Eating Behaviors 19 (2015) 15–19

Contents lists available at ScienceDirect

Eating Behaviors

Relationships of eating competence, sleep behaviors and quality, and overweight status among college students

Virginia Quick [a,*], Suzanne Shoff [b], Barbara Lohse [c], Adrienne White [d], Tanya Horacek [e], Geoffrey Greene [f]

[a] Department of Health Sciences, James Madison University, 801 Carrier Drive, MSC 4301, Harrisonburg, VA 22802, USA
[b] Department of Nutritional Sciences, University of Wisconsin-Madison, Madison, WI, USA
[c] Nutritional Sciences, The Pennsylvania State University, University Park, PA, USA
[d] Food Science and Human Nutrition, University of Maine, Orono, ME, USA
[e] Department of Public Health, Food Studies and Nutrition, Syracuse University, Syracuse, NY, USA
[f] Department of Nutrition and Food Sciences, University of Rhode Island, Kingston, RI, USA

ARTICLE INFO

Article history:
Received 11 January 2015
Received in revised form 23 April 2015
Accepted 24 June 2015
Available online 2 July 2015

Keywords:
Eating
Sleep
Behavior
College
Students

ABSTRACT

Little is known about the relationships between eating competence (intra-individual approach to eating and food-related attitudes and behaviors that entrain positive bio-psychosocial outcomes) and sleep behaviors and quality in college students, a high-risk group for poor eating habits, weight gain, and inadequate sleep. Thus, data from full-time college students ($N = 1035$; 82% White; 61% female) aged 18–24 years from 5 U.S. universities were obtained from online questionnaires (eating competence (ecSI), Pittsburg Sleep Quality Index (PSQI), physical activity, demographics) and physical assessments (measured height, weight), to explore sleep behavior and quality between eating-competent (EC; ecSI score ≥ 32) and non-EC groups (ecSI < 32). Generalized linear models controlling for gender, body mass index, and physical activity were utilized. A higher proportion of those in the EC group reported adequate sleep quality (67% vs. 57% in non-EC, $p = 0.001$), sleep duration of ≥7 h nightly (58% vs. 50% in non-EC, $p = 0.007$), and infrequent daytime dysfunction (72% vs. 65% in non-EC, $p = 0.02$). When ecSI scores were grouped as tertiles, those in the highest tertile reported a higher prevalence of no sleep disturbances (7% vs. 2% in the lowest ecSI tertile, $p = 0.006$) and lower prevalence of sleep medication use (10% vs. 15% in the lowest ecSI tertile, $p = 0.04$). Results suggest that competent eaters are more likely to have better overall sleep quality and fewer sleep-related issuescompared to less competent eaters. These findings may inform future longitudinal studies, and health promotion and weight management interventions for young adults.

1. Introduction

Lack of sleep is a major public health concern because it is associated with several health problems such as hypertension, diabetes, and obesity (Institute of Medicine, 2006). Although the Centers for Disease Control and Prevention recommend adults to sleep at least 7 h per night (Centers for Disease Control & Prevention, 2015) more than 40 percent of U.S. adults report sleeping less than 7 h per night on weekdays (National Sleep Foundation, 2011), and this percentage has increased over the last 30 years (Centers for Disease Control & Prevention, 2005). Concurrently, unhealthy eating behaviors and rates of obesity have increased over this same time period (Drewnowski & Popkin, 1997; Ogden, Fryar, Carroll, & Flegal, 2004).

Indeed, cross-sectional and prospective studies have found that adequate sleep is positively associated with health-related behaviors such as adopting a healthy diet among children (Moreira et al., 2010), adolescents (Al-Disi et al., 2010; Weiss et al., 2010), and adults (Grandner, Kripke, Naidoo, & Langer, 2010), and inadequate sleep is negatively associated with health-related behaviors (Quick et al., in press). For example, among college students in whom sleep deprivation is common (Lund, Reider, Whiting, & Richard, 2010), inadequate sleep (<7 h/night) was associated with negative eating attitudes, poor internal regulation of food, and binge-eating behaviors (Quick et al., in press). Individuals with less sleep are also more likely to consume energy-rich foods with higher proportions of calories from fats or refined carbohydrates, consume lower amounts of fruits and vegetables, and have irregular meal patterns than those with more sleep (Al-Disi et al., 2010; Grandner et al., 2010; Moreira et al., 2010; Weiss et al., 2010). Additionally, being overweight/obese is significantly associated with poor sleep quality and low eating competence (Quick et al., 2014) as defined by the Satter Eating Competence Model (ecSatter) (Satter, 2007a).

Eating competence, as defined by ecSatter, is an intra-individual approach to eating, and food-related attitudes and behaviors that entrains positive bio-psychosocial outcomes (Satter, 2007a). ecSatter advocates

* Corresponding author. Tel.: +1 540 568 6362; fax: +1 540 568 3666.
E-mail address: gingermquick@gmail.com (V. Quick).

http://dx.doi.org/10.1016/j.eatbeh.2015.06.012
1471-0153/

for nutrition education that emphasizes eating enjoyment, internal regulation of food intake and letting body weight be dictated by lifestyle and genetics, using skills to provide meals regularly, and eating a variety of foods for pleasure, rather than to meet dietary guidelines alone (Satter, 2007b). Prior research has found competent eaters to have better diet quality with greater intakes of fiber, most vitamins (A, C, E, B) and some minerals (magnesium, iron, zinc, potassium) (Lohse, Bailey, Krall, Wall, & Mitchell, 2012). Additionally, competent eaters have fewer risks for cardiovascular disease (Lohse et al., 2010; Psota, Lohse, & West, 2007), lower BMI, greater body weight satisfaction (Greene et al., 2011; Krall & Lohse, 2009; Lohse, Satter, Horacek, Gebreselassie, & Oakland, 2007), better sleep quality (Shoff et al., 2009), and fewer correlates with disordered eating (Krall & Lohse, 2009; Lohse et al., 2007).

To date, little is known about the relationships of eating competence with sleep behaviors and quality among young adults. The purpose of this study was to explore the associations of eating competence with sleep behavior and quality among college students.

2. Materials and Methods

2.1. Design

University partners in the United States Department of Agriculture (USDA) Multistate Healthy Campus Research Consortium participated in Project WebHealth, a 3-month nutrition and physical activity intervention at eight geographically diverse universities in the United States. Participating students were surveyed pre, post-, and follow-up (3 and 15 months). This study used baseline data to examine the relationship of sleep behavior and quality with eating competence. Additional information on the study can be found elsewhere (Greene et al., 2012).

2.2. Participants and procedures

Participants were full-time students, aged 18–24 years, enrolled at eight universities. Eligibility criteria for Project WebHealth included the following: body mass index (BMI) ≥ 18.5 kg/m^2, not nutrition or exercise science majors, free from health conditions that could interfere with diet and exercise changes, and not pregnant or lactating. This study was approved by the institutional review boards at all participating universities. Only a subset of five universities collected sleep data.

Students were recruited using a variety of methods directing potential participants to a web site for initial screening (e.g., posters, flyers, mass emails, class announcements) and were surveyed pre-, post- (3 months), and follow-up (15 months). Students meeting eligibility criteria in the initial screening provided informed consent then completed an online questionnaire including the ecSI, and made an appointment for a physical assessment (Greene et al., 2011). During the physical assessment, trained researchers conducted anthropometric assessments. At baseline, $n = 1689$ eligible participants enrolled in Project WebHealth. The sleep questionnaire (described below) was administered as a substudy at 5 of the 8 institutions. It was completed by $n = 1083$ during the physical assessments; the study sample consists of $n = 1035$ (96%) with complete baseline, eating competence and sleep data.

2.3. Questionnaires

2.3.1. Eating competence (EC)

The ecSI is a valid and reliable measure of eating competence ($\alpha = 0.81$) (Quick et al., 2014). Respondents select from 5 response options (never, rarely, sometimes, often, always), which are scored on a 4-point scale from 0 (never/rarely) to 3 (always), then summed for a total score (possible range, 0 to 48). A score greater than or equal to 32 is defined as being EC. Four scales define each EC component (i.e., Eating Attitudes [5 items], Food Acceptance [3 items], Internal Regulation [3 items], and Contextual Skills [5 items]). The Eating Attitudes scale measures the degree to which an individual has a positive and flexible orientation towards eating (score range, 0–15). The Food Acceptance scale measures inclination to try new foods and learn one's own unique food preferences (score range, 0–9). The Internal Regulation scale measures awareness of and responsiveness to cycles of hunger, appetite, and satiety (score range, 0–9). The Contextual Skills scale measures engagement with eating, ability to organize and provide routine meals and snacks (score range, 0–15) (Lohse et al., 2007; Satter, 2007a). The Ellyn Satter Institute web site provides more details on the ecSI (Satter, 2015).

2.3.2. Sleep behavior

The Pittsburgh Sleep Quality Index (PSQI) (Buysee, Reynolds, Monk, Berman, & Kupfer, 1989) was completed during the physical assessment appointment. It is a validated instrument with seven scales that assess subjective sleep quality (i.e., perception of one's own sleep quality), sleep latency (i.e., how long it usually takes to fall asleep per night), sleep duration (i.e., average number of hours of actual sleep per night), habitual sleep efficiency (i.e., actual hours of sleep versus hours spent in bed), sleep disturbances (i.e., factors that cause individuals to wake up in the middle of the night or early morning), sleep medication use (i.e., prescribed or "over the counter"), and daytime dysfunction (i.e., difficulty staying awake during the day) due to sleep quality over the past month. Traditional scoring methods were used as described by Buysee et al. (1989). That is, each of the scales is equally weighted with score ranges from 0 to 3. Scales are then summed to generate a global index score that reflects quantitative aspects of sleep (e.g., sleep duration and latency) and subjective aspects (e.g., restfulness of sleep). Global scores range from 0 to 21, with higher scores reflecting poorer sleep quality. A global score of 5 or higher is indicative of a poor-quality sleeper. The PSQI adequately differentiates between good and bad sleepers (Grandner, Kripke, Yoon, & Youngstedt, 2006). Additionally, previous research among college students has indicated that the PSQI is a reliable measure ($\alpha = 0.73$) (Lund et al., 2010).

2.3.3. Demographics and physical activity

Demographic data included self-reports of age, sex, year in school, race/ethnicity, and physical activity using the USDA exercise self-assessment categories (i.e., <30 min/day, 30–60 min/day, or ≥60 min/day).

2.4. Physical assessments

2.4.1. Anthropometrics

Participants were instructed to refrain from eating or drinking caloric beverages for 4 h and to avoid high-intensity exercise for 24 h prior to the physical assessment, and to wear light clothing. Trained research personnel used standardized procedures (Lohman, Roche, & Martorell, 1988) and measured the participants' weight (lb) and height (in.) in duplicate. Weight was measured to the nearest 1/4 lb. with a calibrated digital or balance beam scale and height was measured to the nearest 1/16 in. using a wall-mounted stadiometer. BMI (kg/m^2) was calculated and categorized (normal, 18.5 to <25 kg/m^2; overweight, 25 to <30 kg/m^2; and obese, 30 to <35 kg/m^2) (U.S. Department of Health & Human Services, 1998).

2.5. Data analysis

All analyses were performed using SPSS (version 21.0, SPSS, Inc., Chicago, IL). In the baseline sample of participants ($N = 1035$), ecSI scores were divided into tertiles and also dichotomized as EC (≥32) or not (<32). Tertile profiles were developed using analysis of variance, multiple comparison test using Scheffe's method, and chi-square for demographics and self-reported physical activity. Dichotomized ecSI scores