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Comparison of environmental supports to a healthy lifestyle on the UNH campus with student behaviors

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Abstract

Background: Environmental factors play a large role in shaping diet and lifestyle behaviors. Creating a college campus environment conducive to healthy dietary choices and physical activity may promote student health.

Objective: The objective of this study was to explore and describe the availability of environmental supports for a healthy lifestyle on the UNH campus and student behaviors.

Design: The Healthy Campus Environmental Audit (HCEA), a comprehensive tool developed by a USDA multi-state research team led by Syracuse University, was implemented to measure the availability of healthy options in dining establishments (n=12) and the adequacy of recreation facilities (n=3) and walking/biking paths (n=28) on the UNH campus. Results from the HCEA were compared to student behaviors, as reported by the College Health and Nutrition Assessment Survey (CHANAS), an ongoing cross-sectional project at UNH. The main outcomes of the HCEA included the availability of fruit and vegetable options in dining establishments and adequacy of recreation facilities and walking and biking paths. The main outcomes of CHANAS included students' reported fruit and vegetable intake and amount of fruit and vegetable intake per week.

Results: Fruit and vegetable options were more frequently available in UNH-affiliated venues than non-UNH-affiliated venues (≥ 2 fruit and ≥ 3 vegetable options in 50% of UNH-affiliated venues and ≥ 1 fruit and ≥ 1 vegetable option in 10% non-UNH-affiliated venues). One-third and one-half of students reported consuming ≥ 2 cups of fruit and $\geq 2 \frac{1}{2}$ cups vegetables, respectively, per day. UNH students reported a mean of 5.0 hours of vigorous activity, 4.3 hours of moderate activity, and 10.6 hours of walking per week.

Conclusion: Walking/biking paths and recreation facilities are adequate to support recommended physical activity levels. However, fruit and vegetable options in dining establishments on the UNH campus may not be adequate to help students meet MyPlate recommendations.

Keywords

Environment, health, behavior, diet, exercise, CHANAS

Subject Categories

Community Health and Preventive Medicine

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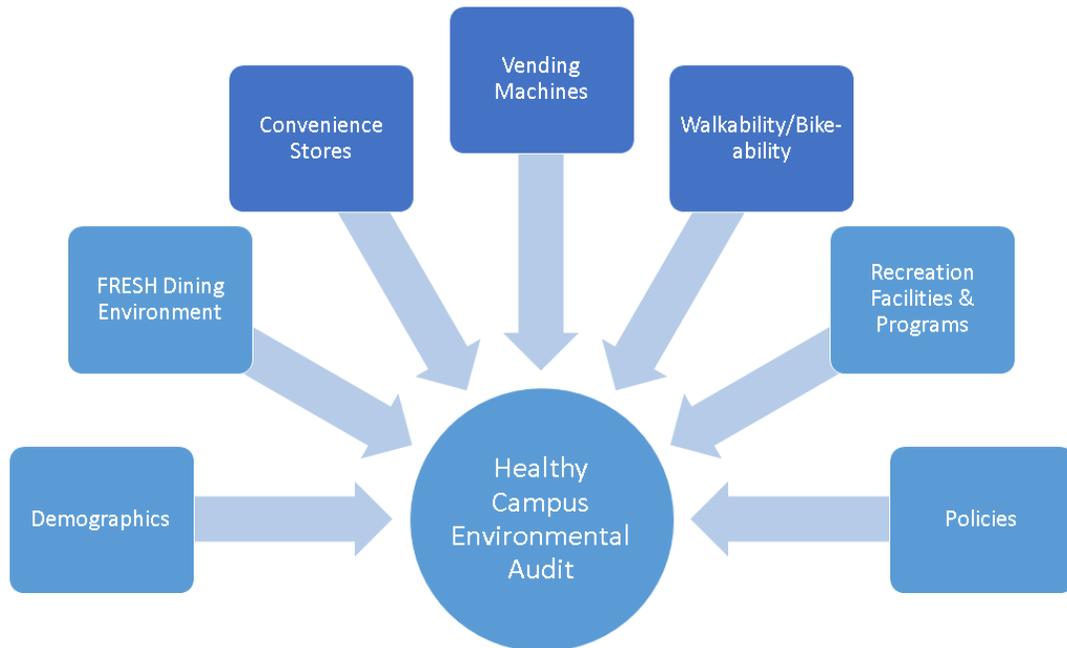
Introduction

Obesity affects 17% of youth ages 2-19 and nearly 40% of adults (1). These rates are concerning, given the increased risk of comorbidities associated with obesity, such as cardiovascular disease and type 2 diabetes (2).

Young adulthood is a critical time for developing healthy behaviors, as habits formed during this time tend to persist throughout life (3). College is a time of change where many students are leaving home for the first time and developing a sense of independence (3). Developing healthy behaviors during the college years is important because college is often stigmatized as a time of unhealthy changes, such as binge drinking and weight gain. In fact, weight gain during college is 2-4 times higher than the average weight gain in adults per year, 2 pounds (4). College can be a time of weight gain but can also be a time for change to healthy behaviors if given the support to do so (5). For example, the built environment has been cited as a major contributor to obesity (6). Such factors as availability of healthy foods, cost, and presence of safe environments to engage in physical activity are all examples of constructs of the built environment (6). Thus, creating college campus environments that are conducive to healthy behaviors may be crucial to promoting healthy diet and physical activity patterns throughout life (5). The objective of this study was to explore and describe the availability of environmental supports for a healthy lifestyle on the UNH campus and student behaviors.

Methods

Healthy Campus Environmental Audit



The Healthy Campus Environmental Audit (HCEA) is a comprehensive tool that was developed by a USDA multi-state research team led by Syracuse University to measure the adequacy and availability of environmental supports for a healthy lifestyle. The audit is designed to be used in schools, communities, worksites, or college campuses. The HCEA is comprised of 7 audits, each designed to evaluate specific environmental factors. The audits include the Full Restaurant Evaluation Supporting a Healthy (FRESH) Dining Environment Audit, the Convenience Store Supporting a Healthy Environment for Life-promoting Food (SHELF) Audit, the Healthfulness Vending Evaluation for Nutrient-Density (VENDING) Audit, Physical Activity Campus Environmental Supports (PACES) Audit, Sneakers and Spokes Walkability/Bike-ability Audit, Healthy Environment Policies, Opportunities, Initiatives, Notable Topics Survey (POINTS) Audit, and the Campus Demographics Audit.

The FRESH Dining Audit evaluates dining establishments in the campus environment, including restaurants, fast food establishments, dining halls, food courts, and food trucks.

Criteria evaluated included the number and variety of fresh fruit and vegetable options, lean meat options, whole grains options, healthy desserts, and healthy beverage options. To evaluate availability of fruit, the FRESH Dining Audit utilized a 5-point scale, where having one fresh fruit option received a score of 3, two fresh fruit options received a score of 4, and having three or more fresh fruit options received a score of 5. Venues with only processed fruit (fruit with added sugar/syrup) receive a score of 2, and venues with no fruit at all received a score of 1. A slightly different scale was used to evaluate the availability of vegetables. Vegetables were defined as “vegetable side options” and could include hot vegetables (not fried or in heavy sauce), vegetable soups, prepared salads, and vegetable toppings for pizzas. Vegetables from the salad bar were not evaluated in this category. The scale utilized ranged from a score of 1 to 5. Establishments with no vegetable side options received a score of 1, while those with 1-2 options received a score of 2 and those with 3-4 options received a score of 3. Venues with 5-6 options received a score of 4 and those with greater than or equal 7 options received a score of 5. A complete list of the specific criteria evaluated for the HCEA is described in Table 1A in the Appendix. Accessibility of the dining halls, such as hours open, location to campus, and availability of parking was also evaluated. Additionally, the language used by the venue to describe food options and the availability of healthy signage and nutrition information was assessed. Sites to be evaluated at UNH were chosen to represent approximately 30% of each type of dining establishment, including: cafeterias/dining halls (n=1), food courts (n=1), sit-down restaurants (n=2), fast food/cafes (n=8), and delivery (n=2). Dining establishments were chosen to reflect those most frequented by students and included: Holloway Commons, Union Court, the food court in the student union, Dunkin Donuts, and Domino’s Pizza.

The SHELF Audit evaluated the availability and accessibility of healthy food options at mini marts/convenience stores, drug stores, and bodegas/corner stores. Criteria evaluated was similar to the FRESH Dining Audit, including the number of fruit, vegetable, whole grain, lean meat, and healthy beverage options, as well as signage to promote healthy choices and store hours. Price comparison between healthier versions of products, such as fruit canned in heavy versus light syrup and low sodium vegetables versus regular varieties were also assessed. Thirty percent of each category of store was evaluated and locations were chosen to represent those most frequented by students. The stores evaluated included: Rite Aid, Hannaford, Sammy's Market, Campus Convenience, Zeke's Café, and Wildcatessen. Grocery stores were not intended to be included in the audit. However, given the particularly small size of the Durham Hannaford, the limited variety of conveniences stores on campus, and the popularity of this store with UNH students, the evaluators decided to include Hannaford in the SHELF audit.

The VENDIng Audit evaluated the healthfulness of products in vending machines throughout campus. Products were rated based on serving size, saturated fat, sodium, added sugar, and total calories and received a corresponding Healthy Dense Snack score between 0 and 7 or a Healthy Dense Beverage Score between 0 and 2. Snacks with a score of ≥ 5 were considered healthy while snacks with a score of 3-4 were considered somewhat healthy, and snacks with a score of ≤ 2 were labeled as unhealthy. Beverages with a score of 2 were considered healthy while those with a score of 1 were classified as somewhat healthy and those with a score of 0 were unhealthy. The audit also assessed variety and availability of products. Machines to be evaluated were chosen to represent 30% of each type of vending machine (snack, beverage, mixed) and to represent those most frequented. Vending machines were chosen from a

variety of building types, including: academic, library, and residential. A complete list of machines evaluated is provided in Table 3A in the Appendix.

The PACES audit evaluated the accessibility and availability of recreation facilities within the campus environment. This audit was comprised of two components: a facilities audit and a campus audit. The facilities audit assessed individual recreation centers or facilities while the campus audit evaluated the resources and services available on campus as a whole. At UNH, the Hamel Recreation Center, the campus' only fitness center, the Swasey Indoor Pool, and Wildcat Fitness, a small, local gym, were evaluated for the fitness audit. Criteria evaluated at these facilities included the type and percent of equipment available, accessibility (hours open and for persons with a disability), friendliness/helpfulness of staff, aesthetic features, and amenities. The campus audit evaluated the number and variety of recreational programs and spaces available for recreational use, such as basketball courts, walking trails, and all-purpose fields.

The Walkability/Bikeability audit assessed walking and biking paths for quality and safety. Specific criteria evaluated included: path size and distance from the road, maintenance, terrain, handicap accessibility, presence of crosswalks, adequacy of bike lanes, and nighttime safety features. Paths were rated on these criteria and then provided with an overall safety/quality score, ranging from Excellent/Safe, to Poor/Dangerous. Paths were chosen on the UNH campus to represent those most utilized by students, such as those frequented to travel to the library, dining halls, dorms, and academic buildings. A minimum of 25 segments were required to be evaluated, 6 of which must have been evaluated at night. A total of 28 segments were evaluated on the greater UNH campus (see Table 2A in the Appendix).

The POINTS audit assessed the availability and adequacy of policies and initiatives in place to promote health and/or prevent obesity in the environment. This audit was conducted at UNH via an online search for campus policies and initiatives. Findings were classified into 34 topics that fell into one of four categories: Stimulant, Disease Prevention, Nutrition, or Active Environment. Table 4A in the Appendix provides a complete breakdown of the topics and categories.

The Campus Environment Demographics Audit defined the demographics of the campus environment in order to put the results in context. Criteria evaluated related to the size of the school, in terms of geographic area and number of buildings, student population size, and gender and racial/ethnic background of students.

In implementing the audit at UNH, first a team of four student researchers was recruited. A lead researcher was assigned to communicate with Syracuse University and to direct audit activities. The research team met weekly to discuss progress with the audits and to plan for completion of the audits.

The campus environment was then determined to be approximately a 1 mile radius from the center of campus. Only locations within these boundaries would be evaluated.

To prepare for each audit, the researchers completed online training and practiced completing the audit as a group. Then, evaluators independently assessed the same locations at the same time to determine interrater reliability. Data collection commenced upon 80% inter-radar reliability being reached.

The main outcomes assessed in the HCEA included: fruit and vegetable availability, accessibility of recreation centers, availability of recreation programs and equipment, and adequacy of walking/biking paths.

College Health and Nutrition Assessment Survey (CHANAS)

CHANAS began twelve years ago at UNH and is an ongoing cross-sectional project. CHANAS (previously YARHSI) was designed to develop a greater understanding about the health of college-aged individuals, an under-studied population. Dietary, anthropometric, clinical, biochemical, and demographic data were collected, as well as data regarding student lifestyle habits.

Participants are recruited from an undergraduate course at UNH, NUTR 400, Nutrition in Health and Well Being. Students in NUTR 400 complete various health assessments as part of the lab activities throughout the course. These activities include: a College Wellness Survey, Health Risk Screening, Physical Activity and Fitness Assessment, and Bone Health Screening. Although the assessments are graded components for the course, participants can choose to take part in CHANAS by allowing the researchers to utilize their data; this portion is not mandatory. Individuals were excluded if they were younger than 18 or older than 24, if they were pregnant, or if they could not complete the assessments for a medical reason.

The College Wellness Survey is a 77-item online survey (administered through Qualtrics) regarding student demographics, lifestyle behaviors, and perceptions of health. Questions pertained to diet and physical activity patterns, tobacco or alcohol use, desired weight status, social support, sleep habits, socioeconomic status, stress management, and screen time. Validated questionnaires, such as the International Physical Activity Questionnaire and the National Cancer Institute's Fruit and Vegetable Screener, were utilized to design the survey. Specific questions from which data was collected in this study are listed in Table 5A in the Appendix.

Additional components of CHANAS include the Health Risk Screening, Fitness assessments, and a 3-day food record. The Health Risk Screening consisted of anthropometric, biochemical, and clinical assessments picked to determine students' relative risk of cardiovascular disease and diabetes. Measurements/tests administered during the screening include: height, weight, waist circumference, body composition (via bioelectrical impedance), blood pressure, Total cholesterol, HDL, LDL, triglycerides, and blood glucose. Fitness assessments conducted a One Mile Rockport Walk test, a push up test, and a sit and reach test to measure cardiovascular endurance, upper body strength and endurance, and flexibility, respectively. To assess diet quality, students completed a 3-day food record on nonconsecutive days, including one weekend day, that was representative of typical eating habits. Dietary data was analyzed using Diet Analysis Plus (10.0, Cengage Learning, Independence, KY). The Bone Health Screening evaluates students' risk for osteoporosis using a bone ultrasound analyzer on the left and right heels.

The main outcomes measured in the CHANAS survey were fruit and vegetable consumption, frequency and duration of vigorous activity, moderate activity, and walking per week, residence, and frequency of fast food consumption.

Data management and was conducted with SPSS (Version 2.2, Chicago, IL).

Results:HCEA*Fruit and Vegetable Availability*

Out of the dining establishments surveyed, four were UNH-affiliated venues and eight were non-UNH-affiliated venues. Among the UNH-affiliated venues, 75 percent had two fresh fruit options and 100 percent had at least one fresh fruit option. In non-UNH affiliated venues, fresh fruit was less available, with 50 percent of venues having no fresh fruit options and 50 percent having 1 or 2 options. Among coffee shops/cafes (non-UNH-affiliated), 75 percent had 1 fresh fruit option available.

UNH-affiliated venues had more vegetable options than non-UNH-affiliated venues. Half of UNH-affiliated venues had 3-4 fresh vegetable side options, a rating of 3, while half had zero fresh vegetable options. Only one non-UNH-affiliated venue had 1-2 fresh vegetable side option, a rating of 2, while the remaining UNH-affiliated venues had no fresh vegetable side options.

PACES Audit

Recreation facilities on the greater UNH campus were found to have high accessibility to students, in terms of hours of operation and geographic location. Hours of operation ranged from 18 hours on a weekday to 14 hours on a weekend day. The UNH and non-UNH affiliated recreation facility were found to have similar accessibility, in terms of hours of operation. Wildcat Fitness and the Hamel Recreation Center were both open 18 hours on a weekday, differing only in their opening and closing times by 1 hour. On the weekend, Wildcat Fitness was open two hours less than the Hamel Recreation Center; however, Wildcat Fitness was open 2 hours earlier than the Hamel Recreation Center. The Hamel Recreation Facility was located

within $\frac{2}{3}$ mile of greater than 3 residence halls. Also, walking trails were located within $\frac{1}{3}$ mile of the center of campus. Availability of equipment was moderate, with 40-59% of aerobic equipment available at the off-campus facility and 20-39% of aerobic equipment available at the on-campus facility. Table 1 provides a list of specific equipment available in the facilities evaluated.

In addition to recreation centers, a variety of opportunities for physical activity are provided throughout the campus. In evaluating a two-day period, greater than 10 health-related offerings were available, such as group fitness classes, which was the highest ranking on the Likert scale on the audit survey. Also, 11-15 varieties of fitness classes were offered, which falls in the middle of the Likert scale used to assess this criteria. Several intramural sports are offered as well, with no additional charge to participate. In addition, there are several indoor/outdoor facilities available for recreation activities, such as all-purpose fields, pools, and basketball courts. Table 2 provides a complete list of additional recreation facilities. UNH had all the facilities available that were listed in the PACES Audit.

Walkability/Bikeability

Of the paths evaluated, 92% had suitable walking surfaces, such as sidewalks or paths completely away from the road, and 89% had a designated bike lane or a path wide enough (>4 ft) to accommodate both bicycles and pedestrians. The majority of paths (57%) were located at least 3 ft from the roadway. Crosswalks were present at all path intersections crossing a roadway and at least 14% of these intersections contained stop signs. In terms of path maintenance, 93% of paths scored ≥ 4 on a 5-point Likert scale, with 1 indicating “Major Problems” and 5 indicating “No Problems”. Of the paths evaluated at night, 83%

scored ≥ 4 on a 5-point Likert scale for the area having adequate lighting.

In terms of total path scores, 86 percent rated Satisfactory or Excellent, while another 10 percent were rated as Fair. One path was rated as Poor/Dangerous.

CHANAS

Subject Characteristics

The majority of students were between ages 18 and 19 years old (78.3 percent), female (65.3 percent), and white (92.1 percent). Six percent identified as Asian or Pacific Islander and 1.5 percent identified as Black or African American. Most students lived in a college-affiliated dorm without a kitchen in the room.

Location of Meals

The majority of students reported eating at least one meal per week in the university dining hall and reported eating at a restaurant/fast food chain at least once per week. Just over one-third of students ate at least two meals per week in the university dining halls and approximately 40 percent did not eat out during the week.

Fruit and Vegetable Consumption

The majority of students reported consuming between $\frac{1}{2}$ to $1\frac{1}{2}$ cups of fruit per day. Approximately one-third of students consumed ≥ 2 cups of fruit per day. The majority of students reported consuming at least 2 cups of vegetables per day, which is greater than average fruit consumption

per day. Just over one-third of students consume $\leq 1 \frac{1}{2}$ cups of vegetables per day.

Athletic Involvement

The majority of students do not play on a UNH athletic, club, or intramural team. Among those students who were on an athletic team, the majority played for a UNH Athletic Team NCAA Division 1 Team.

Physical Activity

On average, students reported spending approximately 5 hours per week participating in vigorous activity, 4.3 hours of moderate activity, and 10.6 hours of walking per week. Most students spent at least one day per week performing moderate or vigorous activity, with 55 percent engaging in moderate activity at least 3 days per week and 60 percent engaging in vigorous activity at least 3 days per week. Approximately 99 percent of students walked at least one day per week, and just under 80 percent reported walking 7 days per week. During a typical moderate exercise session, the majority of students reported spending least 30 minutes, on average, with about one-third of students reporting spending greater than one hour per day. During a typical vigorous exercise session, most students spent at least 30 minutes. Approximately 95 percent of students spent an average of at least 30 minutes or more walking each day and 80 percent walked at least 1 hour per day.

Table 1: Available Aerobic Equipment		
	Hamel Recreation Center	Wildcat Fitness
Treadmill	Yes	Yes
Bike	Yes	Yes
Air rower (rowing machine)	Yes	Yes
Stair stepper	Yes	Yes
Elliptical	Yes	Yes
Cycle ergometer	Yes	Yes
Lateral elliptical	Yes	Yes
Arc trainer	Yes	Yes
Ski Erg	Yes	No
Jacobs Ladder	Yes	No
Slat belt treadmill	Yes	No

Figure 1: Walkability/Bikeability Scores

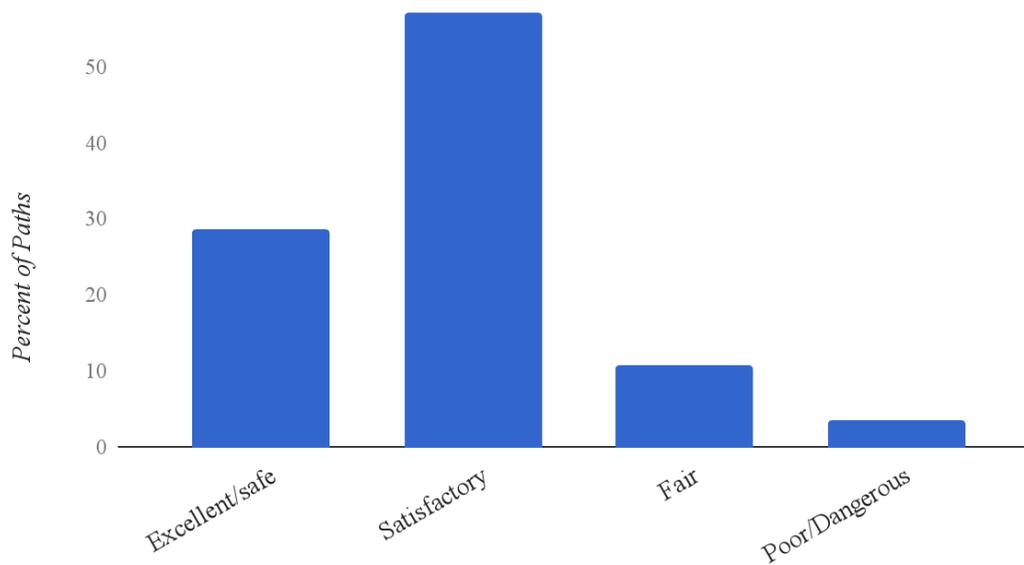


Table 2: Additional Recreation Facilities	
Indoor track	Basketball courts
Outdoor track	Tennis courts
Volleyball courts	Skating rink
Baseball/softball field	Climbing wall
All-purpose	Racquetball court
Outdoor pool	Squash court
Indoor pool	

Table 3: Location of Meals	
Average Number of Meals per Week Eaten in University Dining Hall	
<u>Number of Meals</u>	<u>Percent</u>
None	8.4
1 - 6	18.1
7 - 13	18.5
14 - 20	38.4
≥ 21	16.4
Average Number of Meals per Week Eaten at Restaurant/Fast Food Chain	
<u>Number of Meals</u>	<u>Percent</u>
None	39.6
1 - 2	52.7
3 - 4	6.2
≥ 5	1.0

Table 4: Average Fruit, Fruit Juice, and Vegetable Intake	
Average Cups of Fruit per Day	
<u>Cups</u>	<u>Percent</u>
None	11.6
½ - 1 ½	55.9
2 - 3	25.2
3 ½ - 4 ½	5.7
Average Cups of 100% Fruit Juice per Day	
<u>Cups</u>	<u>Percent</u>
None	43.6
½ - 1 ½	43.5
2 - 3	10.7
3 ½ - 4 ½	1.5
≥ 5	0.7
Average Cups of Vegetables per Day	
<u>Cups</u>	<u>Percent</u>
None	5.5
½ - 1 ½	36.7
2 - 3	40.3
3 ½ - 4 ½	12.6

≥ 5	4.9
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Table 5: Frequency of Physical Activity	
Days Spent Performing Vigorous Activity per Week	
<u>Number of Days</u>	<u>Percent of Students</u>
0	14.8
1-2	24.9
3-5	45.9
6-7	14.3
Days Spent Performing Moderate Activity per Week	
<u>Number of Days</u>	<u>Percent of Students</u>
0	13.4
1-2	30.7
3-5	41.6
6-7	13.6
Days Spent Walking per Week	
<u>Number of Days</u>	<u>Percent of Students</u>
0	1.2
1-2	0.5
3-5	12.9
6-7	85.2

Table 6: Duration of Physical Activity	
Average Time Engaged in Vigorous Activity per Day Reported	
<u>Average Time Per Day</u>	<u>Percent</u>
< 30 min	12.8
30 min - 1 hr	33.4
> 1 hr	53.9
Average Time Engaged in Moderate Activity per Day Reported	
<u>Average Time per Day</u>	<u>Percent</u>
< 30 min	16.3
30 min - 1 hr	50.5
>1 hr	33.2
Average Time Spent Walking per Day Reported	
<u>Average Time per Day</u>	<u>Percent</u>
< 30 min	5.4
30 min - 1 hr	45.1
> 1 hr	49.4

Discussion

The results of this study provide valuable insight regarding the relationship between environmental factors on a college campus and behaviors among young adults. By evaluating both objective data regarding the campus environment and student reported data, this study was able to provide more comprehensive results. The results of this study indicate that availability of recreation facilities on the UNH campus is adequate to support and encourage recommended levels of physical activity for college students. However, the presence of fruit and vegetable options on the UNH campus does not appear to sufficient to promote recommended levels of fruit and vegetable consumption.

The degree to which fruits and vegetables are included in the diet offers insight regarding the nutritional content of the diet (7). Approximately one-third and one-half of students meet the MyPlate recommendations for fruit and vegetable consumption, respectively (2 cups of fruit and 2 ½ cups of vegetables for a 2,000 calorie diet). This is notable, considering that inadequate consumption of fruits and vegetables, as part of a healthy eating pattern has been linked with a higher risk of chronic disease, namely, cardiovascular disease, and to a lesser extent, type 2 diabetes and some cancers, overweight, and obesity (7). In contrast, the American College Health Association found that only 5.4 percent of college students consumed at least 5 servings of fruits and vegetables each day (8).

In comparison to student intake, the university dining hall provided 2 fresh fruit options and 3-4 vegetable side options during lunchtime. Thus, a lack of fruit and vegetable options is likely not the contributing reason for low fruit and vegetable intake among this population. However, the all-you-can-eat, unlimited access style of the dining hall may lead students to

choose less nutritious options in place of the healthy options (9). Conversely, the presence of healthy options without cost as a barrier may encourage fruit and vegetable consumption (9).

Having adequate healthy options available in the dining hall is important to ensure that the university dining services are not a barrier to healthy eating for students. The majority of UNH students live in on-campus residence halls and consume ≥ 7 –14 meals in the university dining hall per week. Students living in college-affiliated residence halls at UNH are required to purchase a meal plan. The lowest-tiered plan provides unlimited access to three all-you-can-eat dining halls on campus. Thus, students are likely consuming the majority of their meals in the dining halls, making these establishments critical outlets to influence dietary behavior.

However, the majority of students also reported eating out at a restaurant or fast food establishment at least once per week. Therefore, providing healthy options other dining establishments is important to influencing healthy behaviors. The HCEA found that fresh fruit and vegetable options were less available at non-UNH-affiliated venues compared to UNH-affiliated venues, and the dining hall had the greatest number of fruit and vegetable options. This finding is consistent with a previous study published in 2012 on fifteen post-secondary institutions that found 80 percent of dining

halls had fresh fruit with no added sugar available and 70 percent of dining halls had nonfried vegetables, compared to 28 percent and 33 percent of fast food restaurants for fruits with no added sugar and nonfried vegetables, respectively (9).

Compared to the recommended 1.25 hours of vigorous activity or 2.5 hours of moderate activity per week (or an equivalent combination of both), UNH students reported a mean of 5.0 hours of vigorous activity, 4.3 hours of moderate activity, and 10.6 hours of walking per week (8).

The majority of students do not play on a UNH Athletics team. Thus, the high report of physical activity is likely not skewed by involvement in athletics.

The American College Health Association found that 48.5 percent of students met the American College of Sports Medicine and the American Heart Association's Physical Activity Recommendations for Adults (8). These recommendations call for engagement in moderate-intensity cardio or aerobic activity on at least 5 days per week for 30 minutes or more or vigorous-intensity cardio or aerobic activity for at least 20 minutes on 3 or more days per week (8). In comparison, 87 percent of UNH students reported spending at least 30 minutes per day of vigorous activity and 84 percent reported spending at least 30 minutes per day of moderate activity. Approximately 60 percent and 55 percent of students reported completing vigorous and moderate activity, respectively, at least 3 days per week. Thus, the majority of UNH students likely obtain adequate physical activity. The relatively high level of physical activity reported by UNH students may be reflective of the adequacy of recreation facilities and walking/biking paths present on campus.

The HCEA findings suggest that cost, location of the recreation facilities, adequacy and availability of fitness equipment and offerings at the recreation facilities are not barriers to engaging in physical activity for UNH students. The university recreation center was located within 2/3 of a mile of greater than 3 residence halls on campus, which was the highest rating for the pertinent question. Also, another private fitness center was located within the 1-mile radius of the center of campus, providing students with an alternative site to be physically active. The absence of a separate fee for use of the university recreation facility and participation in fitness classes or intramurals would also serve to promote student physical activity. Also, walking trails are located within a 10-minute walk from the center of campus. UNH is fortunate to have a 250-acre Natural Area with many walking trails, including a 2.14-mile marked loop trail that begins at a common landmark, the Wildcat Statue, on campus.

The major limitation of this study was the reliance on self-reported data in the CHANAS study. For example, student report of exercise may have been overestimated or intake of fruits and vegetables may have been inaccurately estimated due to limited understanding of portion sizes.

Another limitation was the potential for error imposed by the methods of the HCEA. Data were collected by the student researchers and entered into Qualtrics. Different facilities were assessed by different researchers, so the researchers were likely only familiar with the facilities they personally evaluated. Data entered into Qualtrics was sent to Syracuse University. Syracuse would then compile the data and report the results back to UNH. Thus, there were several areas for error in utilizing this approach to data collection and reporting.

Finally, the use of two different surveys, the HCEA and CHANAS was a limitation in that not all questions matched up between the surveys. For instance, CHANAS specifically

asked students about their dairy consumption while the HCEA included dairy as one beverage qualifying for the “healthy beverage category”, which also included water, 100% juice, unsweetened coffee or tea, and seltzer water.

HCEA and CHANAS findings suggest that recreations facilities and walking/biking paths are adequate to support and enhance engagement in recommended levels of physical activity. However, the presence of fruit and vegetable options in dining establishments on the greater UNH campus may not be prominent enough to help students meet the MyPlate recommendations. The findings from this study may be used to educate UNH Dining staff about student fruit and vegetable intake and to suggest methods to increase student fruit and vegetable consumption. Additionally, future studies should evaluate student perceptions regarding the adequacy of campus dining establishments to identify barriers to fruit and vegetable consumption and to determine specific areas for improvements.

Appendix

Table 1A: HCEA Selected Criteria	
FRESH Dining Audit	
	(26) What type of fresh fruit is available?
	(27) How many vegetable side options are there?
Walkability/Bike-ability Audit	
	A. Pedestrian Facilities: Presence of suitable walking surface such as sidewalk or path
	E. Maintenance: Cracking, buckling, overgrown vegetation, standing water, etc. on or near walking path. Does not include temporary deficiencies likely to soon be resolved (e.g. tall grass)
	I. Aesthetics: proximity of construction zones, fences, buildings, noise pollution, quality of landscaping, and pedestrian-oriented features (benches and water fountains)
	J. Bikeability: Presence of designated lane for bikes on the road and/or walking path
PACES Audit: Facilities Audit	
	(15) Facility hours open per day
	(21) Aerobic equipment available
	(23) Accessibility of aerobic equipment (% open machines)
	(24) Strength training equipment available
PACES Audit: Campus Audit	
	(10) Activities requiring a fee
	(12) How far is the closest walking/biking trail from the center of campus?
	(13) Indoor/outdoor facilities available
	(15) If on-campus housing is available, how many residence halls

	are there within 2/3 mile?
	(16) How many health-related offerings are available for Tuesday and Wednesday combined?
	(17) How many different varieties of fitness classes are offered
	(18) Description of intramural and club sports

Figure 1A: Components for SHELF, VENDing, and Walkability/Bike-ability Audits

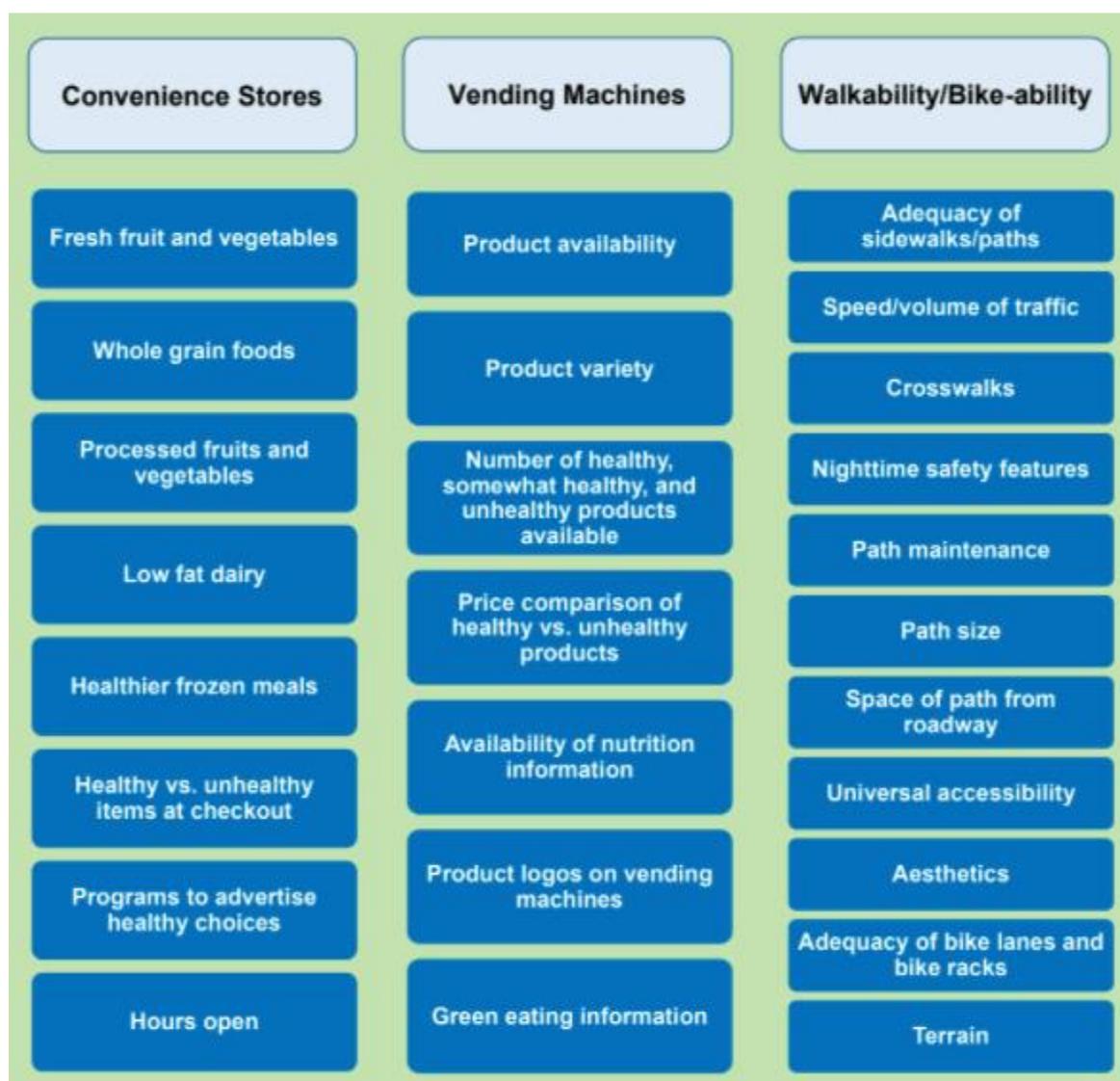


Table 2A: Walking Paths and Segments Evaluated	
<u>Path Name</u>	<u>Path Segments</u>
A-Lot/Dimond Library	
	A-Lot/Nesmith Hall
	Nesmith Hall/Dimond Library
Madbury Apartments/Paul College	
	Madbury Apartments/Rosemary Lane
	Rosemary Lane/Paul College
Hitchcock Hall/Hannaford	
	Hitchcock Hall/Academic Way
	Academic Way/Randall Hall
	Randall Hall/Quad Way
	Quad Way/C-Lot
	C-Lot/Mill Road
	Mill Road/Hannaford
Christensen Hall/Conant Hall	
	Christensen/McDaniel Drive
	McDaniel Drive/Academic Way
	Academic Way/Conant Hall
Stoke Hall/Durham House of Pizza	
	Stoke Hall/Garrison Avenue
	Garrison Avenue/Health Services

	Health Services/Aroma Joe's
	Aroma Joe's/Durham House of Pizza
Woodsides Apartments/Horton Hall	
	Woodsides Apartments/Main Street
	Main Street/Dimond Library
	Dimond Library/Horton Hall
Mills Hall/Kingsbury Hall	
	C-Lot/Upper Quad
	Upper Quad/Horton Hall
	Horton Hall/Kingsbury Hall
Hamel Recreation Center/Holloway Commons	
	Hamel Recreation Center/Edgewood Road
	Edgewood Road/Main Street
	Main Street/Holloway Commons Driveway
	Holloway Commons Driveway/Holloway Commons

Table 3A: Vending Machines Evaluated		
<u>Building Classification</u>	<u>Location</u>	<u>Type of Machine(s)</u>
Library		
	Dimond Library	Snack, beverage
Academic Buildings		
	Rudman Hall	Snack, beverage
	Pettee Hall	Snack, beverage
	Paul College	Snack, beverage
	Memorial Union Building	Snack, beverage, ice cream
Residential Buildings		
	Handler Hall	Snack, beverage
	Christensen Hall	Snack, beverage

Table 4A: POINTS Audit Categories and Topics	
Stimulant	
	Smoking Policy
	Alcohol Policy
Disease Prevention	
	Chronic disease education
	Healthy challenges
	Health education for credit
	Nutrition education for credit
	Physical education for credit
	Health education
	Nutrition education
	Physical education
	Health promotion
	Health fair
	Health screening
Nutrition	
	Healthy food options
	Nutrient standards
	Healthy food label
	Campus tax
	Eating environment
	Local food

	Organic waste
	Farmer's market
	Local food access
	Walkable dining
	Food insecurity
Active Environment	
	Active environment
	Closed campus
	Sustainable transportation
	Health and wellness
	Healthy fundraising
	Health insurance

Table 5A: Selected CHANAS Questions	
Food and Diet	How many MEALS PER WEEK do you eat at university/college dining hall?
	On average, how many times per week do you eat in a restaurant or fast food chain?
	On average, how many cups of fruit, <u>NOT</u> including fruit juice, do you consume each day?
	On average, how many <u>CUPS</u> of vegetable do you consume each day?
Physical Activity	During the last 7 days, on how many days did you do VIGOROUS physical activities like heavy lifting, digging, aerobics, or fast bicycling?
	How much time did you usually spend doing VIGOROUS physical activities?
	During the last 7 days, on how many days did you do moderate physical activities carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.
	How much time did you usually spend doing MODERATE physical activities on one of those days?
	During the last 7 days, on how many days did you WALK for at least 10 minutes at a time?
	How much time did you usually spend WALKING on one of those days? Where do you currently live?
Athletics	Are you a member of a UNH athletic team?
	What type of athletic team are you on?
Residence	Where do you currently live?

Figure 2A: IRB Approval**University of New Hampshire**

Research Integrity Services, Service Building
51 College Road, Durham, NH 03824-3585
Fax: 603-862-3564

18-Aug-2016

Morrell, Jesse Stabile
MCBS, Kendall Hall 418
Durham, NH 03824

IRB #: 5524

Study: College Health & Nutrition Assessment Survey

Review Level: Full

Approval Expiration Date: 09-Aug-2017

The Institutional Review Board for the Protection of Human Subjects in Research (IRB) has reviewed and approved your request for time extension for this study. Approval for this study expires on the date indicated above. At the end of the approval period you will be asked to submit a report with regard to the involvement of human subjects. If your study is still active, you may apply for extension of IRB approval through this office.

Researchers who conduct studies involving human subjects have responsibilities as outlined in the document, *Responsibilities of Directors of Research Studies Involving Human Subjects*. This document is available at <http://unh.edu/research/irb-application-resources> or from me.

If you have questions or concerns about your study or this approval, please feel free to contact me at 603-862-2003 or Julie.simpson@unh.edu. Please refer to the IRB # above in all correspondence related to this study. The IRB wishes you success with your research.

For the IRB,



Julie F. Simpson
Director

cc: File
Reilly, Ruth
Begis, Maggie

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