

Challenges, Opportunities, and Motivators for Developing and Applying Food Literacy in a University Setting: A Qualitative Study



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ABSTRACT

Background Evolving norms and complex food environments may require new skill sets and mind-sets to maintain a healthy diet. Food literacy acknowledges the influence of external factors in shaping a person's development and application of the knowledge, skills, and behaviors required for healthy eating. Food literacy among college students is not well understood; however, higher education presents a unique opportunity for promoting food literacy.

Objective This study aimed to identify a range of challenges, opportunities, and motivators for students to develop and apply food literacy in a university setting.

Design Eleven focus groups were conducted with four student subpopulations: three with residential undergraduates, three with off-campus undergraduates, three with graduate students, and two with students using food security resources.

Participants/setting Eighty-two students enrolled at a large, diverse, public university in an urban setting in California.

Analysis Guided by an ecological perspective, transcripts were analyzed using an integrated approach. This involved an inductive development of themes and deductive organization of themes according to research aims.

Results We developed a novel model as a starting point for understanding and addressing the dynamic challenges, opportunities, and motivators for students to develop and apply food literacy. Challenges include the physical food environment, confusing information, capacity and resource constraints, and social tensions. Opportunities include media and the Internet, academic courses, peer learning, campus resources, and dining halls. Motivators include health, social responsibility, personal development, and enjoyment and bonding.

Conclusions Students view college as an appropriate time to develop food literacy and the university as a trusted partner. However, efforts to promote food literacy should acknowledge perceived challenges and varying motivations for engaging with food.

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PROMOTING HEALTHY EATING IS A CRUCIAL STRATEGY for enhancing health and reducing risk of chronic diseases.¹ A review of dietary interventions suggests that, to promote healthy eating, people should be motivated, confident in their abilities, and exposed to supportive environments.² Contemporary life, however, poses challenges to healthy eating. Driven largely by urbanization and industry incentives, ultraprocessed foods high in sugar and saturated fat now dominate our food supply.³ This shift from traditional, whole foods to more energy-dense convenience foods is often referred to as the “nutrition transition.”^{3,4} In the United States, this shift is accompanied by notable sociodemographic and lifestyle changes, including a rise in dual income households, higher consumption of food prepared outside the home, increased portion sizes, and reduced food preparation skills.⁵⁻¹⁰ Despite continued investment in nutrition education, typical eating patterns do

not align with national guidelines or objectives.^{11,12} Indeed nutrition knowledge is necessary but not sufficient for healthy eating; evolving norms and complex food environments may require new skill sets and mind-sets to maintain healthy eating.^{13,14}

Food Literacy

A growing literature identifies “food literacy” as an opportunity to promote healthy eating at individual and societal levels.^{6,14-21} In contrast to the historical emphasis on knowledge or skills in isolation, food literacy acknowledges the influence of external factors in shaping a person's development and application of the knowledge, skills, and behaviors required for healthy eating.^{14,18,20-22} A recently published food literacy framework consists of 11 attributes in five categories: (1) food and nutrition knowledge, (2) food

skills, (3) self-efficacy and confidence, (4) ecologic (external) factors, and (5) food decisions.²² Still, conceptualization, measurement, and promotion of food literacy may differ by population and context.

Food Literacy Among College Students

From a life course perspective, interventions that target food literacy early in life offer the greatest potential for lifelong impact.²³ Addressing food literacy among adolescents and young adults may be particularly impactful, given this group's developmental period when they are navigating new eating independence, establishing their own identity, and building lifelong health-related habits.^{16,17,24} To date, food literacy efforts have focused primarily on early and middle adolescents.^{16,17,25,26} However, research suggests diet quality often declines in late adolescence and early adulthood, a sensitive period when many Americans are moving away from home and navigating new autonomy in food responsibilities and behavior.²⁷ Furthermore, although numerous studies have demonstrated positive associations between food literacy attributes and healthy eating, food literacy as a holistic concept is less understood.^{16,17}

In 2018, approximately 20 million Americans enrolled in colleges and universities, environments that often pose challenges to healthy eating, such as all-you-care-to-eat dining halls, lack of peer and institutional support, financial constraints, and stress.^{24,28,29} On the other hand, higher education settings present a unique opportunity for promoting food literacy, and many institutions already promote healthy eating through both programmatic and environmental strategies.³⁰ Emerging findings suggest strategies to promote food literacy among college students may improve healthy eating in the short term and hold promise to impact long-term well-being and academic success.^{27,30-32} Recent studies have noted an overall lack of opportunities for food skills development prior to independent living; however, little is known about influences that could shape food literacy among college students and what aspects of food literacy are relevant in a university setting.^{6,32,33}

This study aimed to build upon our prior work³² by further exploring the challenges, opportunities, and motivators for students to develop and apply food literacy in a university setting. Qualitative methodology was appropriate to address our exploratory, student-centered research aims; focus groups were chosen to facilitate interaction and elicit rich, experiential information.³⁴ By describing students' experiences and perspectives, this article contributes to the conceptualization of food literacy in higher education and provides insights for future measurement and promotion.

METHODS

Study Setting and Participants

The study took place at a large, diverse, public university in an urban setting in California. Of the over 31,000 undergraduates and 14,500 graduate students, the majority belong to a racial or ethnic minority group.³⁵ More than 97% of new freshman and 51% of new transfers live in campus housing with a residential meal plan.³⁵ Meal plan options range from 11 to 19 meals per week.³⁶ Residential dining options consist of six quick-service restaurants and four all-you-care-to-eat dining halls, including one health-themed

RESEARCH SNAPSHOT

Research Question: What are the challenges, opportunities, and motivators for students to develop and apply food literacy in a university setting?

Key Findings: In this qualitative study of 11 focus groups (n=82) at a large, public university, we developed a novel model as a starting point for understanding and addressing the dynamic challenges, opportunities, and motivators for students to develop and apply food literacy in a university setting. Overall, we found students view college as an appropriate time to develop food literacy and the university as a trusted partner. However, efforts to promote food literacy should acknowledge perceived challenges and varying motivations for engaging with food.

dining hall, which opened in fall 2013.^{37,38} Nonresidential students can buy vouchers to eat at residential restaurants or purchase food and drinks at the numerous venues across campus. Other food- and nutrition-related campus resources include the Healthy Campus Initiative programs and gardens,³⁹ Student Health Education & Promotion,⁴⁰ the Student Wellness Commission,⁴¹ the Community Programs Office food closet,⁴² Swipe Out Hunger meal donations,⁴³ services of a registered dietitian at the student health center,⁴⁴ and education and menu nutritive analyses provided by residential dining.³⁶

Study participants included 82 students from four student subpopulations: residential undergraduates, undergraduates living off campus, graduate students, and students using food security resources, such as the food pantry or free meal vouchers. Due to the unique dining experience of residential undergraduates, recruitment was tailored to reach students in leadership roles who could serve as "informants," including student policy review board representatives; this was achieved by e-mailing the Residential Life student leadership listserv. Undergraduates and graduate students living off campus were recruited via e-mail announcements distributed by academic departments. Interested students completed a brief online screener, including questions about major, gender, international student status, and racial or ethnic group. Of those who completed the screener, the research team purposively selected a diverse sample of students to include a range of perspectives. Due to growing concern around food insecurity among college students, undergraduates and graduate students utilizing food security resources (used as a proxy for food insecurity) were purposively recruited.⁴⁵ These students were referred by food security program leaders.

Description of Focus Groups

To maximize homogeneity among focus group participants, students were assigned to sessions by subpopulation. A total of 11 focus groups were conducted: three with residential undergraduates, three with undergraduates living off campus, three with graduate students, and two with students using food security resources. Group size ranged from five to 10, with a mean of seven students. It is considered best practice to conduct at least three sessions with each

subpopulation; however, the research team was unable to recruit an adequate number of students using food security resources within the data collection period of spring 2016. All focus groups were held on campus, except the sessions with students using food security resources, which were held at a campus-adjacent community space. Upon arrival, students were informed of confidentiality, asked to read and sign informed consent documents, and asked to complete a short survey, which included demographic information and the validated US Department of Agriculture six-item food security short form.⁴⁶ Focus group interviews were moderated by authors H.M. and T.W., lasted 90 minutes, and followed a semistructured format. Moderators were both graduate students at the time of the study. All sessions were audio recorded, and participation was incentivized with a meal and \$30 gift card. The study was approved by the university's Institutional Review Board.

Focus Group Questions

The research team developed the interview guide based on food literacy literature and qualitative literature on eating behavior among college students (Figure 1). Following recommended procedures,⁴⁷ the guide was pretested using a convenience sample of eight students from the same university, including both undergraduates and graduate students. It was then modified to improve clarity of questions and conversational flow. Questions were intentionally broad to allow for exploration of important student-identified topics. For example, sessions began by asking students to discuss where they usually get food and what is most important to them when deciding what and where to eat; we then asked how they learn about food, how their food behaviors have changed since growing up, and their opinions about receiving food education or training from the university.

Data Analysis

Results from the intake survey were tabulated, and student food security status was assessed using the validated US Department of Agriculture six-item short form scoring criteria.⁴⁶ Audio recordings were transcribed by a transcription service. The goal of the analysis was to capture common themes and the range of perspectives within in each theme; thus, we decided early on to aggregate the data for analysis. As such, findings refer to all subgroups unless otherwise noted. Authors H.M., T.W., D.G., and M.P. analyzed the transcripts using an integrated approach, including an inductive development of codes and themes, and a deductive

framework for organizing themes according to the study aims.⁴⁸ Guided by an ecological perspective,⁴⁹ we reviewed session notes and transcripts multiple times for overall understanding and to allow themes to emerge. More specifically, we interpreted student experiences as influenced by multiple levels—including individual, interpersonal, institutional, and broader system levels—and considered the interaction of influences across levels.⁴⁹ This was particularly important for interpreting conflicting student perspectives, where external conditions appeared to affect students differently.⁵⁰ Codes were finalized through an iterative process in which authors H.M. and T.W. used the constant comparison method to compare segments of coded text and determine whether the same concept was captured.⁴⁸ Once finalized, the coding structure was applied to all transcripts using Atlas.ti Version 1.0.48.⁵¹

RESULTS

Participant characteristics are presented in the Table. Compared with the broader campus population, participants were more likely to be female and minority race or ethnicity, receive financial aid, and have experienced food insecurity. Themes are described herein within three domains of challenges, opportunities, and motivators. Themes were assigned to domains based on typical comments. However, we note the range of student perspectives within each theme such that factors typically experienced as opportunities or motivators were experienced by some students as challenges, and vice versa. Domains, themes, and supporting quotes are presented in Figure 2. In Figure 3, we present a novel model illustrating themes within domains. We conceptualize each domain as dynamically influenced by and influencing the others. For example, motivators can inspire students to seek out opportunities to develop food literacy but can also be dampened by challenges.

Challenges

The first domain captures challenges students typically perceive in developing and applying food literacy. These include the physical environment, confusing information, capacity and resource constraints, and social tensions.

Physical Environment. In general, students perceived their physical environments (the accessibility, availability, and affordability of food) to contradict what they know or are being told about healthy eating. There was mixed discussion about the acceptability of food sold on and near campus, but nonresidential students typically emphasized that available

Where do you usually eat or get food?
 What is most important to you when deciding what and where to eat?
 Now that you're a [university] student, how are your food choices different than they were growing up?
 Over the course of your life, how have you learned about food and nutrition?
 Can you think of any examples of when you've gotten mixed messages about food?
 What do you think about receiving training or education around food as a [university] student?
 What would it mean for someone to be food literate?
 Would you consider yourself to be food literate? Why or why not?

Figure 1. Food literacy interview guide for 11 focus groups with 82 students at a large public university, 2016.

Table. Sociodemographic characteristics of university students participating in food literacy focus groups (n=82) and broader campus population^a

Characteristics	Participants	Participants	Campus population
Gender	<i>n</i>	← % ^b →	
Female	50	61	53
Male	31	38	47
Gender nonconforming	1	1	—
Race or ethnicity			
Asian or Pacific Islander	27	33	35
Hispanic or Latino	23	28	20
White	15	18	35
Biracial or multiracial	7	9	—
Black or African American	5	6	5
Other	5	6	4
International student status			
Domestic	77	94	85
International	5	6	15
Year in school			
First-year undergraduate	12	15	13
Second-year undergraduate	7	9	13
Third-year undergraduate	19	23	19
Fourth-year undergraduate	14	17	18
Fifth year or more	6	7	5
Total undergraduate	57	70	86
Graduate	24	29	32
Living situation			
Campus residential housing	25	30	27
Off-campus housing	57	69	73
Receiving financial aid^c			
Yes	64	78	65 ^d
No	18	22	35 ^d
Food security status^e			
Food secure	38	46	60
Food insecure	44	54	40
Age	<i>Range</i>	<i>Mean</i>	
Residential undergraduate	18-22	19.32	—
Undergraduate living off campus	19-29	21.49	—
Graduate student	24-45	28.54	—

^aAdapted with permission from Watson TD, Malan H, Glik D, Martinez SM. College students identify university support for basic needs and life skills as key ingredient in addressing food insecurity on campus. *Calif Agric.* 2017;71(3):130-138.³²

^bPercentages may not add up to 100 due to rounding.

^cStudents receiving any financial aid, including grants, loans, and scholarships.

^dPercentages available for undergraduate students only.

^eAssessed using the validated US Department of Agriculture six-item short form.⁴⁴

food perceived as healthy is expensive or does not fill them up. Residential undergraduates discussed challenges with managing access to new food options and consuming

appropriate portion sizes in an all-you-care-to-eat dining format. Nonresidential students typically said they felt confined to food retailers within walking distance of campus,

Theme	Student quote
Domain 1: Challenges	
Physical environment	"They send you mixed messages. They're saying obesity is a problem or whatever, but in reality, they're making it a problem for you because you can't get the salad because it's much more expensive than the unhealthy food. So, how is that your fault?" <i>[Female undergraduate student living off campus]</i> "For me, as a low-income student, [healthy food is] not affordable, it's not accessible . . . all of the healthy options near [campus], it seems like they're just increasing in price." <i>[Male graduate student]</i> "Now I have a choice of what I want to eat . . . I just go, and it's already made. I guess that's where the Freshman 15 comes in . . . I guess just having options." <i>[Female residential undergraduate student]</i> "Yeah, [supermarket chain store within walking distance of campus] is really expensive . . . [an ethnic supermarket store], it's much cheaper sometimes, or the [discount variety store]. I shop there all the time. I get all my veggies from the [discount variety store], they're really good." <i>[Female undergraduate student living off campus]</i>
Confusing information	"There's so many articles, I think, that are conflicting, that sometimes it's confusing which ones you need to follow. So then I need to look at the sources, but then I don't know . . . and I get confused, so I just think, I'm gonna do what I'm gonna do already." <i>[Female graduate student]</i> "I think labels are a big thing, especially with processed foods. Especially today, there is healthy processed food, so those have organic or natural labels, but what are organic or really natural labels? They are still processed and not natural." <i>[Female undergraduate student living off campus]</i> "[There is a perception of] the vegetarian choice being healthy, but then you put salad dressing on it, and suddenly you have a 2,000-calorie salad. And that's something that a lot of people take for granted." <i>[Male graduate student]</i>
Capacity and resource constraints	"Sometimes I don't care. I'm like, I'm in college. I'm a student. I have finals to worry about, not what I'm eating." <i>[Male residential undergraduate student]</i> "When I feel busy and when I feel low energy, I just don't eat real [food], I just eat snacks. Yeah, even though I want to be healthy and just eat healthy food, I just don't feel the mood of doing that." <i>[Female graduate student]</i> "I try my best to plan meals every week . . . how can I maximize the ingredients the rest of the week so they don't rot . . . [and so] I stay within my budget. But it's really hard because sometimes you're really busy at school or you're at [school] the entire day, so you don't have time to cook every night or you just don't feel like eating the same thing over and over again." <i>[Female undergraduate student living off campus]</i> "I've felt that way before as well, survival mode . . . there's guilt associated with, 'I'm not going to spend \$5 on a sandwich when I have all of these things to pay' . . . so, I just never really ate until I got home for dinner." <i>[Female graduate student]</i>
Social tensions	"I grew up in a Chinese household . . . so my mom always cooked Asian dishes and she taught me, but we have no Asian markets around here that I can conveniently go to and it's kind of harder to cook, so . . . I never cook Asian food." <i>[Female undergraduate student living off campus]</i> "I come from a very traditional Mexican household, so you would have pozole, enchiladas, a lot of fatty foods . . . now that I cook stir-fry or I have hummus and pita chips, when I go back home, they're like, 'What are you eating, what is that? Like, you're not Mexican anymore.'" <i>[Female undergraduate student living off campus]</i> "Where we come from—personally, at [the health-themed dining hall], I have no idea what any of the food was . . . So yeah, for me, I go with what I'm comfortable with. I'm comfortable with pizza, okay, I know what that is." <i>[Female residential undergraduate student]</i> "It's like a culture thing too . . . everyone knows when you go to college you're going to eat unhealthy, that kind of the thing." <i>[Female undergraduate student living off campus]</i>

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Figure 2. Domains, themes, and supporting quotes about developing and applying food literacy in a university setting, generated from 11 focus groups with 82 students at a large public university, 2016.

Theme	Student quote
Domain 2: Opportunities	
Media and Internet	"When I was in high school, it was more of a family factor, but at college it's more about friends and documentary or online resources, newspaper, magazines." <i>[Male undergraduate student living off campus]</i> "[I learn from] basically just me [searching videos and materials online], and over the course of time . . . you kind of put together for yourself what seems to be the correct combination of protein, carbs, and where to get that kind of stuff." <i>[Male undergraduate student living off campus]</i> "When I see somebody 'Like' [a cooking video on social media], I'm like, oh, that looks good, okay. Then, I'll do my own research . . . and go, like, eggplant pomodoro, how do I make that? Then I look through recipes . . . and come up with my own thing." <i>[Female graduate student]</i>
Academic courses	"I'm in environmental sciences, so classes always talk about what food does, where it comes from, and all that so it's—that's factoring in [to my food decisions], what my professors are teaching me." <i>[Male residential undergraduate student]</i> "I took [the physiology course] . . . It really talks about all aspects of diet and exercise. I was like, 'Wow. Now I can start implementing this into my life.'" <i>[Male undergraduate student living off campus]</i>
Peer learning	"You see . . . people in the dining hall, and your friends kind of influence what you eat too. 'Oh, this thing's really good, you should try it.' So that type of thing." <i>[Female residential undergraduate student]</i> "There's so many people around me that are talking about all these documentaries that they've seen on [internet entertainment service] about different types of food, and what diets to do . . . I feel like when I moved [here] all my friends were on a diet . . . So it's very salient for me now." <i>[Female graduate student]</i>
Campus resources	"I took one seminar . . . about diet and what . . . and how you should eat, and how you actually shouldn't diet, and those types of things. I think that's actually really helpful to hear from a dietitian or a nutritionist." <i>[Female undergraduate student living off campus]</i> "What I liked about [the program] so much was that [the dietitian] designed the class in a way and gave us the tips . . . where she knew that we were on a student budget. For example, she knew that sometimes all we could afford was cup of noodles . . . 'Okay, do your cup of noodles, but buy yourself some veggies and mix it as a stir fry' or ideas . . . that I can actually do . . . because I can't afford to eat 100% right every day." <i>[Female undergraduate student living off campus]</i> "[The community café] has been literally a miracle discovery, and that's pretty much the place where I get most of my food . . . I was like, 'Oh, I can get food from here and other people understand my situation,' and I felt more comfortable." <i>[Female graduate student]</i>
Dining halls	"It's exciting . . . there's so many foods that I've tried here that I never had at home . . . I tried way more vegetables and fruits so . . . it's a learning experience." <i>[Female residential undergraduate student]</i> "They have little flyers in [the dining hall about] why they were cutting their salt . . . or why they're cutting down on beef. It's really interesting and informative." <i>[Female residential undergraduate student]</i>
Domain 3: Motivators	
Health	"[Chinese fast food] and pizza and stuff that makes you real sleepy or real groggy—that's not gonna fuel you to study right." <i>[Male undergraduate student living off campus]</i> "It's not until someone in your family or someone close to you gets sick with high cholesterol or diabetes . . . I think I'm more conscious of [what I eat] because of that." <i>[Male undergraduate student living off campus]</i>

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Figure 2. (continued) Domains, themes, and supporting quotes about developing and applying food literacy in a university setting, generated from 11 focus groups with 82 students at a large public university, 2016.

Theme	Student quote
Social responsibility	"I'll go back home and tell my parents, 'I tried this, and this, and this. Can I try to make it? Would you guys try it?' . . . I'm slowly trying to get them to eat healthier, too." <i>[Female residential undergraduate student]</i>
	"I think [food education is] more compelling when it's attached to a social justice issue . . . Food desert sort of issues, or the ways in which the youth in certain environments aren't getting access to things that would help them do well in school." <i>[Female graduate student]</i>
	"I think in college I realized that my individual actions actually can make an impact . . . [I went vegan because of the] impact on the environment and as a political statement against the agribusiness industry." <i>[Female undergraduate student living off campus]</i>
	"The exploitation of farmworkers . . . those sorts of things really do affect our communities . . . even exploiting the animals as well." <i>[Female undergraduate student living off campus]</i>
Personal development	"I didn't start thinking about my health until college. Even if I pondered about it in high school, there was no way I could decide about what I was gonna eat." <i>[Male undergraduate student living off campus]</i>
	"Next year I am not living on [campus] anymore, so I wanna know how to buy smart or maybe how to buy things on a budget but still not go for chips and ramen . . . a lot of people don't know how to cook. I know my friend, she's like, 'Oh no, I'll just go buy frozen foods.' And it's like, maybe you can just learn how to cook." <i>[Female residential undergraduate student]</i>
	"If [food and nutrition education] was more of mainstream education, I think that would be beneficial. Like high school, you only learn health about like once." <i>[Male undergraduate student living off campus]</i>
Enjoyment and bonding	"I really enjoy cooking . . . and [my boyfriend] appreciates my cooking, so I will just [take the time] anyway." <i>[Female undergraduate student living off campus]</i>
	"[My roommate and I] didn't really talk until we found out that we both liked [cooking]. And, we ended up becoming roommates after that, and best friends. So, that kind of really spurred my want to learn more and to experiment more." <i>[Female graduate student]</i>

Figure 2. (continued) Domains, themes, and supporting quotes about developing and applying food literacy in a university setting, generated from 11 focus groups with 82 students at a large public university, 2016.

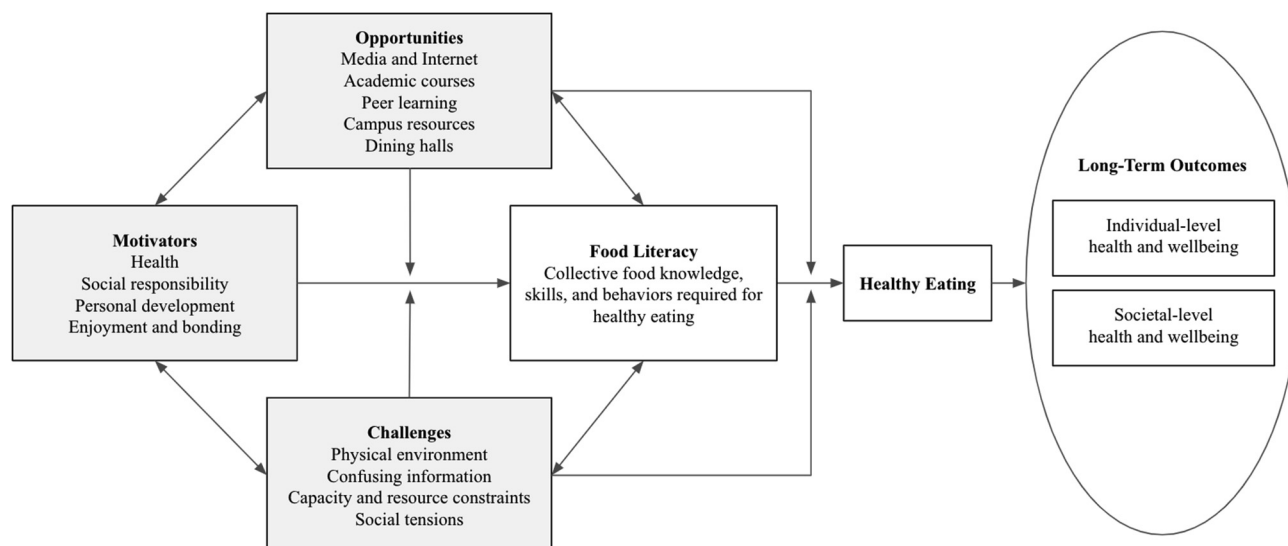


Figure 3. Conceptual model of emergent challenges, opportunities, and motivators for developing and applying food literacy in a university setting, generated from 11 focus groups with 82 students at a large public university, 2016.

because many did not own cars. Some said nearby grocery stores were unaffordable or culturally inappropriate (eg, lack of Asian foods), thus they found ways to travel to discount and ethnic markets.

Confusing Information. Students described confusing food and nutrition information as a challenge, commonly discussing conflicting Internet sources and media coverage of dietary guidance. In general, students were aware of evolving nutrition science, yet some expressed frustration about contradictory findings. Students identified confusion around a variety of topics, including genetically modified organisms, dietary supplements, and fad diets. Students expressed skepticism of a profit-oriented food system. They discussed mistrust toward food companies and product claims, including misleading labels. It was also typical for students to comment on the complexity of food choices, including nutritional tradeoffs (eg, less fat, more sugar) and hidden threats.

Capacity and Resource Constraints. Students discussed personal capacity limitations due to competing priorities. This involved feeling overwhelmed by the demands of student life, where healthy eating is seen as not worth it. It was also typical for students to comment on financial constraints. Nonresidential students consistently described planning and preparing meals for one person on a budget as challenging. They also commented on lacking a fully stocked kitchen as a barrier to cooking. Students described lacking the capacity or resources to eat according to their ideals. For example, students discussed feeling bad about skipping meals or choosing foods perceived as undesirable, such as frozen foods, nonorganic produce, or conventionally produced eggs. Students who experienced persistent resource constraints described eating as a stressor. This was particularly pronounced among participants in the groups of students utilizing food security resources.

Social Tensions. Students discussed tensions around navigating new eating independence, social norms, and identities. Some described conflicts between family norms and new ways of eating in college. Nonresidential students described a tendency to cook noncultural food. Some students noted a loss of cultural identity as a result of new dietary patterns or described healthy eating as incompatible with their cultural preferences. When discussing the transition to college, some students, particularly those of color, said they avoid unfamiliar foods and the university's health-themed dining hall. Undergraduates described the dining halls as having different themes (eg, comfort food, Asian, healthy) and thus attracting students from different social groups. It was also typical for students to discuss perceptions of college norms that challenge healthy behaviors, such as eating snack foods, eating at all hours, and eating for appearance over health.

Opportunities

The second domain captures opportunities utilized for developing and applying food literacy. These include media and the Internet, academic courses, peer learning, campus resources, and dining halls.

Media and the Internet. Although students described challenges with confusing information, they consistently discussed media and the Internet as opportunities to learn about food. Students indicated greater exposure to and use of these sources in college as compared with earlier in life. It was typical for students to refer to documentary films as a source of information about food systems, food politics, and health. Students also discussed TV shows, websites, social media, and digital applications as sources of information and skills. Although it was common for students to discuss searching for food and nutrition information on the Internet, it was clear they encountered food-related content regardless of whether they actively sought it out.

Academic Courses. University courses also emerged as an opportunity to develop food literacy. Students referred to a broad range of academic disciplines and topics, from life sciences to law. Students expressed trust in their professors, saying courses often changed their behaviors and critical thinking about food. In general, undergraduates discussed greater exposure to food-related academic topics, and graduate student exposure depended largely on field of study. Undergraduates consistently discussed their perceived impact of a general education physiology course on their exercise and dietary behaviors. This course requires students to keep a food and exercise journal as part of the curriculum.

Peer Learning. Students described how the primary social influence over their eating habits changed from family to peers during college. They consistently discussed their peers' role in expanding their knowledge of food and ways of eating. Students described learning by observing others, discussing peers' dietary preferences and restrictions, exploring new restaurants, and cooking with friends or living companions.

Campus Resources. Students discussed various campus resources. They mentioned utilizing research databases, participating in extracurricular programs, reading newsletters, meeting with nutrition professionals, and getting free food from events and other sources. Although students typically described these resources as helpful, there was mixed discussion about visibility and students' willingness to seek them out. Students were most enthusiastic about programming that provided instruction about mindfulness and eating on a budget. In the groups of students using food resources, free meal vouchers, the campus food pantry, and a nearby community café (which provides free meals to students) were discussed as essential resources. In particular, students commented on the social support gained in the community café setting.

Dining Halls. Undergraduate groups consistently discussed the dining halls as an opportunity to develop and apply food literacy. They discussed trying new things, expanding their food vocabulary, and acting on their motivation to eat healthfully. Some commented on how their tastes changed after eating in the dining halls for an extended period of time, which often facilitated healthier habits. Many of these comments involved the health-themed dining hall. However, as mentioned previously, some students discussed discomfort around trying new foods and said they did not feel comfortable at the health-themed dining hall. In general, students said they appreciate having access to menus and

nutritive analyses online and said they pay attention to the informational signage in the dining halls about ingredients and procurement (eg, local, free range).

Motivators

The third domain captures motivators for students to develop and apply food literacy. These include health, social responsibility, personal development, and enjoyment and bonding.

Health. Students discussed health as a driver for developing and applying food literacy. Comments typically referred to health in terms of immediate physical and mental responses to food intake. For example, students discussed wanting to feel alert and energetic, and healthy eating was described as a way to enhance academic performance and physical functioning. Students also discussed their desire to eat healthfully to prevent chronic disease, which was typically a reaction to family experiences. Some students were motivated not only to change their own behavior, but also to improve their families' health.

Social Responsibility. Students discussed social responsibility as a motivator for developing and applying food literacy. Beyond individual health, students discussed interest in food as a social justice and environmental issue. Some students described food choices as political statements, such as buying fair trade or boycotting food products. Students also expressed concern for the ethical treatment of animals, and some discussed problematic environmental and labor practices.

Personal Development. Students referred to college as a time when they became responsible for and more conscious of their food behaviors. As such, they described college as an appropriate time to develop food knowledge and skills. They identified the transition to living off campus as a particularly important time to learn meal planning and cooking. Students were also interested in developing life skills around budgeting and time management. Graduate students often said life skills training should be provided during undergraduate rather than graduate education; however, many were still interested in improving their cooking skills. Although some mentioned learning about the food pyramid, students typically described a lack of food and nutrition education in school.

Enjoyment and Bonding. Students described enjoyment and bonding as motivators for dedicating time and resources to food. It was common for students to describe eating, cooking, and exploring restaurants as a fun activity to share with friends. Some students discussed building friendships or gaining respect among social groups through cooking.

DISCUSSION

Our findings contribute to the emerging understanding of food literacy by describing a range of influences on students' development and application of food literacy in a university setting. We categorized emergent food literacy themes within three domains: challenges, opportunities, and motivators. As described previously and illustrated in Figure 3, these domains and themes reinforce the interaction of individual and external factors emphasized in prior work.²²

Within the domain of challenges, salient external factors include the physical food environment, confusing information, and social tensions; individual factors include capacity and resource constraints. The opportunities domain highlights students' engagement with external resources including media and the Internet, academic courses, peer learning, campus resources, and dining halls. Finally, we identify factors that may motivate different students, including health, social responsibility, personal development, and enjoyment and bonding.

Results can be used by dietitians and researchers to complement existing food literacy frameworks when designing quantitative measures and programs for college students. For example, our findings echo previous work indicating important skills and attitudes for residential undergraduates may include navigating campus dining halls and willingness to try new foods²⁹; for students living off campus, important skills may include planning and preparing efficient meals for one person on a limited budget.^{52,53} In general, reported perceptions of healthy options as expensive, unacceptable, or inconvenient are well documented.^{29,52,54,55} As such, our results underscore the potential for dietitians to positively impact students' diet quality by partnering with campus food providers to create supportive food environments.^{56,57} Increasing the availability of and promoting price-beneficial, appealing, and satiating healthy foods may be particularly important in this setting where food insecurity and meal-skipping are common.^{45,58} In addition, dietitians can help students build skills to identify available food resources or select and prepare affordable, culturally acceptable, and convenient healthy options.^{27,54}

Our diverse participants also highlighted the apparent interaction between individual, social, and physical environmental factors in shaping food literacy. For instance, students' perceptions of the university environment varied widely, with some describing the transition to college as an exciting opportunity and others describing it as a challenge. A particularly insightful example involves students' reported engagement with the health-themed dining hall. Although all residential undergraduates have access to the health-themed dining hall, students who were already comfortable with or motivated by healthy eating were more likely to utilize this resource. Other students felt the dining hall was not for them. These findings may help explain why some food environment interventions do not result in desired behavior change.⁵⁹

Students' exposure to and seeking of food information emerged as both a challenge and an opportunity for food literacy. Studies suggest it is common for college students to report using the Internet to find health information; however, their ability to critically assess food and nutrition information from various sources is less understood.^{60,61} Food-related media has proliferated in recent years, and although some media may enhance food literacy, studies suggest ubiquitous and conflicting information can result in apathy and loss of self-efficacy.⁶²⁻⁶⁴ Amidst confusing information, participants in this study commented on the usefulness and credibility of information provided by professors, dietitians, and the university itself; thus, we emphasize nutrition staff, faculty, and food-service as important sources and curators of food information. Previous work with college students confirms their desire for expert information and suggests positive responses to point-of-selection signage on campus.^{30,53,65} Reported effectiveness

of academic courses to change behavior is also supported in the literature.³⁰ More specifically, courses that include self-monitoring or address food issues from a variety of perspectives (eg, food and society) have been effective in improving healthy eating behaviors among college students.^{30,66,67}

Importantly, our results suggest students are interested in developing life skills, and they view college as an appropriate time to develop food literacy. The range of motivators identified in this study indicates a variety of approaches for engaging students. Beyond disease prevention, results confirm that emphasizing short-term positive feelings associated with healthy eating may be particularly resonant.⁶⁸ In line with reported interest in social responsibility, a previous study found about half of young adults place moderate to high importance on alternative food production practices, which in turn is associated with healthy dietary behaviors.⁶⁹ Prior work has also emphasized the importance of creating enjoyable, social food experiences to encourage healthy eating among young people.¹⁹

Limitations

Due to convenience and purposive sampling methods used at a single university, as well as the qualitative design, results may not be generalizable to other higher education settings. Additional research is needed to replicate, clarify, and expand upon results. Study participants may have been more interested than the broader student body in food issues and university support for food literacy. Recruitment barriers also limited the number of sessions to only two focus group with students using food security resources. Despite efforts to create a comfortable environment, some experiences and opinions perceived as rare or unpopular may not have been shared.³⁴ The framework we describe here is intended as a first step in contextualizing food literacy in a higher education setting. Future work on other campuses will be important to generate a comprehensive list of challenges, opportunities, and motivators. Finally, emergent themes could have been assumed a priori; to minimize bias, multiple authors took a systematic approach to discussing and resolving coding discrepancies and finalizing themes.

CONCLUSIONS

Food literacy is an emerging concept for promoting healthy eating. This study presents a novel model as a starting point for understanding and addressing the dynamic challenges, opportunities, and motivators for students to develop and apply food literacy in a university setting. We identify a range of themes and student perspectives, which underscores the interplay of individual and external factors in shaping food literacy. Findings suggest students view college as an appropriate time to develop food literacy and the university as a trusted partner. However, efforts to promote food literacy should acknowledge perceived challenges and varying motivations for engaging with food. Results can be used by dietitians and researchers to complement existing food literacy frameworks when designing quantitative measures and programming.

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STATEMENT OF POTENTIAL CONFLICT OF INTEREST

No potential conflict of interest was reported by the authors.

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H. Malan, T. D. Watson, and W. Slusser conceptualized the study. H. Malan and T. D. Watson designed the study and facilitated the focus groups. H. Malan, T. D. Watson, M. Prelip, and D. Glik analyzed the data. H. Malan interpreted the data and drafted the initial manuscript with contributions from T. D. Watson and M. Prelip. W. Slusser, D. Glik, and A. C. Rowat substantially contributed to the development of the focus group interview guide and study protocol. D. Glik and M. Prelip provided crucial feedback on the analytic plan and interpretation of the data. T. D. Watson, W. Slusser, D. Glik, A. C. Rowat, and M. Prelip revised the article critically for important intellectual content.