

# Systematic Review of Dietary Interventions With College Students: Directions for Future Research and Practice

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## ABSTRACT

**Objective:** To clarify directions for research and practice, research literature evaluating nutrition and dietary interventions in college and university settings was reviewed.

**Design:** Systematic search of database literature.

**Setting:** Postsecondary education.

**Participants:** Fourteen research articles evaluating randomized controlled trials or quasi-experimental interventions targeting dietary outcomes.

**Main Outcome Measures:** Diet/nutrition intake, knowledge, motivation, self-efficacy, barriers, intentions, social support, self-regulation, outcome expectations, and sales.

**Analysis:** Systematic search of 936 articles and review of 14 articles meeting search criteria.

**Results:** Some in-person interventions (n = 6) show promise in improving students' dietary behaviors, although changes were minimal. The inclusion of self-regulation components, including self-monitoring and goal setting, may maximize outcomes. Dietary outcomes from online interventions (n = 5) were less promising overall, although they may be more effective with a subset of college students early in their readiness to change their eating habits. Environmental approaches (n = 3) may increase the sale of healthy food by serving as visual cues-to-action.

**Conclusions and Implications:** A number of intervention approaches show promise for improving college students' dietary habits. However, much of this research has methodological limitations, rendering it difficult to draw conclusions across studies and hindering dissemination efforts.

**Key Words:** nutrition, diet, health, college, university (*J Nutr Educ Behav.* 2013;45:304-313.)

## INTRODUCTION

The transition to college can pose significant challenges to healthy eating.<sup>1</sup> Some students have difficulty with the responsibilities of purchasing and preparing their own meals and managing new eating schedules. Students also express concern about the cost of healthy food,<sup>1</sup> and they report preferring processed snacks vs fresh produce, which spoils more quickly.<sup>2</sup> Additional social and environmental factors, including limited access to healthy food and limited peer support for eating well, may negatively influence students' dietary habits.<sup>2-4</sup>

In addition to the stress associated with learning to navigate food selection and preparation, college students

are also confronted with additional stressors related to new academic challenges.<sup>5</sup> Stress, in turn, is positively associated with the intake of calorically dense, high-fat food.<sup>6</sup> Alcohol consumption also increases in college, which directly contributes to increases in overall caloric intake and is also associated with greater consumption of unhealthy food.<sup>2,7</sup>

Given all these factors, it is not surprising that the typical college student's diet is high in fat, sugar, and sodium and lacking in valuable nutrients. Indeed, the average college student consumes 1 serving of fruit, 1.5 servings of vegetables, 0.5 serving of low-fat dairy, and 1.4 servings of whole grains daily.<sup>2,8</sup> These values are significantly lower for some men and

nonwhite students,<sup>9</sup> are drastically below dietary recommendations,<sup>10</sup> and continue to decrease over the course of students' first year of college.<sup>7</sup>

College students' eating habits are concerning because poor nutritional intake is associated with a number of negative health outcomes, including weight gain, or the "freshman 5," chronic diseases, and increased health care costs.<sup>11,12</sup> Indeed, results from a prospective longitudinal study suggest that men and women in their first year of college gain weight more rapidly than the average American at the same age.<sup>12</sup> Thus, these young adults' dietary habits might have significant long-term implications. As such, the transition to college represents a critical time period for dietary intervention. Nonetheless, research regarding the efficacy of interventions to promote healthy eating among college students is extremely limited. As a result, these interventions are implemented in the absence of clear empirical guidance. The aim of this research was to conduct a systematic review<sup>13</sup> to facilitate a narrative synthesis of the literature evaluating nutrition

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and dietary interventions in college/university settings to identify specific programs and programmatic factors associated with healthful changes in students' dietary habits. Results are intended to inform the development of more effective intervention efforts and provide directions for future research.

## METHODS

### Literature Search

The current systematic review was conducted based on guidelines presented by the Institute of Medicine.<sup>13</sup> PubMed/Medline and PsycInfo were searched for relevant studies published within the past 10 years (ie, between January 2001 and June 2011). The following key words were used: "college," "university," "nutrition," "diet," "program," "education," "intervention," "fiber," "fat," "whole grains," "fruits," "vegetables," "sugar," and "soda."

### Inclusion and Exclusion Criteria

Criteria for inclusion in this review were studies that evaluated the efficacy of an intervention, program, or educational course intending to improve the dietary or nutrition habits of college/university undergraduate students. Appropriate outcomes included intake (actual or self-reported) of food and/or beverages, such as fruit, vegetables, whole grains, soda, and various nutrient groups (eg, fat, fiber, calories), as well as secondary indicators of dietary intake (eg, food selected or purchased). Studies were excluded if the intervention's primary goal was to address other outcomes, including weight or body mass index, or if the study focused on a specific subgroup of the college population (eg, medical students).

Initially, it was the intent of this study to review the results of randomized controlled trials (RCTs). However, initial searches yielded only 6 studies;<sup>14-19</sup> thus, the review was broadened to include quasi-experimental and nonexperimental designs. Studies selected for this review included those with human participants, written in English, and published in full-text format in peer-reviewed journals. Because of international differences in university systems, the authors limited the search

to studies conducted in the United States.

### Selection Process

Titles and abstracts from the preliminary search were retrieved and reviewed for relevancy. Full articles of relevant studies were retrieved for further review. Two authors assessed the retrieved studies for inclusion based on the criteria listed above. Inconsistencies were resolved between authors. A table summarizing included studies was composed (Table), describing: design, description of approach, theoretical approach, number of participants, duration, follow-up evaluations, dietary/nutrition outcomes, and a summary of key findings.

## RESULTS

In total, 936 abstracts were identified through the initial search. Upon review, 34 papers were retrieved for further examination, of which 14 met inclusion criteria.<sup>14-27</sup> Six of the included studies were RCTs, 1 was quasi-experimental, and 7 were non-experimental. The most frequent reasons articles were excluded were that they did not include undergraduate college/university students; did not report results of an intervention, program, or educational course; and/or were conducted outside of the United States. The Figure outlines the search process.

### Overview of Studies

Interventions were conducted using 1 of 3 approaches: in-person (n = 6),<sup>15,18,20-22,24</sup> online (n = 5),<sup>14,16,17,19,23</sup> or environmental/point-of-purchase (POP) messages (n = 3).<sup>25-27</sup> Because of the diversity of theoretical approaches, measured outcomes, study design, and intervention duration (Table), a meta-analysis was not possible. Therefore, a qualitative assessment of the current evidence stratified by intervention approach is presented.

### Intervention Approach

*In-person interventions.* Ha et al examined the impact of a nutrition education class on dietary intake.<sup>20-22</sup> Classes met 3 times per week for 50

minutes and included personalized and interactive activities based on participants' food logs, in addition to tasting activities, general nutrition information, and goal setting. Three-day food logs revealed positive dietary changes, including increases in fruit, vegetable, whole grain, and skim milk consumption; decreases in soda consumption; and increases in nutritional knowledge (Table). However, without a control group, it is impossible to determine whether these changes were a result of the intervention or the result of social desirability bias or other confounding variables.

Another limitation of this study is the inability to determine which intervention components were effective in promoting dietary change. Another study addressed this limitation by using a dismantling approach (ie, various intervention components were evaluated independently) to determine their effectiveness in promoting fiber intake among students enrolled in a nutrition course.<sup>18</sup> Students were assigned to 1 of 4 four-week groups: (1) goal setting only; (2) self-monitoring only; (3) goal setting and self-monitoring combined; or (4) no self-regulation components. Students in a separate health class served as the control group. Findings suggested that participants who were taught both self-monitoring and goal setting, compared with those taught 1 or fewer self-regulation skills, reported the greatest increases in dietary fiber intake.<sup>18</sup>

Hekler et al indirectly targeted students' eating habits via a food production and social issues course.<sup>24</sup> Rather than focusing specifically on diet, this course reviewed social, environmental, and policy topics associated with food. The dietary intake of students enrolled in this course was compared with that of students enrolled in health-focused courses at the beginning and the end of the semester. At posttesting, students in the social issues course reported increased vegetable consumption and decreased intake of high-fat dairy. In contrast, students in the health courses reported reductions in their vegetable intake; no additional within-group dietary changes were noted. However, because students were not randomly assigned to these classes, pre-group differences may have influenced outcomes.

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