

9-1-2017

Weight Gain and Decreased Sleep Duration in First-Year College Students: A Longitudinal Study

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Tucker, Robin M.; Leone, Ryan J.; Morgan, Amy L.; and Ludy, Mary-Jon, "Weight Gain and Decreased Sleep Duration in First-Year College Students: A Longitudinal Study" (2017). *Public and Allied Health Faculty Publications*. 18.

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Learning Objective: Participants will be able to explain how both decreased diet quality and decreased sleep duration additively contribute to weight gain in first-year university students.

Background: Among college students, alterations in sleep and diet quality are common, and the propensity for weight gain is well established. The role of sleep duration during periods of rapid weight gain is understudied.

Objective: This study explored the relationships between sleep duration, diet quality, and body composition in college freshmen.

Design: A longitudinal, observational design was used. Laboratory testing occurred during the beginning of the fall and spring semesters. Anthropometric measures included weight, height, and percent body fat (%BF). Survey questions assessed sleep and diet quality.

Results: As a group, participants (N = 61) gained weight (1.9 ± 2.2 kg) over the 4.5-month period of study. The amount of weight gained did not differ by sex, so data were pooled. Participants were grouped into quartiles based on weight change at follow-up. No differences between weight, BMI, %BF, sleep duration, or diet quality existed at baseline. Sleep duration decreased (6.9 ± 0.9 to 6.5 ± 1.2 h, $p = 0.047$) among those in the top quartile of weight gain (4.8 ± 1.7 kg); whereas, no changes were noted in the other quartiles. Diet quality decreased among participants in the top two quartiles compared to baseline ($p < 0.046$ for both).

Conclusions: Participants who gained the most weight slept significantly less compared to baseline reports and also experienced decreases in diet quality. These combined changes were not observed in other quartiles. Combining diet and sleep education may increase effectiveness of interventions designed to mitigate weight gain in this high-risk population.

Funding Source: This project was supported by the DuPont Nutrition & Health/Academy of Nutrition & Dietetics Research DPG Pilot Grant Program, the USDA National Institute of Food and Agriculture, and Michigan AgBioResearch.

Weight Gain and Decreased Sleep Duration in First-Year College Students: A Longitudinal Study

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Abstract

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Introduction

Few longitudinal studies have examined relationships between sleep duration and weight or body composition in college students, and findings are mixed.¹⁻³ Differences in study duration and design could explain discrepant findings.

Purpose of the study: to examine relationships between self-reported sleep duration, diet quality, and body composition over the course of an academic semester in first-year university students (late August/early September – January).

Primary hypothesis: students reporting the least amount of sleep would gain the most weight and most body fat over the study's time course.

- Secondary hypothesis:** diet quality would decrease in those who gained the most weight, given the associations between poorer diet quality and obesity.⁴

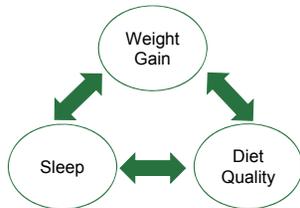
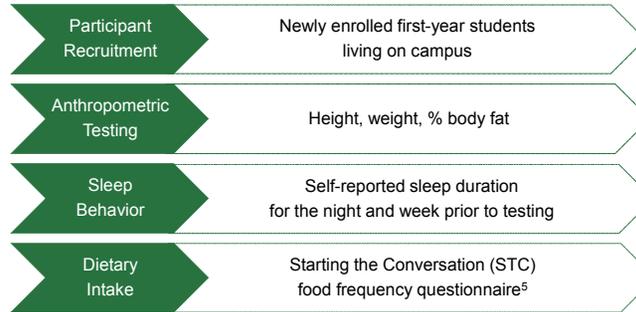


Fig. 1 Previously established relationships between weight gain, sleep, and diet quality.

Methods



Results

- Participants: N = 61, 82.0% female; average age 18.1 ± 0.3 years.
- Majority reported sleeping ≥ 7 h per night the week prior to testing (N = 42, 68.9%), and a similar number reported sleeping ≥ 7 h the night before testing (N = 41, 67.2%).
- No differences in sleep duration or diet quality by sex at baseline (Table 1).

	All (n = 61)	
	Baseline	Follow-Up
BMI (kg/m ²)	22.9 ± 3.8	23.6 ± 4.1*
% Body Fat	24.5 ± 9.6	27.1 ± 9.1*
Weight Δ (kg)	-	1.9 ± 2.2*
Sleep: last night (h)	7.1 ± 1.3	7.1 ± 1.1
Sleep: avg last 7d (h)	7.1 ± 0.9	7.3 ± 1.3
Diet Quality (STC)	7.3 ± 2.1	9.1 ± 3.3*

Table 1. Anthropometric, sleep, and diet quality characteristics of participants by sex at baseline and follow-up. Significant changes within groups are denoted by * (p < 0.05). Increased diet quality scores reflect a poorer quality diet.

Quartile	N, males	Weight gained (kg)	Sleep duration (h)	p-value
1	14, 2	-0.7 ± 0.8	7.2 ± 1.2	0.176
2	16, 2	0.9 ± 0.4	7.4 ± 0.9	0.007
3	15, 3	2.3 ± 0.5	7.5 ± 0.9	0.011
4	16, 4	4.8 ± 1.7	6.5 ± 1.1	-

Table 2. Average weight change and sleep duration at follow-up by quartile. Quartile 1 lost weight; whereas, quartiles 2-4 gained weight between the two testing time points. Self-reported average sleep duration during the week prior to testing differed by quartile. P-values identify significant differences in sleep duration compared to Q4.

Results (continued)

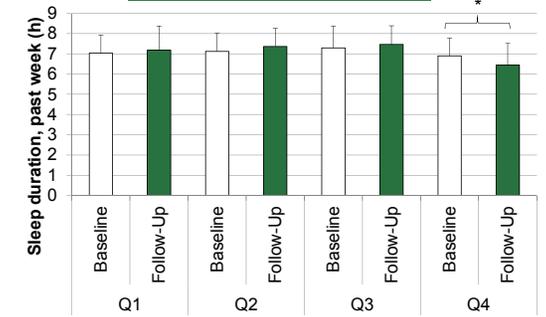


Fig. 2 Average reported sleep duration over the past week by weight gain quartile. Sleep duration differed between baseline and follow-up testing only among participants who gained the most weight, with sleep duration decreasing significantly over time (p=0.047).

- Diet quality did not differ between quartiles at baseline.
- Diet quality significantly worsened in both Q3 (8.5 ± 3.1, p = 0.046) and Q4 (10.4 ± 3.7, p = 0.003) participants at follow-up.
- Diet quality did not significantly differ between quartiles at follow-up; but Q4 had the highest score.

Conclusions

- Reduced sleep duration and decreased diet quality resulted in the largest increase in body weight and body fat over a 4.5-month period.
- The greatest amount of weight gain occurred among those not meeting national recommendations for sleeping at least 7 h/night over the previous week.
- To prevent significant weight gain, protecting sleep time and maintaining diet quality should be emphasized by nutrition and public health professionals working with this vulnerable population.

References & Acknowledgements

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Funding: This work was funded by the DuPont Nutrition & Health/Academy of Nutrition and Dietetics Research DPG Early Career Research Scientist Pilot Grant Program (RMT, MJL), the USDA National Institute of Food and Agriculture (RMT), and Michigan AgBioResearch (RMT).