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Introduction

Energy-dense and nutrient-poor foods are prevalent in the average American diet (1,2). Growing body of evidence suggests that food choices and BMI are related to sleep habits (3). Previous research has identified a relationship between short sleep duration (<6hrs) and obesity among young adults (4) as well as high consumption of fat (5).

There is limited research looking at the sleep habits of young adults and their intake of energy dense vs. nutrient dense foods. Examining when adolescents sleep rather than the total hours of sleep may elucidate new relationships between sleep behaviors and dietary choices.

Objectives

- To test the hypothesis that college students with late sleep midpoints consume more energy dense foods as compared to students with early sleep midpoints.
- To explore the relationship between sleep midpoint and food choices.

Methods

Subjects

Participants 18-24 years old enrolled in the ongoing College Health and Nutrition Assessment Survey (CHANAS) (6) were emailed an eighteen question survey in the fall of 2012 (UNH IRB #3329, 5524). One hundred fifty-six students completed the survey; a total of 146 students were included in the final analysis after removal of outliers and students with missing data.

Sleep Questionnaire

Reported weekday and weekend sleep times were used to estimate total hours of sleep and midpoint of sleep time (hours of sleep/2 + sleep onset time).

Nutrient Analysis

Students’ self-reported 3-day food record were analyzed for intake of nutrients, energy, and total weight of foods eaten using DietAnalysis Plus 10. Average energy density of the diet was calculated by dividing total calories (kcal) by grams.

Empty Calories

Empty calories were defined according to USDA MyPlate guidelines and often come from added sugars or fat in foods; they are defined as calories available in a person’s daily intake once nutrient needs have been met (7). Recommended discretionary calories for females and males age 19-30 are 267-362 and 362-512 kcal, respectively (8).

Statistical Analysis

Subjects were divided into 3 groups based on midpoint sleep time. Data were analyzed via ANOVA (SPSS V. 21). Covariates include gender and BMI. Data are presented as means ± SEM. Differences between tertiles were considered significant when p<0.05.

Results

Subject Characteristics by Sleep Midpoint

<table>
<thead>
<tr>
<th></th>
<th>Early n= 53</th>
<th>Average n= 40</th>
<th>Late n = 53</th>
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</thead>
<tbody>
<tr>
<td>Males/Females (%)</td>
<td>40/60</td>
<td>27/73</td>
<td>33/67</td>
</tr>
<tr>
<td>Age (years)</td>
<td>19.1±0.2</td>
<td>19.0±0.2</td>
<td>18.8±0.2</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>22.9±0.5</td>
<td>23.5±0.6</td>
<td>23.4±0.5</td>
</tr>
<tr>
<td>Sleep Hours</td>
<td>8.2±0.2ᵃ</td>
<td>8.5±0.2ᵃᵇ</td>
<td>8.8±0.2ᵇ</td>
</tr>
<tr>
<td>Sleep Midpoint (time)</td>
<td>03:06</td>
<td>03:54ᵃ</td>
<td>04:54ᵃᵇ</td>
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</tbody>
</table>

*vs. Early; *vs. Average

Nutrient Intake

<table>
<thead>
<tr>
<th></th>
<th>Early</th>
<th>Average</th>
<th>Late</th>
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</thead>
<tbody>
<tr>
<td>Sugar (g)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Fat (g)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sat Fat (g)</td>
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<td></td>
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<tr>
<td>MUFA (g)</td>
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*vs. Early & Average

Sleep Midpoint & Total Hours of Sleep

<table>
<thead>
<tr>
<th>Hours of Sleep</th>
<th>Early</th>
<th>Average</th>
<th>Late</th>
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<tbody>
<tr>
<td>7</td>
<td></td>
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<tr>
<td>10</td>
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</table>

*vs. Early

Summary

- As compared to those with an earlier sleep midpoint, students with a later sleep midpoint consumed more:
  - Empty calories (569 vs 730 kcal, p=0.03)
  - Total fat (61.4 vs 71.1 g, p=0.02)
  - Saturated fat (19.7 vs 24.9 g, p<0.01)
  - Monounsaturated fat (15.1 vs 20.7 g, p=0.01)
- Subjects with later sleep midpoints tended to consume more energy dense diets
- No difference observed between total sleep and total carbohydrate intake
- Those with a later sleep midpoint reported the greatest total hours of sleep

References


Acknowledgements:

NH Agricultural Experiment Station (NAEXES), Leah Tully, Christie Mastrianos, Danielle Dubke
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CHANAS

An ongoing research project at the University of New Hampshire studying the health status of students age 18-24 years. Information collected from students includes anthropometric and biochemical measurements, clinical data, self-reported dietary intake, and fitness level. Introductory nutrition students who had given informed consent and had anthropometric measurements and three-day dietary recall information collected were included.