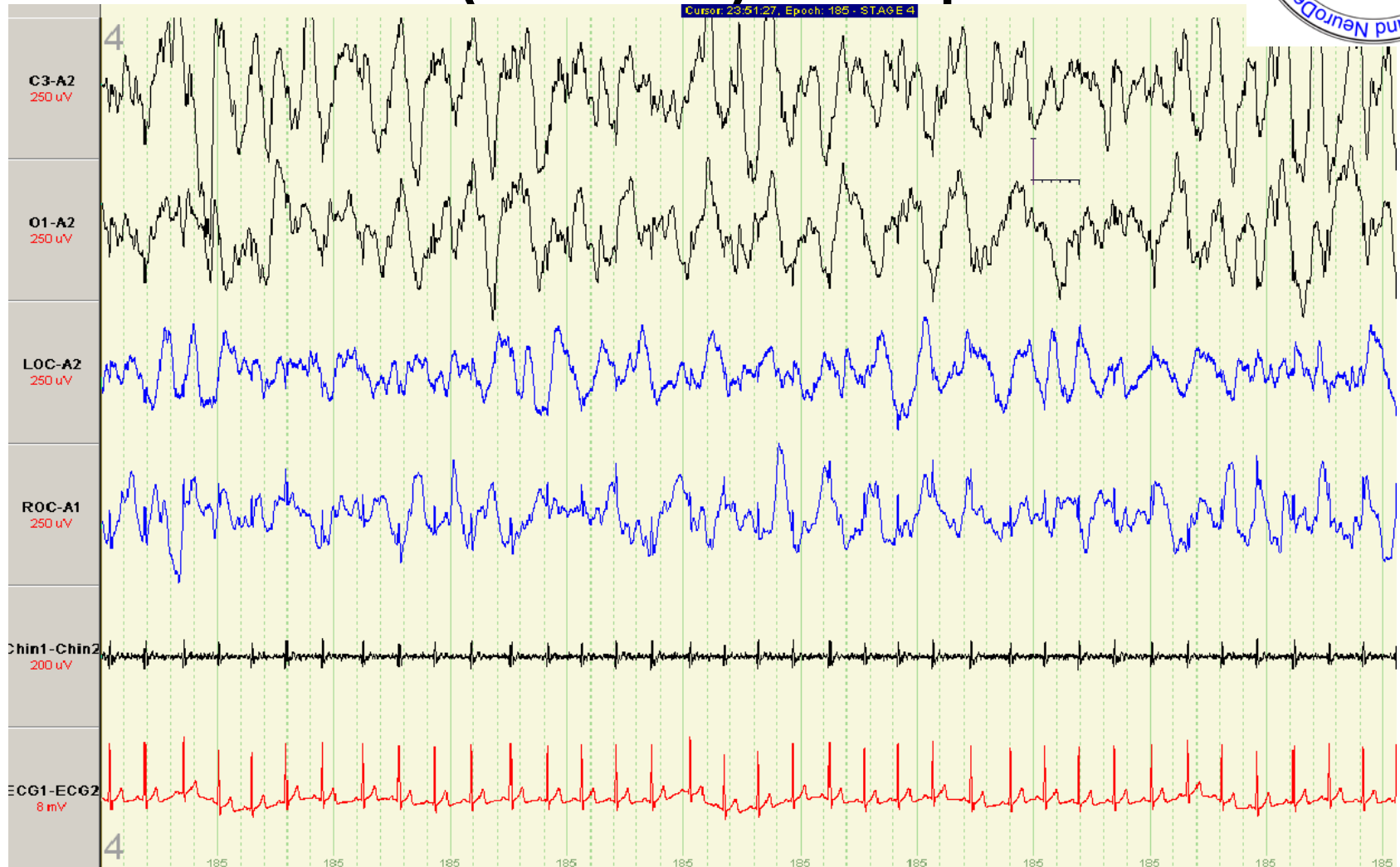
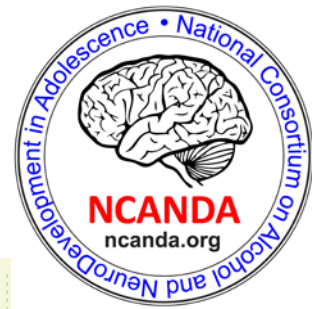


- Electroencephalograph
- Electromyograph
- Electro-oculograph

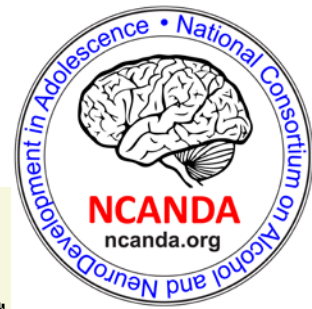


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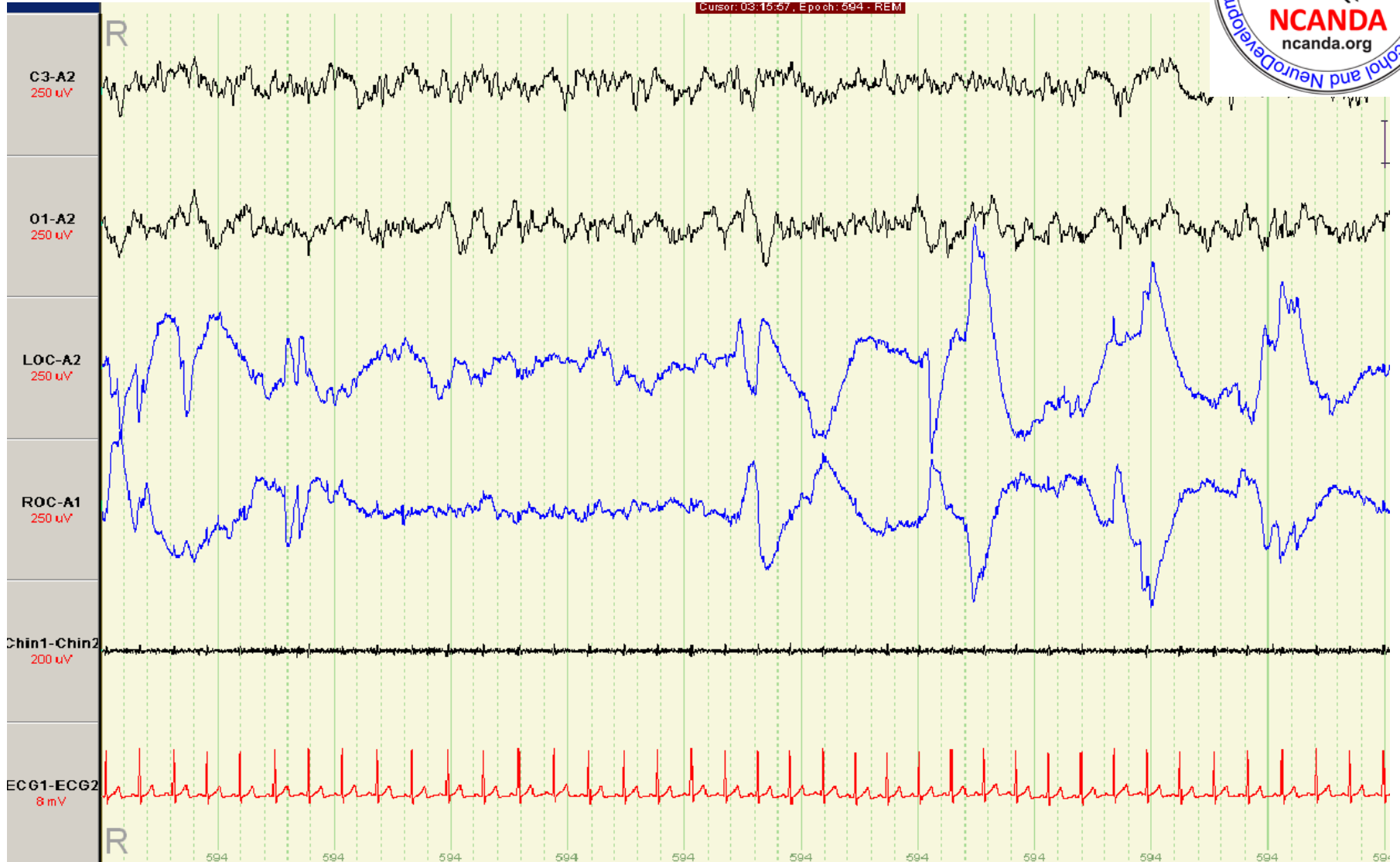
Non-rapid eye movement (NREM) sleep



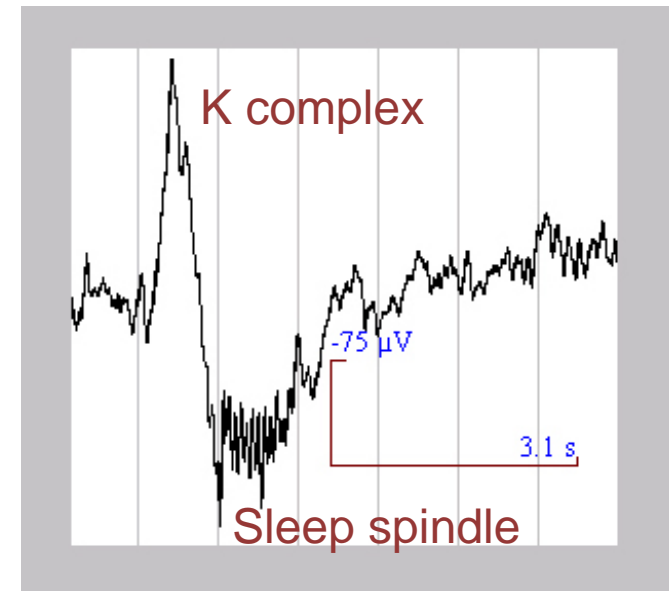
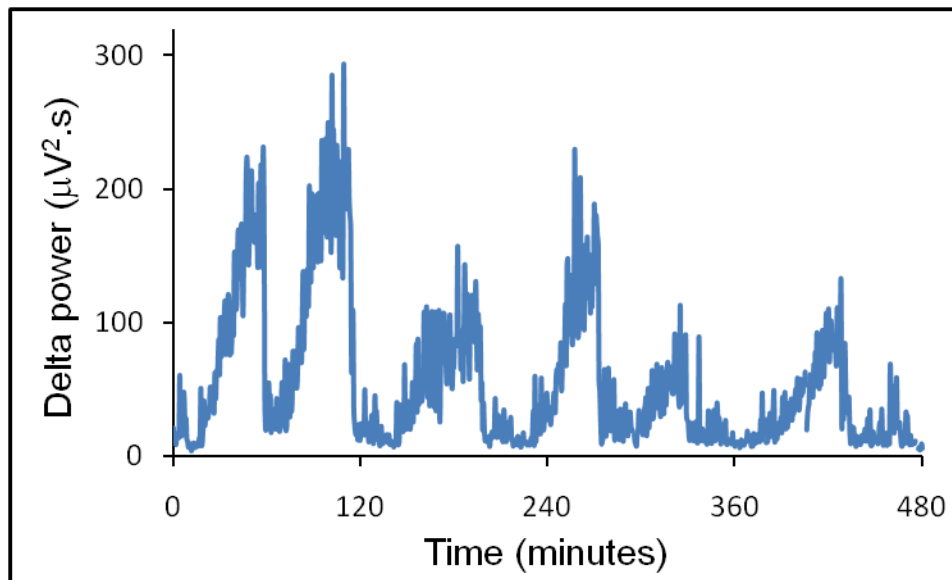
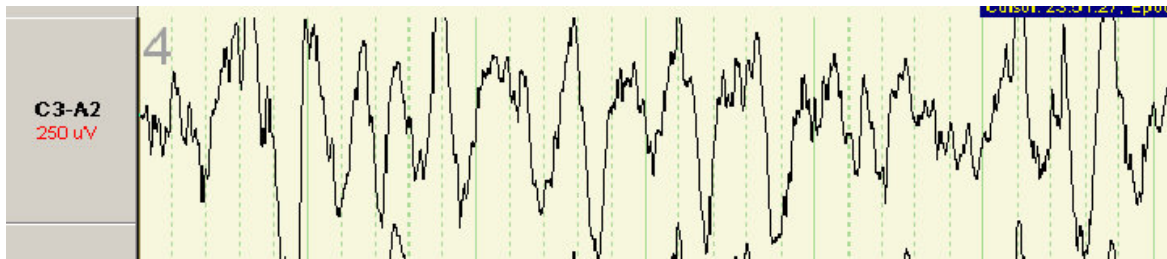
REM sleep



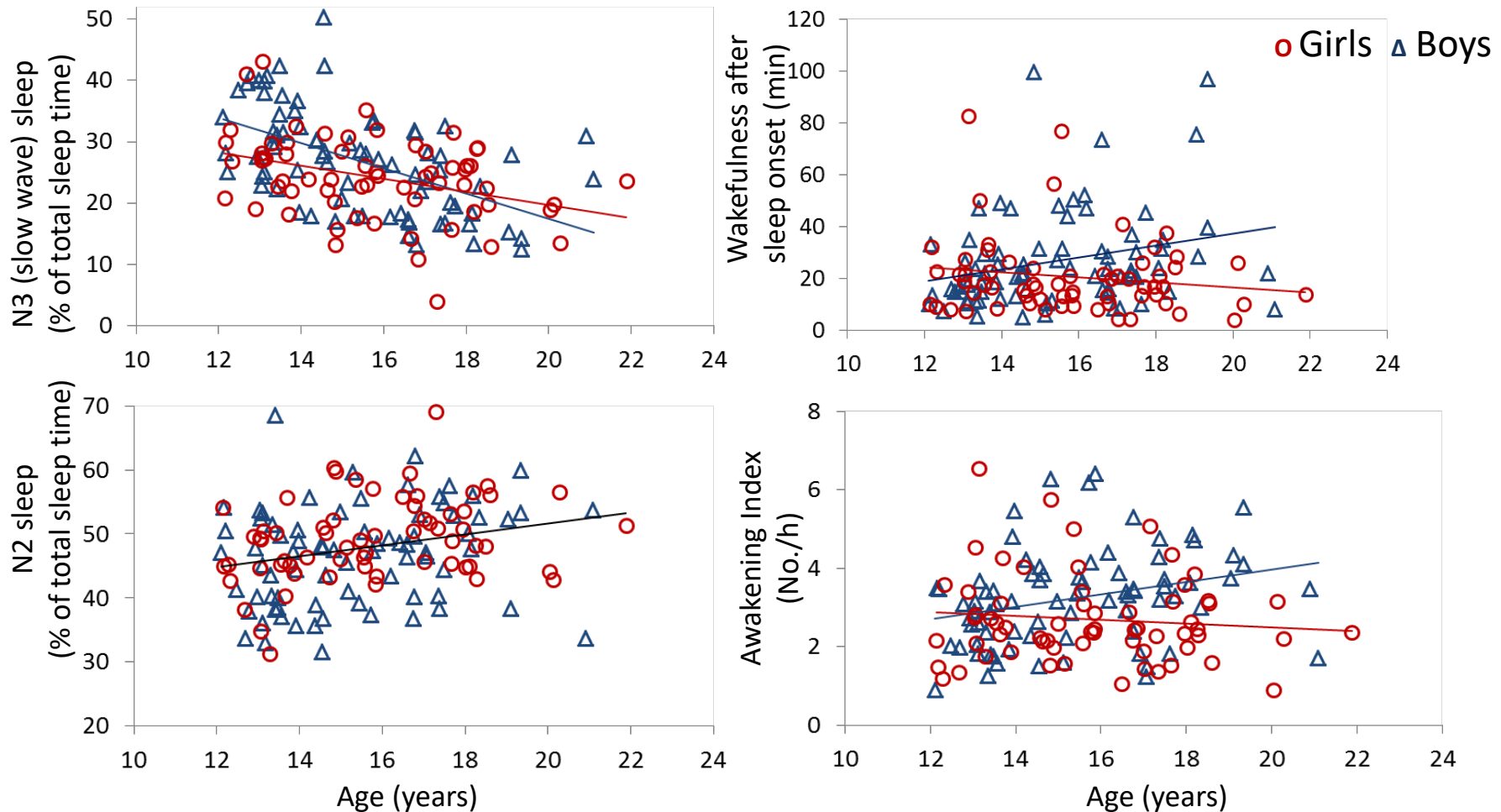
Cursor: 03:15:57, Epoch: 594 - REM



Microstructure of sleep



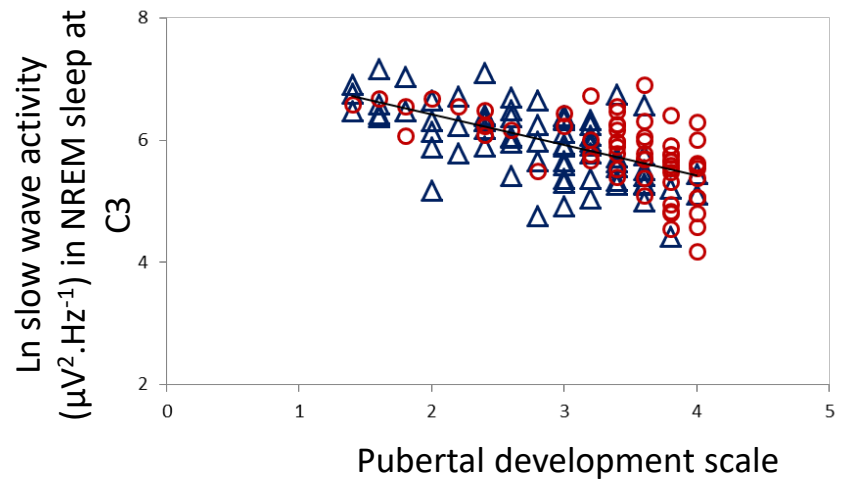
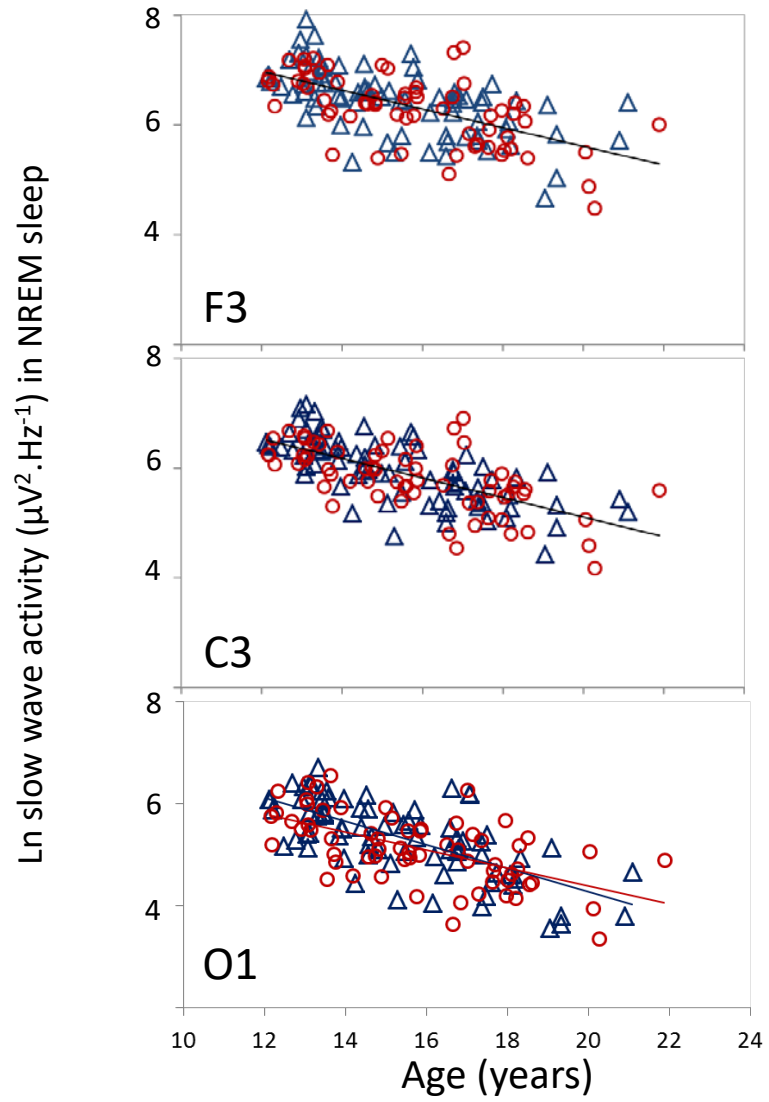
Age-related differences in sleep architecture in adolescents



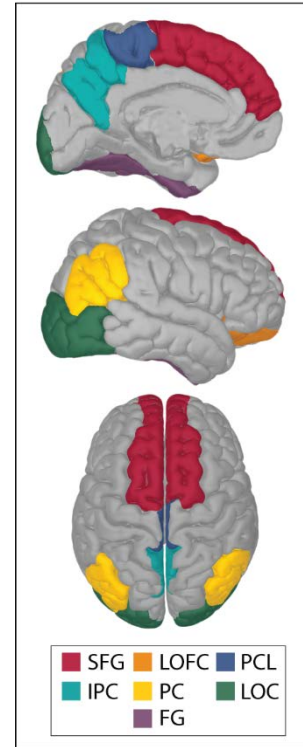
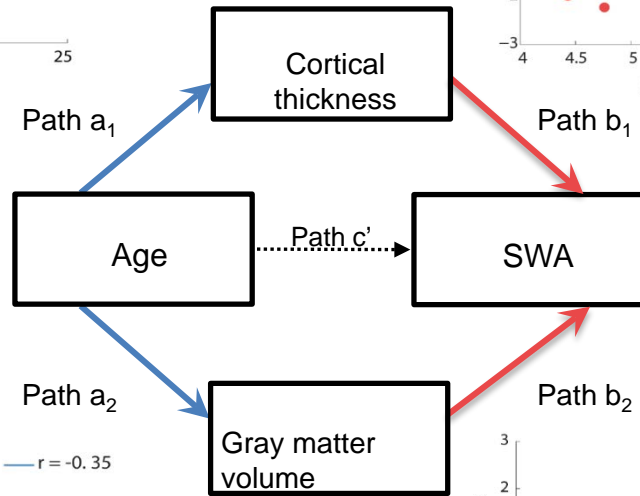
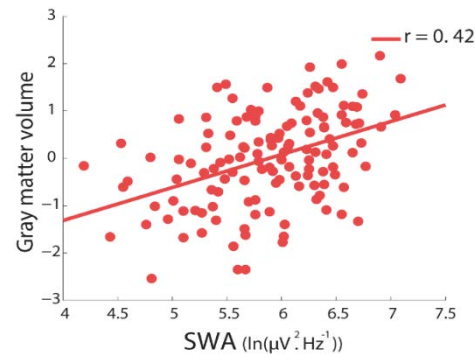
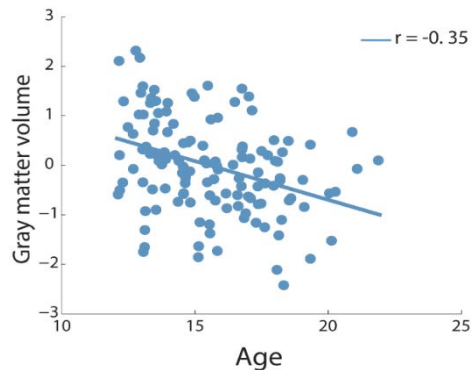
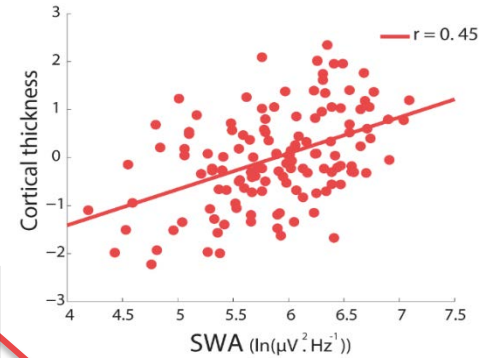
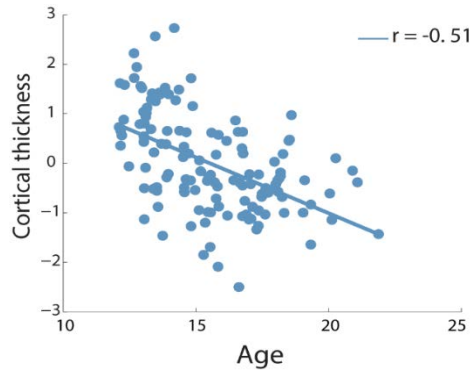
N = 141 adolescents

Baker et al., 2016

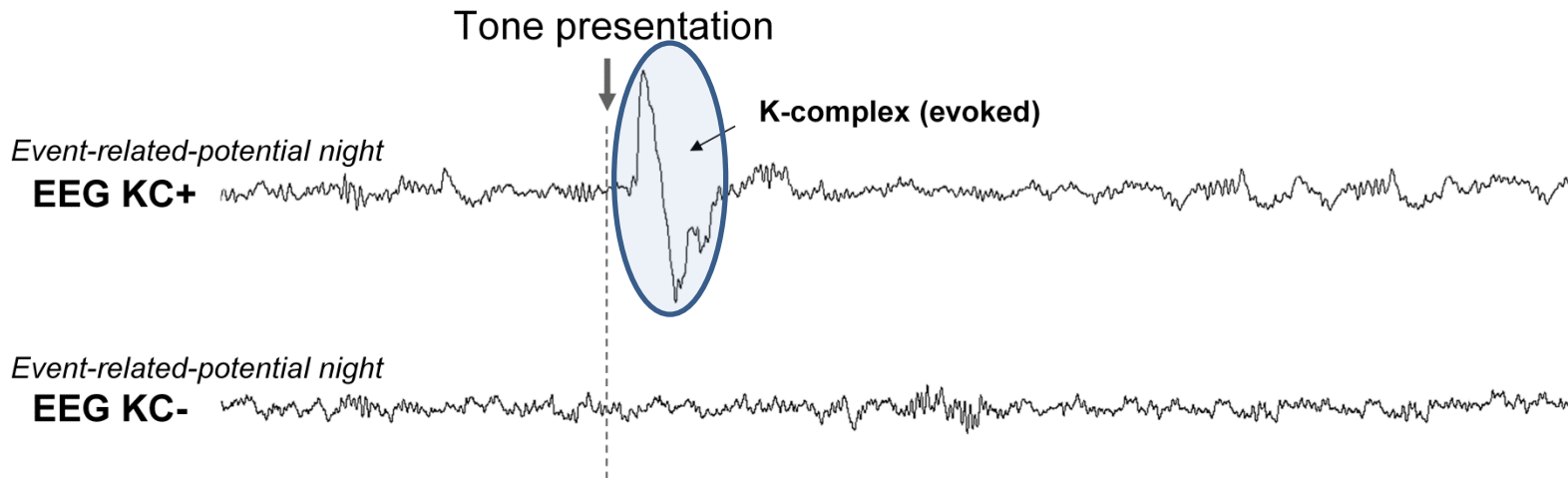
Age-related differences in sleep slow wave EEG activity in adolescents



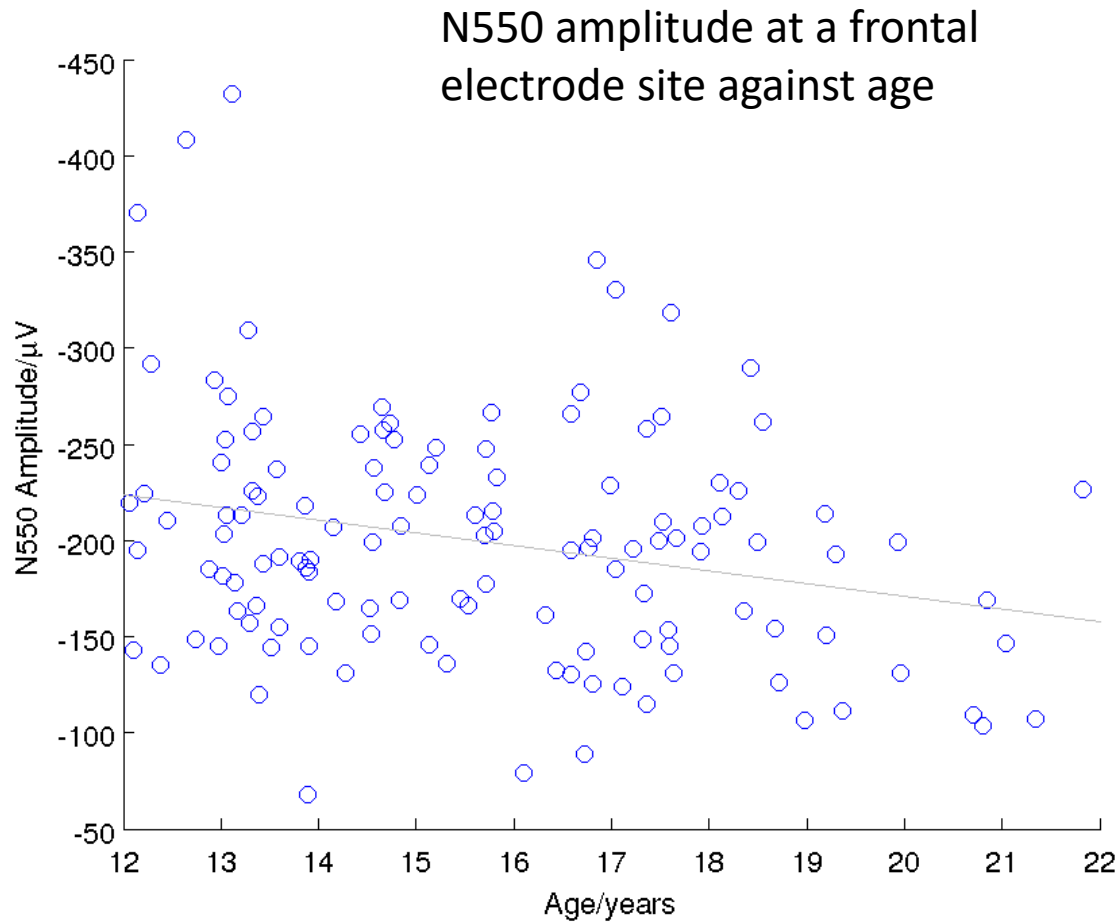
Cortical thickness and gray matter volume mediate the age-related difference in sleep slow wave activity



Experimentally evoking slow-wave K-complexes during sleep



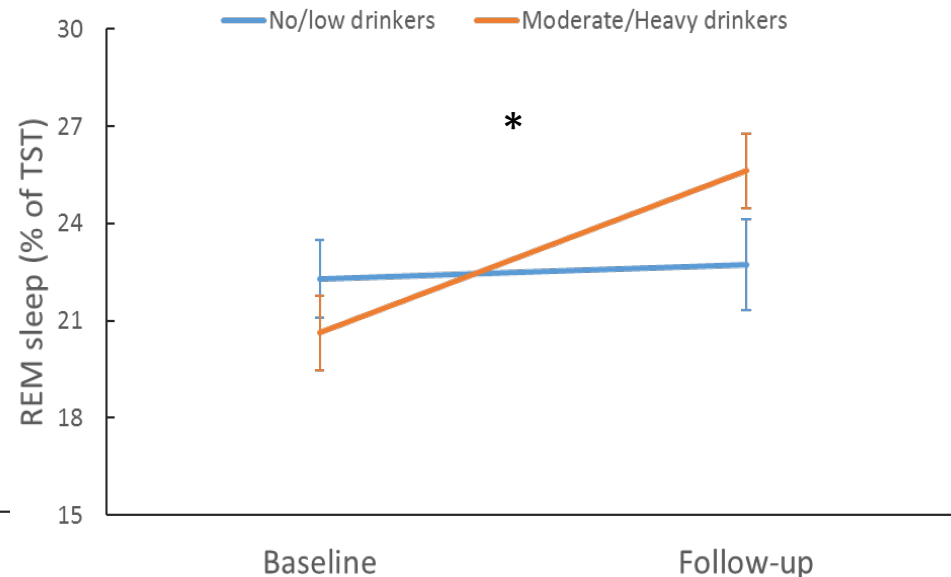
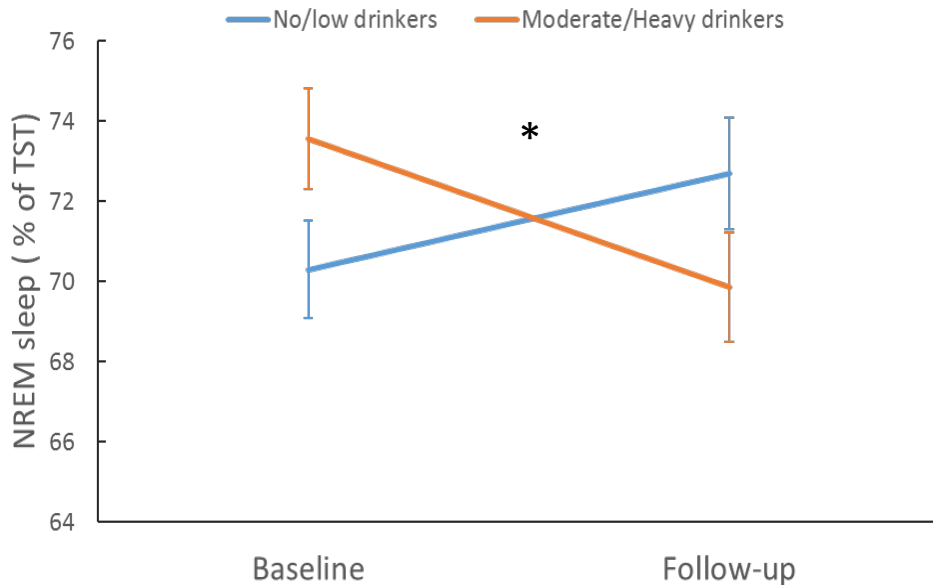
Older adolescents have smaller amplitude of evoked slow-wave K-complexes than younger adolescents



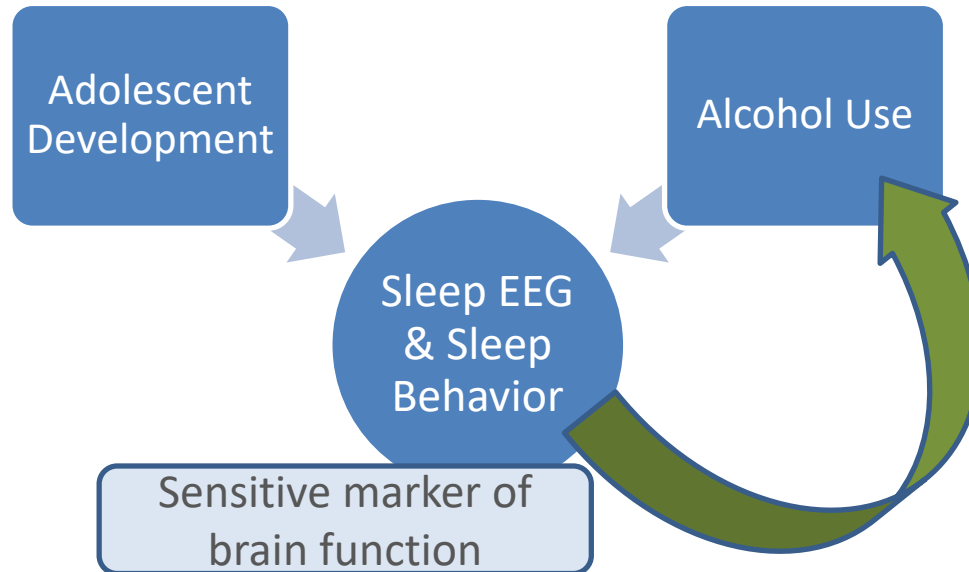
Transition to alcohol use: Impact on sleep architecture



Follow-up drinking patterns (mean (SD))	No/low drinkers (n = 18)	Moderate/heavy drinkers (n = 17)
Number of drinking days in past year	< 1	31 (48)
Average number of drinks per time	< 1	4.4 (2.3)
Largest number of drinks at one time	< 1	6.4 (2.8)



Sleep behavior and risk for drug and alcohol use



Shibley et al., J Psychiat Prac 2008; Wong et al., Alcohol Clin Exp Res 2015;
Roberts et al., J Adolesc Health 2008; Hasler and Clark, Alcohol Clin Exp Res 2013



NCANDA Sleep Behavior Metrics

N = 729 adolescents (12 – 21.9 years)

Sleep Quality

- Pittsburgh Sleep Quality Index (Buysse et al., 1989)
- During the past month, how would you rate your sleep quality overall? (Very good – Very bad)

Daytime sleepiness

- Cleveland Adolescent Sleepiness Questionnaire (Spilsbury et al., 2007)
- In the morning when I am in school, I fall asleep (Never – Always)

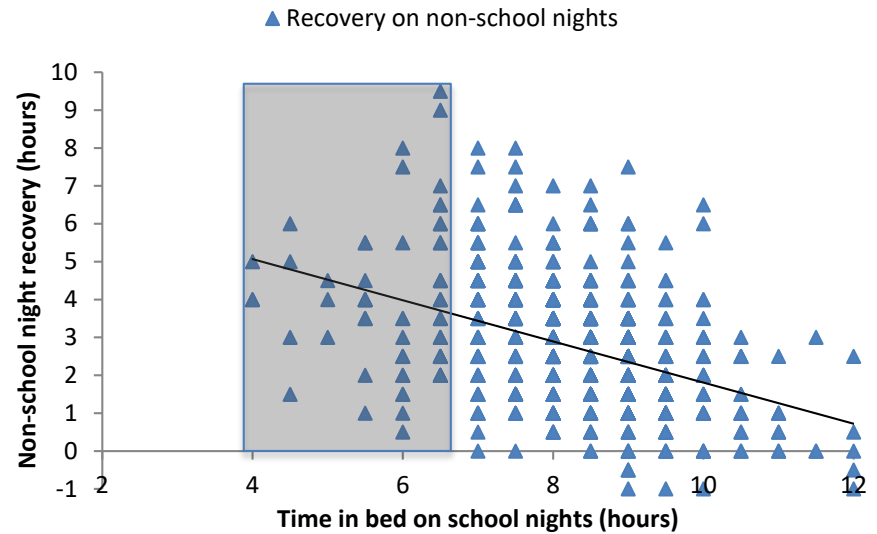
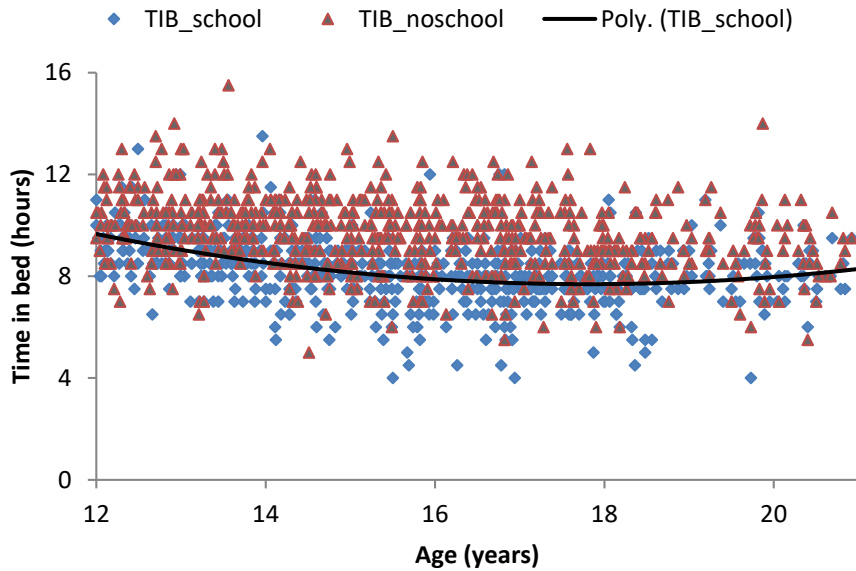
Chronotype

- Composite Scale of Morningness (Smith et al., 1989)
- One hears about “morning” and “evening” types of people. Which ONE of these types do you consider yourself to be? (Extreme evening – Extreme morning)

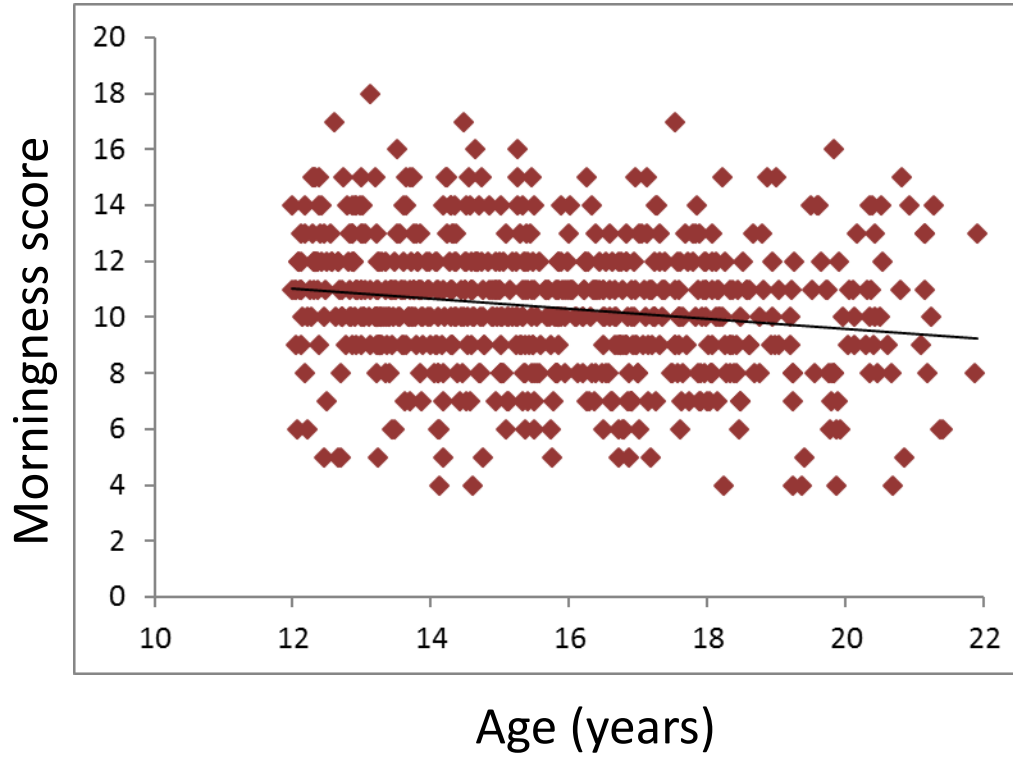
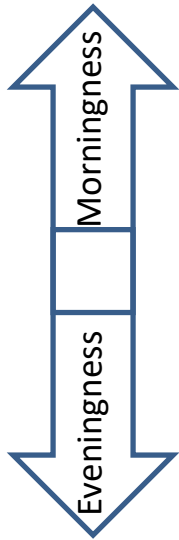
Sleep Behavior

- Bedtimes and Wakeup times
- Weekdays and weekends

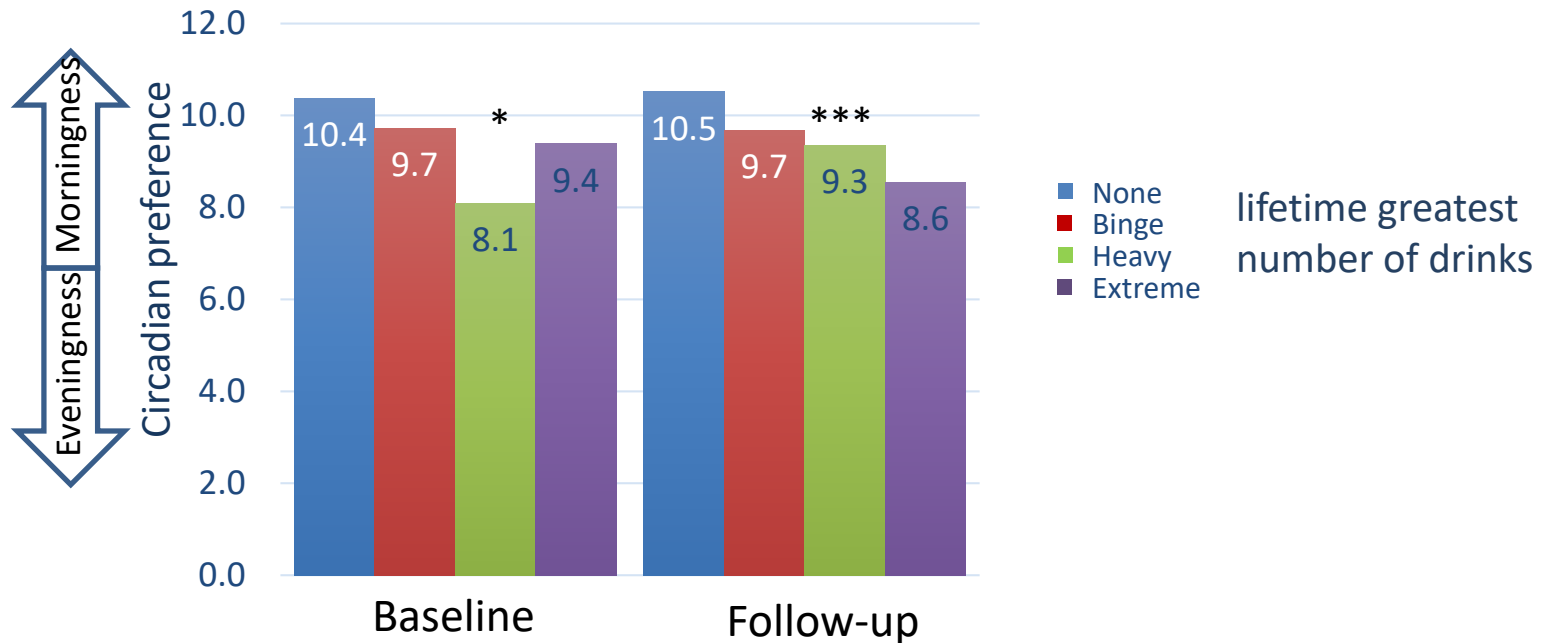
NCANDA Baseline Sleep Data: Time in Bed



Chronotype

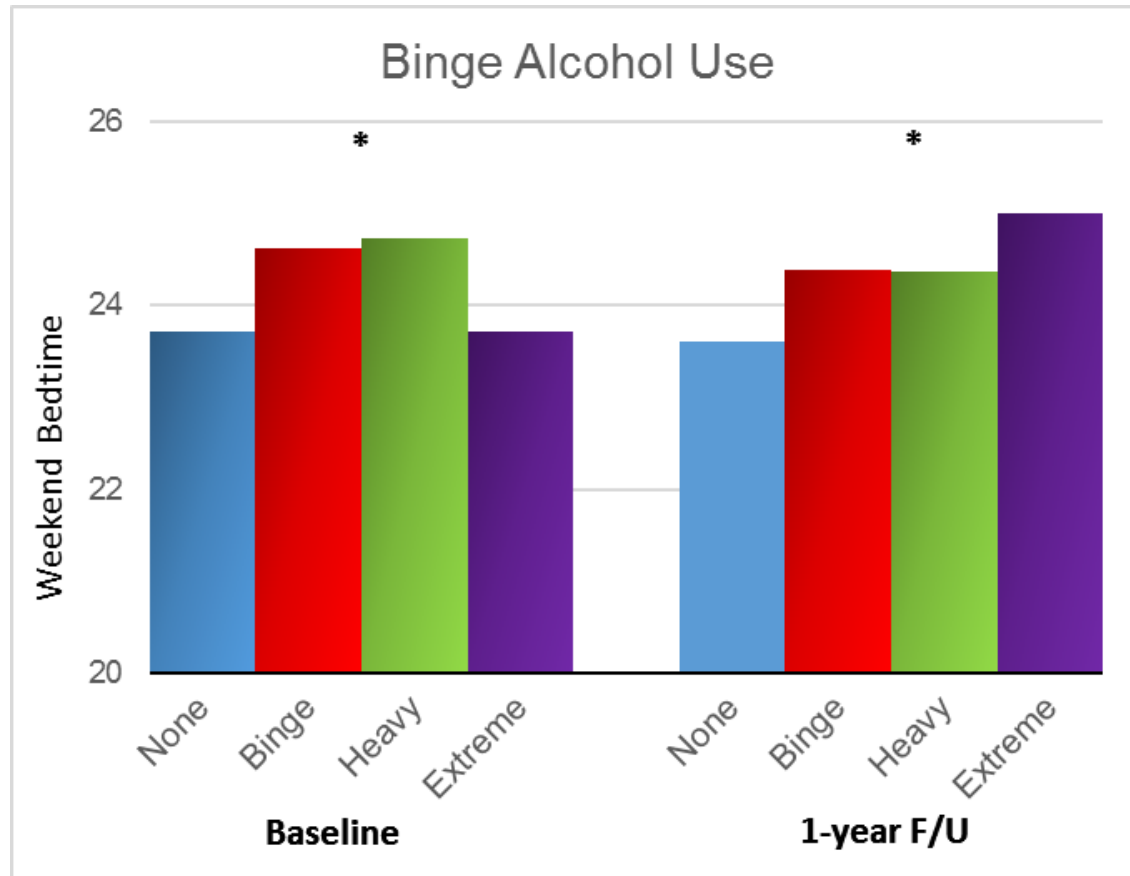


Greater eveningness predicts Binge Alcohol Use

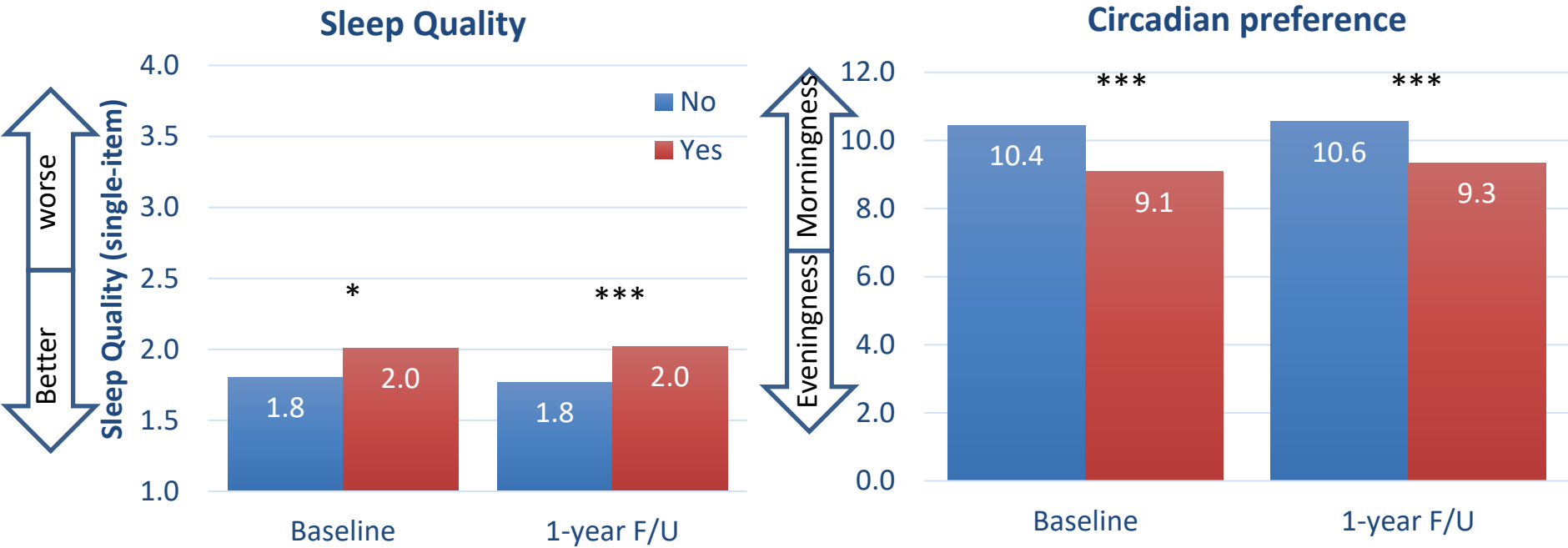
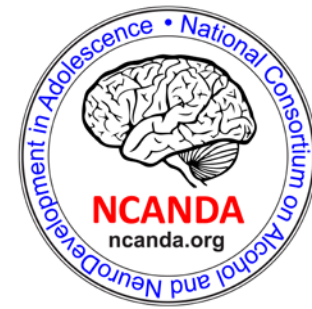


covariates: age, race, ethnicity, SES. Also,
baseline substance use for 1-year F/U model

Later bedtimes predicts Binge Alcohol Use



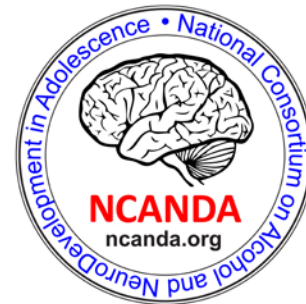
Sleep and Past-Year Marijuana Use



Summary



- There are dramatic age-related differences in sleep architecture and sleep behavior across adolescence, with some differences between boys and girls.
- Brain structural measures partially mediate the age-related difference in slow wave activity during sleep.
- Preliminary data suggests that transitioning to alcohol use impacts sleep architecture.
- Poorer sleep quality and later sleep timing (preferred and “actual”) show cross-sectional and longitudinal associations with risky substance use.
- Future longitudinal analyses will be aimed at further understanding the bidirectional relationship between sleep and alcohol use during this sensitive developmental period.



NCANDA FUNDING:
NIAAA • NIMH •
NICHD • NIDA

