

**Identifying Perceived Barriers and Enablers of Healthy Eating in College Students in
Hawai'i: a Qualitative Study Using Focus Groups**

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Abstract

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The purpose of this study was to identify and describe perceived barriers and enablers of healthy eating in college students ages 18-24 at the University of Hawai'i at Mānoa. A semi-structured interview guide was developed based on review of relevant literature and pilot tested in one focus group. Six focus groups of 4-6 students (n=30) were conducted by a trained moderator (LA). Discussions were audio recorded and subsequently transcribed. After each focus group, LA coded the transcript using NVivo 11, and additional codes were added to the codebook based on emergent ideas. Once all transcripts were coded, key themes were then determined by examining code counts and identifying overarching ideas based on the socio-ecological model of health. Key barriers identified were attitudes and beliefs toward healthy eating, the cost of healthy food options in Hawai'i, knowledge deficit of healthy foods or preparation, and institution-related food availability. Key enablers identified were knowledge of nutrition, attitudes or prioritization of healthy eating, and social support. Results revealed that social and educational factors play a role in promoting healthy eating in Hawai'i, but the cost of living and food availability at college serve as barriers even for motivated students. Incorporating nutrition education into the curriculum may be one way to help college students with the transition into independent living in the early years. Additional studies are still needed to determine how best to design and prioritize food environment interventions in colleges.

Keywords: barriers, enablers, healthy eating, food environment

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Chapter 1: Introduction

College students have poor nutritional habits, with fruit and vegetable consumption below the recommended five servings a day and frequent fast food or fried food consumption.^{1,2} The college environment has been termed an “obesogenic environment” due to high access to low nutrient, energy dense foods and the high-calorie environment of the university dorm.³ College students may not immediately realize the impact of their poor nutritional habits, because college students have high energy metabolism as they reach peak lean body mass (a significant contributor to resting energy expenditure) around the time of college years.⁴ With high energy expenditure, calories consumed in the college years are greater than at other points in life.

Eating behaviors of college students may carry over to the rest of their life, as the college years are a critical period in habit formation.⁵ For this reason, the college years are also a potential period of intervention. The college years present an opportunity to acquire healthy habits as students enter emerging adulthood, in which change occurs more frequently than at any other point in life.⁶ While the college years are a potential period of intervention, recent research points to the lack of nutrition education for college students, particularly in healthy weight management.⁷

To design effective nutrition education interventions for college students, research is needed to determine the factors influencing college students’ food choices. Previous research studies using focus groups have identified several determinants of eating behaviors in college students, such as taste preference, availability and accessibility of foods, cost, and other college life factors.⁸⁻¹¹ Several of these studies have made use of the socio-ecological model, which identifies influences at the individual, social environmental, physical environmental, and macrosystem levels and is used in health promotion to better understand not only the individual

but the unique environment in which he/she lives.¹² Previous studies examining the barriers and enablers to healthy eating in college students have been conducted in the US, Europe, Australia, and New Zealand, but there have been no such studies performed in Hawai'i. To address the needs of this population, the objective of this study was to identify barriers and enablers of healthy eating in college students in Hawai'i.

Chapter 2: Methods

The University of Hawai'i at Mānoa (UHM) Institutional Review Board approved the study.

Question guide

A question guide was developed based on findings of studies in similar populations.^{9,10} The question guide was tested in one focus group to confirm that it would yield answers relevant to identifying barriers and enablers of healthy eating.

Participants

Participants were full-time students in the age range of 18-24 at UHM, the largest college in Hawai'i. Students were recruited via email, class listservs, flyers, and word of mouth. The initial recruitment aim was to schedule at least five participants per focus group. However, due to the number of “no-shows” or absent participants repeatedly occurring over the course of recruitment, the scheduling goal became seven.

Codebook Development

Prior to conducting focus groups, one researcher (LA) developed a preliminary codebook based on previous studies. Barriers and enablers of healthy eating identified in the codebook were organized based on the socioecological model,¹³ with codes in four levels of influence: individual, social environmental, physical environmental, and macrosystem. For example, in the “individual” category, codes included “knowledge,” “behaviors,” and “attitudes and beliefs.” The codebook was expanded as focus group transcripts were analyzed, and two other researchers (OB and JB) reviewed the codes. These procedures were conducted to ensure validity of findings.¹⁴

Focus groups

Focus groups were held on the UHM campus. Focus groups were scheduled using Google forms and formed based on availability. A reminder email was sent for confirmation. On the day of the focus group, all students were asked to read the consent form and complete a demographic survey. All focus groups were conducted by a trained moderator. After obtaining consent, the focus groups were audio-recorded. The focus groups typically lasted approximately one hour. After the focus group discussion, the students received a \$10 gift card to a local grocery store. Focus groups were subsequently transcribed and analyzed. Only focus groups with adequate numbers (four to six) were analyzed (n=30). Focus groups were held until the point of data saturation, or the point at which after analysis, no more themes emerged.¹⁵ After analysis of the fifth and sixth focus group yielded no new ideas, it was confirmed that data saturation had been reached.

Data Analysis

Data were analyzed using NVivo software package version 11 (QSR International Inc., Burlington, MA, USA) using content analysis.¹⁶ Beginning with the initial codes from the literature, LA coded the transcripts. After additional codes were identified, the codebook was revised. After the final codebook had been approved by the other two researchers, LA recoded all transcripts. The key barriers and enablers were determined by code counts.

Chapter 3: Results

The characteristics of students who participated in focus groups are displayed in Table 1. Student major varied, with 33% enrolled in biology or other biology-related programs and 17% enrolled in health-related programs. Over half of students were at normal weight, while the rest were underweight (17%) or overweight (23%). A large proportion identified as Asian (43%), a smaller number identified as White (33%), and 20% were multiracial.

Barriers and enablers to healthy eating behaviors were identified at the four levels of the socio-ecological model. Themes are displayed in order of prominence by socio-ecological level in Tables 2 and 3, along with exemplifying quotations. As some barriers were also perceived as enablers, some themes appear in both tables. For barriers or enablers marked with an asterisk*, there is an expanded summary presented, separated by barrier and enabler and organized according to the socio-ecological model. More barriers than enablers were identified.

Barrier – Individual

Attitudes and Beliefs

Some individuals framed healthy eating as an undesirable, which served as a barrier. There were multiple reasons for this, such as the perception that healthy eating does not taste good or is as satisfying as unhealthy foods. Some students considered healthy eating to be “*a chore.*” “*I feel like eating healthy is kind of a chore. It’s healthy but it doesn’t taste the best. It doesn’t make me happy, because you’re supposed to enjoy eating.*”

Attitudes and Beliefs: Prioritization

For individuals, lack of prioritization of healthy eating in relation to school or other activities served as a barrier to healthy eating. Selecting healthy foods was

perceived to detract from students' ability to focus on school responsibilities because *"You only have so much mental energy."* Another participant describes how priorities changed in the context of school: *"After a long day of school [...] we worry more about convenience than health."* Participants usually reported prioritizing schoolwork over healthy eating.

Attitudes and Beliefs: Procrastination

Some participants did not feel urgency in making healthy food choices. Participants reported delaying healthy choices until experiencing negative consequences: *"Not until something affects them do they really realize like, 'Oh I should probably change my eating habits.'"* When asked why healthy eating was less of a priority, one said *"[A poor diet is] just for today. We don't think of it more as 'I'm running out of time.' Or like, 'I have all the time in the world to fix that tomorrow.'"*

Attitudes and Beliefs: Thriftiness

Thriftiness, or the practice of using resources carefully and avoiding waste, emerged as a consideration in unhealthy eating habits, like overeating. Students reported seeking to maximize their money's worth at buffets on campus (at UHM, the cafeteria offerings for students are served as "all-you-can-eat"). Thriftiness functioned as a barrier when students sought to avoid throwing away food by eating beyond satiety: *"You don't want to throw the rest of it away cause you can't finish it and then that's wasting food when there's people who don't have food to eat or things like that."*

Behaviors

Eating while bored was cited as a common barrier to healthy eating. This practice fostered overeating and mindless snacking without attention to quantity consumed. The following quote described this common behavior: *“You take a handful of [brand name snack] and go study. Studying is really boring and you’re not focusing well. Then you get another handful and then you go get another handful. Then you bring the box in your room [laughter]. And [...] you’re basically unconsciously just eating them as you study and you don’t even recognize [how much] you’ve eaten.”*

Taste Preference

Other examples pertaining to food preference came from a preference for unhealthy food because of the taste compared to perceived healthy foods: *“I’m not going to suffer through gross, I’m going to go eat pizza [laughs].”* Some participants had a preference for less healthy options because participants deemed unhealthy options more flavorful and desirable.

Barrier – Social Environmental

Parental Control

Parental influence and control over foods during childhood and adolescence was important in determining eating habits in college. When parents were overly controlling of the eating environment, some students reported a rebound into worse eating habits or rebellion when entering college because of the absence of a social force governing eating habits: *“Students may also change their eating habits on purpose because they were limited by their parents or guardians. Because it’s ‘Eat your vegetables,’ and now there’s nobody so there’s no*

restrictions.” Too much parental control served as a barrier by making prohibited foods, which were usually less nutritious foods, more desirable once students could access them freely in the college environment.

Peer Pressure

Several students recalled instances of peer pressure in which personal inclinations were suppressed due to the influence of peers. For example, participants reported eating with friends even when they were not hungry: *“I would never eat past 8, but when everyone’s hanging out, eating like chips and stuff, [...] and it’s there and [you’re] like, “Oh okay, I’ll have like a few chips.” I’d never [...] do that at home. So it’s the social part.”*

Aside from peers, some participants reported gaining weight when going on regular dates with their significant other. Some of the female participants termed this the *“boyfriend effect”* and noticed a weight change from the time before they began dating their boyfriend to the time the focus group was conducted. Most participants attributed this to going out to eat more than they normally would on their own.

Barrier – Physical Environmental

Institutional Environment

While some students stated that there are desirably healthy foods on campus, they said that with the caveat that the cost is undesirable: *“there’s definitely ways to be healthy on campus, but there’s a lot of places here that have better, healthier options that are way more expensive.”*

With regard to the cafeteria food, students discussed that healthy food options are available and accessible, but also mentioned that *“we don’t have much variety... it’s the same things everyday, too.”* Students felt as if the healthier options, specifically vegetarian options, at the cafeteria were limited in that they were repetitive, had the appearance of *“leftover vegetables”*, had an undesirable taste, or were not a complete meal option: *“that’s not a dinner; that’s a side dish.”*

Living Situation

“Dorming” was mentioned as a barrier to healthy eating behaviors due to lack of kitchen availability: *“if I had an apartment with a kitchen I would be better off because I could just cook for myself.”* A student who moved from the dorms to an off-campus location felt as if *“dorming”* resulted in limited healthy options: *“Now I live off campus and I pack lunches every day, so I’m not buying the food [on campus] since there are the limited healthy options [...] I definitely see better eating habits now that I’m living off campus as opposed to living on campus.”*

Lack of Facilities

Lack of cooking facilities was reported as a hindrance to healthy eating. Some students mentioned that a lack of cookware limited food options in terms of what foods could be prepared. Cold storage for foods were often limited, and storage and shelf life were factors students considered when purchasing food. One student mentioned that limited cookware shifted her food choices to *“ramen and whatever [...] I could order on amazon, or so not really fruits or veggies.”*

Students cited the lack of cookware or a fully-furnished kitchen as a reason they ate less healthy foods.

Location

The location of homes, dorms, and campus in relation to grocery stores was cited as a barrier. For students who lived in the dorms, they described lack of accessibility of fresh foods: *“Because a lot of us aren’t from here, we don’t have that access—Well, I mean, we have the bus, but it’s not like we can take so many groceries with us on the bus. It’s difficult for us to... wander away from campus to go buy what we need.”* Aside from distance, students mentioned that transportation, arm-carrying capacity, and ease of transport were factors that limited their food choices.

One student who studied abroad mentioned that location was a barrier she recognized to a greater degree upon her return to the US with regard to the city environment: *“in Europe everything was walking distance. I’d just go around the corner and boop! Grocery store, very convenient. [Here,] its America you need a car. [laughter] There’s no way around it - everything is so far away.”*

Barrier – Macrosystem

Cost

Cost was the most frequently mentioned barrier to healthy eating. Almost all students identified money as a barrier to healthy eating, because the cheapest foods often tend to be unhealthy. Students who lived in the dorms noticed the price disparity in *“a little thing of strawberries is \$10”* compared to *“musubis at \$1,”* identifying not only the cost of food in Hawai’i but also the cost of fresh

fruit as a barrier in Hawai'i. Cost influenced student food choices in purchasing food: *"I can get a lot more out of my money if I'm buying things like pastas, cereals, those kinds of fast filling foods. Rather than buying fresh fruit, vegetables, and meat [which are] expensive as well [...] it's much more cost effective."*

For students who were beginners in learning to budget, food cost and expenses were a large adjustment, especially after moving from home or not eating on a meal plan anymore. One student described the surprise at the challenge of budgeting: *"all of a sudden the food money comes out of your pocket, that's like a big dent in your wallet."*

Other students mentioned that cost was also complicated by other logistical considerations such as travel expenses, gas money, and coordinating with other students to buy food products in bulk.

Students from out of state also reported experiencing *"sticker shock"* because most students are used to comparatively cheaper prices in their hometowns.

Lack of Education

Students also reported feeling unprepared to make informed food choices upon entering into college. One of the most frequently mentioned causes of this lack of knowledge was the decision to remove home economics from high schools, as students recalled: *"in the education system, we've taken out so many things that are important, you know? When- when my parents- just older generations talk about school, they had a lot of life skills classes? You know like they had home*

ec. “ While some students mentioned that they had life skills classes or health courses, they noted a lack of nutrition education in the high school curriculum.

Enabler – Individual

Attitudes and Beliefs: Thriftiness

Avoiding waste served as an enabler of healthy eating with regards to cooking smaller portions: *“a recipe makes a certain amount and you’re like “well I don’t want to waste this or it won’t fit in my fridge and to me being wasteful is really being part of being healthy. Like being healthy to the planet.”*

Students sought to avoid food waste and overspending by preparing no more than they could eat or store given their budget and facilities.

Behaviors

Planning or meal preparation served as an enabler of healthy eating for students: *“I take time to meal prep and so I can eat healthy and it’s easier for me to choose a healthy snack.”* Other students reported that meal preparation or packing lunch served as a way to avoid eating the convenience food that was more accessible on campus.

Enabler – Social Environmental

Parental Control

Some students stated that eating healthy foods was easier in the home environment where there were other people partially accountable for their eating behaviors. *“When it’s at home your parents monitor what you eat. Like, “No, you’re not going to eat half a pan of brownies.””*

For some students, eating behaviors did not change much upon entering college even with the physical environment changed, because they felt that *“the thing that impacts my life the most about my healthy eating choices, exercise choices, [and] lifestyle is what started a long time before college: It’s how I was raised. It’s what my parents fed me, what they thought was important [...] that also impacted what I think now as well.”*

Enabler – Physical Environmental

Institutional Environment

Students praised the campus offerings like the farmer’s market: *“One of the things I do like about UH though is the farmers market that they have. Where it has those fruits and vegetables. That’s at a really good price. So it’s almost like having a mini grocery store. So I appreciate the school giving us that much.”*

Students also mentioned the free garden spaces on campus organized by the student organic farming training club, or the cafeteria consistently providing fruits, vegetables, and options for a balanced meal.

Enabler - Macrosystem

Social Media

Although commercials and advertising for foods do not necessarily display healthy foods, students reported learning more about healthy food through social media. Some students reported following certain health bloggers to find inspiration, which some noted is becoming “trendy.”

Cost

Students mentioned money as an enabler, as funds provided options for healthy food: *“if we have a little more money [...] then it might be easier for some students to figure out what food they want that’s more of a priority to them - which might be the more expensive healthier food.”*

Table 1: Demographic characteristics of focus group participants at UHM (n=30)

	Characteristic	Total (n[%])
Gender	Female	22 (73%)
	Male	8 (27%)
	Age (yrs) (mean±SD)	19.8 ±2.1
BMI Category	BMI (kg/m ²) (mean±SD)	22.9 ±3.9
	Underweight (BMI<18.5)	5 (17%)
	Normal (BMI 18.5 - 25)	15 (53%)
	Overweight (BMI 25 - 30)	7 (23%)
	Obese (BMI 30+)	1 (3%)
Ethnicity	Hispanic	4 (13%)
	Not Hispanic	26 (87%)
Race	Multiracial*	5 (20%)
	Asian (Chinese, Filipino, Japanese, Korean, Vietnamese)	13 (43%)
	White	10 (33%)
	Not reported	2 (6%)
Class Standing	Freshmen	12 (40%)
	Sophomore	4 (13%)
	Junior	4 (13%)
	Senior	6 (20%)
	5 th year / grad student	2 (6%)
Major	Biological Sciences**	10 (33%)
	Health Focus***	5 (17%)
	Other	15 (50%)

*Multiracial: Participants who reported as ≥2 races. This included combinations of Native Hawaiian+ Asian, Native American + White, Asian + White

**Biological sciences: majors pertaining to biology and other related studies (microbiology, marine biology, etc..).

***Health focus was defined as majors pertaining to nutrition, medicine, and kinesiology.

Table 2: Key barriers to healthy eating in college students at UHM (n=30)

	Barrier	Definition	Exemplifying Quotation
Individual^a	Lack of Knowledge	Lack of knowledge of how to obtain or prepare food, lack of nutrition knowledge or inability to identify healthy foods	<i>"I think my biggest barrier is definitely not knowing what I'm doing. Just not knowing what to buy, not knowing what to cook to be healthy."</i>
	Attitudes and Beliefs	Regarding healthy eating as undesirable	<i>"I feel like eating healthy is kind of a chore. It's healthy but it doesn't taste the best. It doesn't make me happy, because you're supposed to enjoy eating."</i>
	Attitude and Beliefs: Prioritization*	Regarding healthy eating as not a priority in relation to other factors	<i>"After a long day of school [...] we worry more about convenience than health."</i>
	Attitude and Beliefs: Procrastination*	Regarding healthy eating as not urgent	<i>"Not until something affects them do they really realize like, 'Oh I should probably change my eating habits'"</i>
	Attitude and Beliefs: Thriftiness*	Believing resources should be used carefully and waste avoided	<i>"I think it's hard for a lot of college students to eat healthy in the dining halls because it's all-you-can-eat. You want to get your money's worth."</i>
	Behaviors*	Performing peripheral behaviors that hinder healthy eating	<i>"You take a handful of [brand name snack] and go study. Studying is really boring and you're not focusing well. Then you get another handful and then you go get another handful. Then you bring the box in your room [laughter]. And [...] you're basically unconsciously just eating them as you study and you don't even recognize [how much] you've eaten."</i>
	Taste Preference*	Preference for the taste of foods perceived to be unhealthy	<i>"I'm not going to suffer through gross, I'm going to go eat pizza [laughs]."</i>
Social Environmental^b	Parental Control*	Parental influence that encourages unhealthy eating behaviors	<i>"Students may also change their eating habits on purpose because they were limited by their parents or guardians. Because it's 'Eat your vegetables,' and now there's nobody so there's no restrictions."</i>
	Peer Pressure*	Pressure from peers to engage in unhealthy eating behaviors	<i>"I would never eat past 8, but when everyone's hanging out, eating like chips and stuff, [...] and it's there and [you're]</i>

			<i>like, “Oh okay, I’ll have like a few chips.” I’d never [...] do that at home. So it’s the social part.”</i>
Physical Environmental^f	Institutional Environment *	Aspects of the college environment that hinder healthy eating	<i>“There’s definitely ways to be healthy on campus, but there’s a lot of places here that have better, healthier options that are way more expensive.”</i>
	Living Situation*	Negative impact of living situation on available food options	<i>“If I had an apartment with a kitchen I would be better off because I could just cook for myself.”</i>
	Lack of Facilities*	Lack of food storage space or utensils that hinder healthy eating	<i>“All I had was a mini fridge and a microwave and my food suddenly became ramen and whatever was just I could order [online] so not really many fruits or veggies”.</i>
	Location*	Lack of proximity to grocery stores or commute hindering healthy eating	<i>“Because a lot of us aren’t from here, we don’t have that access—Well, I mean, we have the bus, but it’s not like we can take so many groceries with us on the bus. It’s difficult for us to... wander away from campus to go buy what we need. “</i>
Macrosystem^d	Cost*	Negative impact of cost on healthy food options	<i>“I can get a lot more out of my money if I’m buying things like pastas, cereals, those kinds of fast filling foods. Rather than buying fresh fruit, vegetables, and meat [which are] expensive as well [...] it’s much more cost effective.”</i>
	Lack of Education*	Characteristics of the educational system that hinder healthy eating	<i>“In the education system, we’ve taken out so many things that are important, you know? When- when my parents- just older generations talk about school, they had a lot of life skills classes [...]they had home-ec.”</i>

^a Individual characteristics that cause people to avoid healthy eating, including psychosocial factors (attitudes and beliefs, knowledge, self-efficacy, preferences), behavioral factors (meal and snack habits and other food-related behaviors), and lifestyle factors (perceived barriers, cost, time, convenience).

^b Interpersonal influences (including family, friends, peer networks, and other social groups that model and reinforce perceived norms) that encourage unhealthy eating behaviors

^c Influences in the community setting which influence the accessibility and availability of foods, such as grocery stores, vending machines, cafeterias, etc. such that healthy eating is more difficult.

^d Influences pertaining to mass media, advertising, marketing, social norms, cultural norms, food production and distribution systems, local, state, and federal policies which influence food-related issues that serve as a barrier to healthy eating.

Definitions of the socio-ecological influences are from Story et al's summary of influences at each socio-ecological level.¹⁷

*Asterisked barriers are expanded on in the "Results" section.

Table 3: Key enablers of healthy eating in college students at UHM (n=30)

	Enabler	Definition	Exemplifying Quote
Individual^a	Knowledge	Knowledge or awareness of nutrition, understanding of dietary restrictions, and ability to identify healthy foods	<i>“Being aware really does help. I took nutrition and fitness last year. It honestly did change the way I ate a little bit because I just learned a lot about eating habits and what’s in food and things like that.”</i>
	Attitude and Beliefs: Perceptions	Perceptions that make healthy eating desirable	<i>“It’s not about the body for me, it’s about the energy. That’s how I look at it. Food is energy”.</i>
	Attitude and Beliefs: Prioritization	Belief that healthy eating is a priority in relation to other factors	<i>“I’m the most disorganized person ever. But [meal prep] is a priority in my life. So every Sunday I cook seven dinners and then snacks and then I freeze them.”</i>
	Attitude and Beliefs: Thriftiness*	Belief that resources should be used carefully and waste avoided	<i>“A recipe makes a certain amount and you’re like “well I don’t want to waste this or it won’t fit in my fridge and to me being wasteful is really being part of being healthy. Like being healthy to the planet.”</i>
	Dietary Restrictions	Having a health condition that requires a particular diet	<i>“last year, I had to go to the doctor a lot because I didn’t know what was going on with me. So I guess that’s why you have to be healthy [...] Even though you don’t want to do it, you still have to.”</i>
	Behaviors*	Performing peripheral behaviors that foster healthy eating	<i>“I take time to meal prep and so I can eat healthy and it’s easier for me to choose a healthy snack”.</i>
Social Environmental^b	Parental Control*	Parental influence on the home eating environment that encourages healthy eating behaviors	<i>“When it’s at home your parents monitor what you eat. Like, ‘No, you’re not going to eat half a pan of brownies.’”</i>
	Peer Support	Interpersonal support for healthy behavior change as a bonding/shared activity	<i>“[my best friend and I] go workout together, make dinner together. It was because that we had each other that we were like ok like ‘tonight we’re gonna do this its gonna be great’. You make it fun.”</i>

Physical Environmental^c	Institutional Environment	Aspects of the college environment that foster healthy eating	<i>“One of the things I do like about UH though is the farmers market that they have. Where it has those fruits and vegetables. That’s at a really good price. So it’s almost like having a mini grocery store. So I appreciate the school giving us that much.”</i>
	Living Situation	Positive impact of living situation on available food options	<i>“Now I live off campus and I pack lunches every day, so I’m not buying the food [on campus] since there are the limited healthy options [...] I definitely see better eating habits now that I’m living off campus as opposed to living on campus.”</i>
Macrosystem^d	Social Media*	Positive impact of social media on eating habits	<i>“Social media now, too, is an enabler. Because there’s so many more like, vegan, vegetarian, like healthy food pages that you can find recipes on that are pretty make-able [...] I think socially and society-wise, it’s being more promoted.”</i>
	Cost*	Positive impact of cost on healthy food options	<i>“if we have a little more money [...] then it might be easier for some students to figure out what food they want that’s more of a priority to them - which might be the more expensive healthier food.”</i>

^a Individual characteristics that encourage people toward healthy eating, including psychosocial factors (attitudes and beliefs, knowledge, self-efficacy, preferences), behavioral factors (meal and snack habits and other food-related behaviors), and lifestyle factors (perceived enablers, cost, time, convenience).

^b Interpersonal influences (including family, friends, peer networks, and other social groups that model and reinforce perceived norms) that encourage healthy eating behaviors

^c Influences in the community setting which influence the accessibility and availability of foods, such as grocery stores, vending machines, cafeterias, etc. such that healthy eating is easier.

^d Influences pertaining to mass media, advertising, marketing, social norms, cultural norms, food production and distribution systems, local, state, and federal policies which influence food-related issues that serve as an enabler of healthy eating.

Definitions of the socio-ecological influences are from Story et al’s summary of influences at each socio-ecological level.¹⁷

*Asterisked barriers are expanded on in the “Results” section.

Chapter 4: Discussion

This study revealed barriers and enablers of healthy eating in college students in Hawai'i at the four levels of influence in the socio-ecological model. Findings may be used to inform additional research in this population or interventions targeting college students in Hawai'i.

Individual:

Knowledge served as both a key barrier and key enabler on the individual level. This finding is in concordance with previous studies that have identified knowledge as an enabler of healthy eating in college students.^{11,18} To address the lack of knowledge some students described, one possibility is offering a health class to improve nutrition education. This suggestion has been offered in previous studies to improve eating habits of students.^{10,18} However, college students may have widely differing characteristics and levels of nutrition-related knowledge. More research into tailoring classes to address varying levels of nutrition knowledge, psychosocial characteristics, or health risks may result in more effective targeting of diverse groups of college students.¹⁹

Attitudes and beliefs toward healthy eating in individuals were identified as both a barrier and enabler. As a barrier, some students viewed healthy eating as something that could be postponed, or a lower priority in relation to their school life. Attitudes found in this population were consistent with a previous study demonstrating that those in earlier life stages placed less importance of healthy eating, while those in later life stages deemed healthy eating of greater significance.²⁰

The perception that healthy food is not convenient food was a common theme. Students often placed healthy food at odds with convenience in stating that healthy food took longer to prepare or required more planning than pre-packaged foods, take-out, or other options.

However, convenience food has typically been defined in relation to time and labor required for food preparation; it is not necessarily unhealthy, although preserved or processed foods may have added sugar or salt to preserve flavor.²¹ Pre-cut fruits or vegetables and nuts fall within the scope of convenience food definition, and these have been shown to be perceived as healthy snacks by college students.^{22,23} Interventions promoting convenient and healthy food options may be helpful in countering the perception that healthy food is labor-intensive.

Social:

Parental control was viewed as both an enabler and barrier to healthy eating. Students reported that healthy food choices were easier with someone creating a healthier environment for them, or monitoring their behavior. Previous research also indicates that parental influence shapes the child's perceptions of regularity and normal behavior.²⁴ Findings of the current study also aligned with previous research regarding the desire to rebel and overindulge in forbidden foods when too much parental control and prohibition is exercised.²⁵

Aside from family groups, peer groups were also identified at the social level of the socio-ecological model. Part of this peer group includes friends, acquaintances, or a boyfriend. Through friend groups, behaviors are modeled, which can serve as either a barrier or enabler to healthy eating. In the current study's focus groups, friend groups were valued as support for making a lifestyle change together especially with encouragement and keeping each other accountable for performing the desired behavior. However, although social support in these focus groups was a reported enabler, other studies in college students have reported peer groups as a barrier by normalizing stress-related eating behaviors, like eating when bored, bingeing on junk food, or eating at irregular times.²⁶ In the current study, participants mentioned eating when bored as an individual rather than social barrier.

Environmental:

The “all you can eat” style of cafeteria at UHM was deemed both a barrier and enabler of healthy eating, because both healthy and less healthy offerings are provided on an unlimited, regular basis. In order to “get one’s money worth,” some students reported eating beyond satiety. However, with buffet layout, there are ways to reduce mindless overeating or minimize the effect of overeating by portioning food or avoiding more than two different foods on the plate at the same time.²⁷ Aside from minimizing overeating, placing healthier foods at the front of the cafeteria may increase better food choices in the buffet.²⁸ A possible intervention could include teaching healthier buffet behavior in conjunction with modifying the physical layout of the buffet.

Location of grocery stores in relation to campus, dorms, or living situation was a barrier for students. A previous study in Hawai’i has been conducted to understand food availability and affordability in local communities based on supermarket or farmer’s market offerings and proximity to bus lines for several Hawai’i communities.²⁹ Future studies could adapt the aforementioned study’s analysis for food availability and affordability in the UHM college and surrounding neighborhood area by examining rent/housing costs, distance to grocery stores or farmer’s markets, cafeteria offerings, and bus line proximity. It is also recommended that future studies measure travel time to grocery stores from campus as travel time is a convenience-related cost that students consider when making food choices.³⁰

Macrosystem:

Cost was the most frequently mentioned barrier, which aligns with the findings of previous studies.^{9,11,33} Previous research has revealed that healthy diets cost more on a daily basis than unhealthy diets.³¹ Moreover, the cost of living in Honolulu is the highest in the United

States.³² Shipping, importation, distribution, and other factors in Hawaii are components of the high food cost. Limited interventions in the college environment have been conducted with food cost-lowering measures, and none have been done yet in Hawaii. A previous study found that identifying budget-friendly fruit and vegetable options as a point-of-purchase message was effective in increasing fruit and vegetable selection by college students, and future research could determine if this intervention is translatable to Hawaii's population.³³

Students' perceived norms played a role in enabling healthy behaviors, as participants perceived health as trendy, especially in social media in the past few years.³⁴ Some participants regarded social media as a source of health promotion, allowing students to shape their perception of normalized behavior by selecting whom to follow. Students may model behavior seen in social media or use it as reinforcement of healthy behaviors. When healthy behaviors are considered part of social identity, and these attitudes are repeatedly reinforced via social media, students may maintain healthier behaviors through the reinforcing spiral model.³⁵

Limitations:

The study may have been subject to selection bias, because students who participated in the study knew the topic prior to the focus group. Half of the students who took part in the study were also from nutrition or health-related majors, which means that their eating habits may not reflect those of the broader student population. Findings may not be generalizable to the rest of the population, nor are the identified barriers or enablers quantifiable.

Future directions:

Future studies could use triangulation to further explore the barriers and enablers through the mix of qualitative and quantitative method research.³⁶ Aside from further elucidating the

barriers and enablers, questionnaires could be administered to quantify or rank barriers or enablers in relation to each other.

Future studies on the physical environment of the school and students' living conditions would be helpful in determining how to establish a more supportive environment, especially since the physical environment was a commonly identified barrier. Interventions should be focused on addressing the most significant perceived barriers of cost, institution, and location to build a supportive environment for healthy eating.

Chapter 6: Conclusion

This study has identified the perceived barriers and enablers of healthy eating in college students. More barriers than enablers were identified. The largest barriers by socio-ecological level were nutrition knowledge deficit (individual), excessive parental control (social environmental), unsupportive institutional environment (physical environmental), and cost (macrosystem). The largest enablers by socio-ecological level were nutrition knowledge (individual), beneficial parental control (social environmental), a college food environment with consistent healthy offerings (physical environmental), and social media (macrosystem). More research is needed to develop a synergistic multi-level intervention to improve healthy eating in college students in Hawai'i. Results suggest the need for an intervention focused on the physical environment and supplemented by nutrition education and social support.

Appendix: Focus Group Question Guide

Opening

- Where are you from and what's your name?

Introduction

- Describe healthy eating.

Transition

- Thinking of 'healthy eating in university students', what comes to your mind?
- Think back of the last year(s) being a university student. Did your eating behaviors change since you entered college?

Key

- Did your eating behaviors change since you entered college?
- Which factors have caused these changes? (or which factors influence current health behaviours)? What barriers and enablers of healthy behavior can you identify?
- Which of the previous mentioned factors have had the greatest influence? How and why?
- Please tell me a few reasons why students like you might want to eat healthier foods?
- Please tell me a few reasons why students might not eat healthy already?

Ending

- Do you have any remarks, suggestions, additions?
- Soon, we will try to help students make healthier choices. Can you give us some advice on how to promote healthy eating behaviours in students?

Questions adapted from:

9) Ashton LM, Hutchesson MJ, Rollo ME, Morgan PJ, Thompson DI, Collins CE. Young adult males' motivators and perceived barriers towards eating healthily and being active: a qualitative study. *Int J Behav Nutr Phys Act.* 2015;12:93. doi:10.1186/s12966-015-0257-6.

10) Deliens T, Clarys P, De Bourdeaudhuij I, Deforche B. Determinants of eating behaviour in university students: a qualitative study using focus group discussions. *BMC Public Health.* 2014;14(1):1-22. doi:10.1186/1471-2458-14-53.

References

1. Racette, SB, Susan S Deusinger Pt P, Phd MJS, Gabrielle R Highstein Rn P, Robert H Deusinger Pt P. Weight changes, exercise, and dietary patterns during freshman and sophomore years of college. *J Am Coll Health*. 2005;53(6):245-251. doi:10.3200/JACH.53.6.245-251.
2. American College Health Association National College Health Assessment. Fall 2016 Reference Group Executive Summary. http://www.acha-ncha.org/docs/NCHA-II_FALL_2016_REFERENCE_GROUP_EXECUTIVE_SUMMARY.pdf. Published 2016. Accessed May 25, 2017.
3. Nelson MC, Story M. Food environments in university dorms: 20,000 calories per dorm room and counting. *Am J Prev Med*. 2009;36(6):523-526. doi:10.1016/j.amepre.2009.01.030.
4. Boot AM, de Ridder MAJ, van der Sluis IM, van Slobbe I, Krenning EP, Keizer-Schrama SMPF de M. Peak bone mineral density, lean body mass and fractures. *Bone*. 2010;46(2):336-341. doi:10.1016/j.bone.2009.10.003.
5. Nelson MC, Story M, Larson NI, Neumark-Sztainer D, Lytle LA. Emerging adulthood and college-aged youth: an overlooked age for weight-related behavior change. *Obesity*. 2008;16(10):2205-2211. doi:10.1038/oby.2008.365.
6. Arnett JJ. Emerging Adulthood: What is it, and what is it good for? *Child Dev Perspect*. 2007;1(2):68-73. doi:10.1111/j.1750-8606.2007.00016.x.
7. Schwartz J, Richardson CG. Exploring the potential for internet-based interventions for treatment of overweight and obesity in college students. *Glob Health Promot*. 2015;22(4):20-28.
8. LaCaille LJ, Dauner KN, Krambeer RJ, Pedersen J. Psychosocial and Environmental Determinants of eating behaviors, physical activity, and weight change among college students: a qualitative analysis. *J Am Coll Health*. 2011;59(6):531-538. doi:10.1080/07448481.2010.523855.
9. Ashton LM, Hutchesson MJ, Rollo ME, Morgan PJ, Thompson DI, Collins CE. Young adult males' motivators and perceived barriers towards eating healthily and being active: a qualitative study. *Int J Behav Nutr Phys Act*. 2015;12:93. doi:10.1186/s12966-015-0257-6.
10. Deliens T, Clarys P, De Bourdeaudhuij I, Deforche B. Determinants of eating behaviour in university students: a qualitative study using focus group discussions. *BMC Public Health*. 2014;14(1):1-22. doi:10.1186/1471-2458-14-53.
11. Hartman H, Wadsworth DP, Penny S, van Assema P, Page R. Psychosocial determinants of fruit and vegetable consumption among students in a New Zealand university. Results of focus group interviews. *Appetite*. 2013;65:35-42. doi:10.1016/j.appet.2013.02.005.

12. Stokols D. Translating social ecological theory into guidelines for community health promotion. *Am J Health Promot.* 1996;10(4):282-298.
13. McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. *Health Educ Q.* 1988;15(4):351-377. doi:10.1177/109019818801500401.
14. Whittemore R, Chase S, Mandle CL. Validity in qualitative research. *Qual Health Res.* 2001;11(4):522-537.
15. Francis JJ, Johnston M, Robertson C, et al. What is an adequate sample size? Operationalising data saturation for theory-based interview studies. *Psychol Health.* 2010;25(10):1229-1245. doi:10.1080/08870440903194015.
16. Hsieh H-F, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res.* 2005;15(9):1277-1288. doi:10.1177/1049732305276687.
17. Story M, Neumark-Sztainer D, French S. Individual and environmental influences on adolescent eating behaviors. *Suppl J Am Diet Assoc.* 2002;102(Number 3):S40-S51.
18. Kolodinsky J, Harvey-Berino JR, Berlin L, Johnson RK, Reynolds TW. Knowledge of current dietary guidelines and food choice by college students: better eaters have higher knowledge of dietary guidance. *J Am Diet Assoc.* 2007;107(8):1409-1413. doi:10.1016/j.jada.2007.05.016.
19. Greene GW, Schembre SM, White AA, et al. Identifying clusters of college students at elevated health risk based on eating and exercise behaviors and psychosocial determinants of body weight. *J Am Diet Assoc.* 2011;111(3):394-400. doi:10.1016/j.jada.2010.11.011.
20. Backett KC, Davison C. Lifecourse and lifestyle: the social and cultural location of health behaviours. *Soc Sci Med.* 1995;40(5):629-638. doi:10.1016/0277-9536(95)80007-7.
21. Scholliers P. Convenience foods: what, why, and when. *Appetite.* 2015;94:2-6. doi:10.1016/j.appet.2015.02.017.
22. Daniels S, Glorieux I. Convenience, food and family lives: a socio-typological study of household food expenditures in 21st-century Belgium. *Appetite.* 2015;94:54-61. doi:10.1016/j.appet.2015.04.074.
23. Banna J, Richards R, Brown LB. College students' perceived differences between the terms real meal, meal, and snack. *J Nutr Educ Behav.* 2017;49(3):228-235.e1. doi:10.1016/j.jneb.2016.11.001.
24. Branen L, Fletcher J. Comparison of college students' current eating habits and recollections of their childhood food practices. *J Nutr Educ.* 1999;31(6):304-310. doi:10.1016/S0022-3182(99)70483-8.

25. Soetens B, Braet C, Van Vlierberghe L, Roets A. Resisting temptation: effects of exposure to a forbidden food on eating behaviour. *Appetite*. 2008;51(1):202-205. doi:10.1016/j.appet.2008.01.007.
26. Hudd SS, Dumlao J, Erdmann-Sager D, et al. Stress at college: effects on health habits, health status and self-esteem. *Coll Stud J*. 2000;34(2):217-228.
27. Just DR, Wansink B. The flat-rate pricing paradox: conflicting effects of “all-you-can-eat” Buffet Pricing. *Rev Econ Stat*. 2010;93(1):193-200. doi:10.1162/REST_a_00057.
28. Wansink B, Hanks AS. Slim by design: serving healthy foods first in buffet lines improves overall meal selection. *PloS One*. 2013;8(10):e77055. doi:10.1371/journal.pone.0077055.
29. Lee S, Oshiro M, Hsu L, Buchthal OV, Sentell T. Public health hotline. *Hawaii J Med Public Health*. 2012;71(8):232-237.
30. Furst T, Connors M, Bisogni CA, Sobal J, Falk LW. Food choice: a conceptual model of the process. *Appetite*. 1996;26(3):247-266. doi:10.1006/appe.1996.0019.
31. Rao M, Afshin A, Singh G, Mozaffarian D. Do healthier foods and diet patterns cost more than less healthy options? A systematic review and meta-analysis. *BMJ Open*. 2013;3(12):e004277. doi:10.1136/bmjopen-2013-004277.
32. The State of Hawaii Data Book. Table 14.22-- Top 10 Most Expensive and 10 Cheapest States to Live: 2015. <http://files.hawaii.gov/dbedt/economic/databook/2014-individual/14/142214.pdf>. Published 2014. Accessed April 6, 2017.
33. Buscher LA, Martin KA, Crocker S. Point-of-purchase messages framed in terms of cost, convenience, taste, and energy improve healthful snack selection in a college foodservice setting. *J Am Diet Assoc*. 2001;101(8):909-913. doi:10.1016/S0002-8223(01)00223-1.
34. Liu JS, Ho MH-C, Lu LYY. Recent themes in social networking service research. *PLOS ONE*. 2017;12(1):e0170293. doi:10.1371/journal.pone.0170293.
35. Slater MD. Reinforcing spirals model: conceptualizing the relationship between media content exposure and the development and maintenance of attitudes. *Media Psychol*. 2015;18(3):370-395. doi:10.1080/15213269.2014.897236.
36. Jick TD. Mixing qualitative and quantitative methods: triangulation in action. *Adm Sci Q*. 1979;24(4):602-611.