Changes in Eating Habits Among Eating Competent and Non-Eating Competent College Students During the COVID-19 Pandemic

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Abstract

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Introduction: Recent studies have illuminated changes related to dietary quality and eating behaviors that U.S. university students experienced during global coronavirus lockdowns. Limited qualitative research has been published on this topic. This study aimed to describe eating- and drinking-related behavior changes reported by U.S. undergraduate students during the COVID-19 pandemic using the theoretical framework of Eating Competence (EC).

Methods: This was a secondary analysis of data collected from an online survey administered from October through December 2020 to undergraduate students. The original survey consisted of previously validated and/or published instruments, including the Satter Eating Competence Inventory (ecSI 2.0™). Using a direct content analysis approach, this study coded respondents' answers to two open-ended questions regarding eating and drinking habits. Codes were written and classified deductively under the four domains of Eating Competence: Eating Attitudes, Food

Acceptance, Internal Regulation, and Contextual Skills. Other codes were developed inductively to represent responses that did not fit within these domains. Respondents were categorized as EC or not EC based on their ecSI 2.0™ scores.

Results: 1,529 responses were analyzed. The eating context changed for many respondents, who widely reported eating and being at home more often during the pandemic, regardless of EC status. Many EC respondents discussed leaning into the changes in context and structure by trying more foods, cooking more often, and listening to their body's hunger cues. Non-EC respondents frequently discussed how changes in their routine and lack of structure had resulted in a struggle to eat regularly, expressed concerns with weight, and were intentionally restricting their intake.

Conclusion: Changes related to the eating context and contextual skills, as well as underlying stress, were primary drivers of the changes in eating habits that respondents experienced during the pandemic. This study highlights the benefit of qualitative analysis for expanding our understanding of theoretical frameworks like Eating Competence.

Supplementary Files: 1) Code book, which includes the parent and sub-codes, a description of when the codes were applied, and examples of code applications. 2) Code tree, which visually represents some of the relationships between codes.

Introduction

The coronavirus outbreak and resulting pandemic presented a unique challenge to college students. In response to the outbreak, on March 9, 2020, the University of Washington moved classes online (1) and continued to conduct classes and operations online through the rest of the academic year. By autumn 2020, about 90% of classes were held remotely (2), and undergraduate students were given the option to attend classes in a fully remote format (3), negating the need for students to be living on or near campus. Residence halls remained open (3), but by the start of autumn quarter 2020, the number of students moving into residence halls at the University of Washington – about 4,000 – was less than half the normal residence hall capacity (2).

The college years are already understood to be a mentally challenging time for young adults, and quarantining, self-isolating, and moving home as a result of the pandemic often negatively affected students' mental health (4). College students' dietary quality has been previously described as less-than-optimal throughout the college experience (5). Still, in light of the unprecedented disruption of the COVID-19 pandemic and its associated effects on mental health and the social environment, researchers have been working to answer the question of how the pandemic affected U.S. students' dietary quality and eating behaviors.

Recent research has revealed that the pandemic negatively impacted dietary quality. In a study of first-year college freshman who were surveyed at two time points before the pandemic and at the end of their first year, which coincided with online classes and COVID-19 restrictions, students' self-perception of changes in their eating patterns were mixed, with the majority reporting eating less healthy, about a third reporting eating healthier, and a fifth reporting no change in their eating (6). During the pandemic, surveyed students who reported poorer dietary quality also reported higher perceived stress and poorer mental health (6). Factors such as higher financial stress, poor sleep quality, and increased rates of food insecurity contributed to poorer dietary quality among U.S. students during the pandemic, as well (7).

The pandemic also negatively affected students' eating behaviors, which likely influenced the overall changes in dietary quality. In a cross-sectional study of eating pattern changes among undergraduate and graduate students during the pandemic, students reported a mix of eating more and eating less, with students attributing eating more to stress and boredom (8). Those students who reported eating less attributed the change to stress, as well as financial limitations in some cases (8). Among students who reported eating more, there was a significant increase in the frequency of eating (8). In a young adult, non-undergraduate population (mean age 24.7 ± 2.0 years), higher occurrence of depressive symptoms, food insecurity, and moderate financial difficulties were associated with higher occurrence of less-extreme unhealthy weight control behaviors (e.g. eating very little, skipping meals) during the pandemic (9). In contrast, respondents with higher stress management abilities had lower counts of extreme unhealthy weight control behaviors (e.g., use of diet pills, self-induced vomiting) and decreased occurrences of binge eating (9). A qualitative analysis of an open-ended question about how COVID-19 had influenced respondents' eating behaviors identified themes such as mindless eating and snacking, eating to cope, and re-emergence or increase in eating disorder symptoms, including skipping meals and difficulty maintaining eating disorder recovery (9). These findings highlight some of the ways in which the pandemic negatively impacted eating behaviors, but because neither of these study populations focused exclusively on undergraduate students (8,9), these findings cannot be generalized to the full U.S. undergraduate population.

Qualitative studies of college students' pandemic-related eating behavior changes are limited. In a focus group conducted among 30 U.S. university students who had relied on the resident dining plan and campus dining hall prior to the start of lockdown, students' food choices were mainly affected by food availability and household roles (10). Most students who moved home with family adopted passive roles and did not participate in purchasing or preparing foods, whereas students living outside of the family home assumed greater responsibility for purchasing and preparing foods (10). While students reported

increased snacking behavior and some negative changes in food choices such as increased consumption of non-perishables and junk food, the most positive behavior changes were associated with students who had an already-developed sense of self-efficacy (e.g. purchasing groceries, cooking meals of higher quality and nutritional content) (10).

One framework for understanding eating habits and behaviors is the evidence- and practice-based Satter eating competence model (ecSatter). The model is built upon the concept that internal cues – hunger, appetite, and satiety – reliably inform food selection and the biological tendency to maintain stable body weight (11). Planning for meal times, trusting internal regulation cues, ensuring that there is enough rewarding food available at meal times, and incorporating a variety of foods are some of the behaviors and skills that define competent eaters (11). Adaptive behavior is also key. In the ecSatter model, competent eaters give themselves permission to choose foods for pleasure, can make do by choosing from available food, and will choose food of varying caloric content to make up for energy deficits using internal regulatory capabilities (11). Previous quantitative studies have demonstrated that eating competent (EC) university students have higher perceived dietary quality, lower desired weight loss, lower psychological/emotional distress, and lower emotional eating when compared to non-EC students (12). EC students also have lower BMI (12) and incidence of overweight/obesity (13,14). In other, non-student populations, eating competence has been associated with better food management skills (15), as well as food budgeting and planning skills (16). Given these findings and what is known about EC individuals, the ecSatter model offers a unique lens through which to view eating behaviors.

Eating competence has primarily been quantitatively studied using the validated ecSatter Inventory (ecSI 2.0™), a questionnaire consisting of 16 scored statements (further described in the Methods section). Qualitative studies that provide contextual nuance to eating competence are limited. The only published qualitative study of eating competence was an analysis of interviews with low-income adults in Pennsylvania that found convenience, mood, family, and food available at home were factors that guided meal and snack planning for both EC and non-EC participants (17). Dieting and weight loss were important considerations in planning discussed by non-EC participants but not EC participants (17). A qualitative study of EC among college students has not been published, so thematic similarities or differences in how EC or non-EC students may describe their own eating attitudes, food preferences, or meal-planning abilities – among other EC-related traits – have yet to be elucidated.

It is unclear how the unprecedented pandemic may have affected eating competence and its related characteristics in the student population. At the time of writing (July 2022), there is only one published study regarding the topic in an adult population. In a retrospective “post-then-pre” study of Brazilian adults, eating competence decreased during the pandemic, particularly among adults who reported weight gain, decreased fruit and vegetable consumption, and increased sugary beverage consumption (18). It is unknown whether behavior changes among EC and non-EC university students may have differed from the changes described in this Brazilian adult population.

The primary aim of this study was to qualitatively assess the ways in which undergraduate university students’ eating and drinking behaviors changed following the coronavirus outbreak in the U.S. Because these differences are not quantifiable due to the cross-sectional nature of the original survey, a qualitative approach was used to explore behavior-change-related themes. This study draws upon a significantly larger sample (with over 1,500 respondents) than that of the focus group conducted by Powell et al (10). The time point of the survey data also differs from most studies conducted in this population; most previously published studies collected data early in the pandemic, often during the lockdown period, with survey deployment dates ranging from March to May 2020 (4,6,8,10). This study draws upon data that was collected in autumn quarter (October to December) 2020, after the initial disruption of the pandemic and the announcement of remote learning. We hypothesized that students in our study may have reported behavior changes that differed from those reported earlier in the pandemic, considering that students would have had time to adapt and adjust to their altered schedules and environments.

Our secondary aim was to understand whether eating habits changed differently among EC and non-EC students, as measured by the ecSI 2.0™. One of the benefits of qualitative analysis is the ability to obtain information directly from study participants (19). With this in mind, we chose to analyze open-ended

responses in an effort to gain more nuanced insights into “how” and “why” EC and non-EC students perceived their eating habits changing during the COVID-19 pandemic. We hypothesized that EC and non-EC students may not only report different types of changes but that they may also describe these changes in different ways. Therefore, the EC component of this study contributes to our qualitative understanding of eating competence, in addition to addressing gaps in the literature regarding pandemic-related changes in eating habits among EC and non-EC undergraduate university students.

Methods

Study setting and participant recruitment

This study utilized data from an existing cross-sectional survey conducted by Dr. Cristen Harris, which was administered online during autumn quarter, October through December 2020, to undergraduate students at the University of Washington. Using an email list provided by the university Registrar, participants were recruited from all three campuses of the university by sending individual emails to a sample of 27,472 undergraduate students (representing 66.5% of the undergraduate student population) registered in autumn quarter 2020 (20). The invitation included a direct link to participate in “research investigating eating attitudes and behaviors during the coronavirus pandemic.” Faculty members teaching undergraduate courses during autumn quarter 2020 were also contacted via email requesting that they encourage students to respond. Respondents who voluntarily followed the link had the opportunity to review the informed consent and continue with the survey questions if they agreed to the consent statement. Respondents were excluded from participation if they met any of the following exclusion criteria: younger than 18 years old, not currently enrolled at the university as an undergraduate student, pregnant or lactating, or unable to read or understand English.

Data were collected using REDCap (Research Electronic Data Capture), a secure, web-based software platform designed to support data capture for research studies (21,22) hosted at the university. Data were collected anonymously, i.e., no personally identifying information was obtained. The online survey took approximately 15 minutes to complete and consisted of previously validated and/or published instruments, including the Satter Eating Competence Inventory (ecSI 2.0™) (23).

The ecSI 2.0™31 is a 16-item instrument used to measure eating competence and its four domains. It has demonstrated retest reliability (24) and construct validity in free-living adults (16), low-income females (25), and adults of higher socioeconomic status (26). Respondents select from five response options to 16 statements scored on a 4-point scale: 0 (never), 0 (rarely), 1 (sometimes), 2 (often), and 3 (always). Total scores range from 0 to 48, with a score of at least 32 or higher considered “eating competent.” This score was used as a continuous variable, consistent with previous work in college students (27,28,29). Four subscales comprise the domains of eating competence: Eating Attitudes (6 items), Food Acceptance (3 items), Internal Regulation (2 items), and Contextual Skills (5 items) (23). Cutoff values have not been established for the subscales.

Sociodemographic information collected to describe the sample included: age (years); gender identity (man, woman, transgender man, transgender woman, queer/gender queer, non-binary/gender non-conforming, or different identity); self-reported international student status (30); and living location (in the state, outside of the state but in the U.S., outside of the U.S. in a different country) (30).

For this study, we utilized responses to two open-ended survey questions that pertained to pandemic-related changes in eating and drinking behaviors: 1) “In what ways have your eating habits changed since the U.S. coronavirus outbreak?” and 2) “In what ways have your drinking habits changed since the U.S. coronavirus outbreak?” Because these responses were open-ended, we chose a qualitative analysis approach for this study. In July 2021, the Human Subjects Division of the University of Washington determined that this secondary analysis does not involve “human subjects” as defined by federal regulations and was considered “exempt” from full IRB review.

Description of theoretical framework

To understand whether eating habits changed differently among EC and non-EC students, as defined by the ecSI 2.0™, we chose to use the ecSatter model as the framework for our directed content analysis approach. The ecSatter model is an "interrelated spectrum of eating attitudes and behaviors" (11), which is divided into four domains consistent with the ecSI 2.0™ subscales: eating attitudes, internal regulation, food acceptance, and contextual skills (11). Because the domains are somewhat overlapping, each domain is theorized to involve and impact the others.

The first domain is eating attitudes. Eating attitudes in general can range from positive to negative – from comfortable to anxious, disinterested, or neutral – depending on past life experience and current factors like economic circumstances or ability to achieve weight and eating goals (11). Positive eating attitudes are supported by skills and behaviors related to the other domains (11). Conventional (or non-EC) attitudes are considered more negative; ambivalence and anxiety can produce inconsistent eating behavior, as well as "conflict between preferred and prescribed food selection" (11).

The second domain, food acceptance, is informed by enjoyment and pleasure, which, in turn, inform food selection (11). In ecSatter, food acceptance includes a curiosity about and inclination to experiment with novel food, which leads to incorporation of novel food into personal repertoires (11). EC food acceptance behaviors include comfort with eating preferred food, the ability to matter-of-factly select from available food, and settling for less-preferred food when needed to satisfy needs (11). In contrast, the non-EC approach downplays hedonic needs and is characterized by externally motivated food selection (11).

Internal regulation is the third domain of ecSatter, which recognizes the "physiological homeostatic mechanisms that support biologically preferred body weight" (11). When in an energy deficit, an individual's appetite reliably guides preference for calories and corresponding foods (11). Those who exhibit EC behaviors in this domain eat intentionally and pay attention to internal cues of hunger, appetite, and satiety (11). They are able to conform to the social structure of meals and snacks, are confident that there will be enough rewarding food available at mealtimes, are comfortable with the amount eaten, and exhibit greater acceptance of their body weight (11). Food restriction and striving for weight loss contrast with characteristics of internal regulation because they involve ignoring internal cues and instead rely on external cues (11). In contrast to internal regulation, external regulation involves calculated calorie requirements, prescribed food selection and portion sizes, and encourages negative energy balance to achieve defined BMI (11).

Because the assurance of regular eating occasions is foundational to eating competence, contextual skills comprise the crucial fourth domain of ecSatter (11). Contextual skills include feeding oneself regularly by scheduling eating times, setting aside time to eat, and making an effort to procure rewarding food (11). Reflective of the interrelated nature of the model, supporting a regular meal pattern with contextual skills theoretically supports behaviors that align with the other ecSatter domains: having a positive and relaxed eating attitude, trusting internal regulation cues and that there will be enough rewarding food available at meal times, and incorporating a variety of foods (11). With a more conventional, non-EC approach, meal planning involves prescribed calorie levels, amounts, and types of foods; this overlaps with externally regulated behaviors, as previously described (11).

Given that one of the aims of this study was to understand respondents' behavior changes within the context of eating competence, we chose to use a directed content analysis approach. Using such an approach allows researchers to validate or extend a theoretical framework – in this case, the ecSatter model as described – and this can help to determine the initial coding scheme (19). With directed content analysis, the key concepts of a theory or model can be used as initial coding categories (19). Therefore, we aligned the initial parent codes for changes in eating habits with the four domains of ecSatter: eating attitudes, food acceptance, internal regulation, and contextual skills.

While a directed content analysis approach is primarily a deductive method of content analysis, this approach can be used with either a structured or unconstrained matrix (31). With an unconstrained matrix, different categories, or codes, can be created under the deductively-identified categories using the

principles of inductive content analysis (31). All data are reviewed and coded to correspond with or exemplify the deductively-identified categories (31).

One of the limitations of the directed content analysis approach is that, by design, researchers approach the process with a strong bias and could be more likely to find evidence that supports their theoretical framework, as well as be blinded to the contextual aspects of the phenomenon they are studying (19). In this sense, the strength of including inductive coding is that it can fill the gaps left by the deductive framework. When using such a framework for analysis, there is a fine line between compressing the data too much and including an abundance of categories, which can either compromise the integrity of the materials or leave researchers unable to categorize the data (31). In using this approach, we strove to integrate the deductive and inductive aspects of analysis to best represent the data in this study.

Data analysis

1,996 respondents completed the online survey; 467 respondents did not provide answers for the open-ended questions related to eating and drinking habits and were excluded from this secondary analysis. In total, answers from 1,529 respondents were tabulated, verified for accuracy, and coded.

We used a direct content analysis approach to develop the initial, deductive code structure for the qualitative analysis of eating habits, which consisted of the four domains of ecSatter. We then used an inductive approach to identify relevant themes and sub-codes that emerged within the data. Acknowledging the breadth of the responses, as part of the preparation phase, we chose to conduct an initial pass of the first 500 responses to obtain a sense of the whole of the data, in accordance with the qualitative methods suggested by Elo and Kyangäs (31). At this time, we began to inductively identify possible sub-codes that would help to make sense of the data. As themes arose related to the characteristics described as part of each ecSatter domain, we categorized the corresponding inductive sub-codes within the overarching, deductive structure.

Given that the reliability of findings in qualitative research depends on how well chosen categories cover the data (31), we designed our sub-codes to reflect as many of the themes discussed by respondents as possible, within reason. Codes that could not be classified under the four domains were categorized as “Other codes” and remained a part of the coding process to identify themes that emerged outside the ecSatter-based framework. Because drinking habits are not addressed as part of the ecSatter domains, we only used inductive coding to identify themes within the responses to the question regarding drinking habits.

We developed a code book with direct quotations from excerpts to exemplify thematic coding choices. Codes were designed to reflect explicit, rather than implicit, themes that emerged. For example, the “eating less healthy” code was not to be applied if an investigator deemed the respondents’ change in eating as less healthy; rather, the code was only applied if the respondent specifically qualified their eating as less healthy. In an effort to ensure validity and reliability (32), the primary author, chair, committee member, and other graduate-student researchers discussed and agreed upon the relevance of the codes and their application to excerpts, as well as how these sub-codes would fit within the overarching code-frame. The code book and visualization of the code tree are included as supplementary materials.

Dedoose software (SocioCultural Research Consultants; Manhattan Beach, California, U.S.) was used for the purposes of coding the data. During code application, we were blinded to respondents’ EC status in order to ensure reliability and validity (33) and prevent biased identification of relevant text (19). After the primary author had initially coded the data, the code book was shared with and tested by a graduate-student researcher, who was blinded to the initial code applications and applied codes using the prepared code book. Following these tests, the primary author and researcher discussed the validity of the codes and resolved discrepancies in the code applications. Once coding was deemed complete by the research team, we analyzed the frequency and content of coded excerpts in relation to EC status.

Results

Of the 1,529 respondents who provided an answer to the open-ended questions regarding changes in their eating and/or drinking habits, a majority of the respondents identified as women (71.0%), white (53.9%), and living off-campus (72.0%), predominantly in Washington State, which limits the generalizability of the results. 40.0% of the sample was classified as eating competent by the ecSI 2.0™, which may have colored the differences between EC and non-EC respondents highlighted in the results. Further demographics are included in Table 1.

Table 1. Demographics of respondents who described their eating and/or drinking habits

	mean (SD)
Age (n=1529)	20.2 (3.7)
Current gender identity (n=1520)	**n (%)**
Man	368 (24.2)
Woman	1079 (71.0)
Transgender man	6 (0.4)
Transgender woman	2 (0.1)
Queer	13 (0.9)
Non-binary	37 (2.4)
All other gender identities	4 (0.3)
Prefer not to answer	11 (0.7)
Race or origin (n=1527)	**n (%)**
Black	22 (1.4)
South Asian	52 (3.4)
Arab/West Asian	19 (1.2)
Southeast Asian	322 (21.1)
Hispanic	72 (4.7)
American Indian	12 (0.8)
Native Hawaiian	4 (0.3)
White	823 (53.9)
More than one	196 (12.8)
All other races or origins	5 (0.3)
International student (n=1524)	**n (%)**
Yes	85 (5.6)
No	1439 (94.4)
Living location (n=1526)	**n (%)**
On-campus dorm	278 (18.2)

Fraternity/sorority	64 (4.2%)
Off-campus	1099 (72.0)
All other living locations	85 (5.6)
Off-campus living location (n=1097)	**n (%)**
In WA State	969 (88.3)
Outside WA, In U.S.	81 (7.4)
Outside U.S.	47 (4.3)
ecSI 2.0™ scores (n=1529)	**mean (SD)**
Total	28.8 (10.0)
Eating attitudes	11.1 (4.9)
Food Acceptance	5.4 (2.4)
Internal Regulation	3.7 (1.7)
Contextual Skills	8.6 (3.6)
Eating Competent (≥ 32)	611 (40.0%)

SD = standard deviation

Because the code-frame was designed with both a deductive framework, informed by the four domains of ecSatter, and an inductive framework that included overarching themes arising from the data, the results for each framework are described separately in the sections that follow.

Changes in eating habits among Eating Competent and non-Eating Competent respondents

As part of this study's deductive framework, responses that fit into one of the four domains of ecSatter were coded accordingly. Of the 1,529 total respondents, 594 reported changes related to contextual skills, 244 reported changes related to internal regulation, 93 reported changes related to eating attitudes, and 83 reported changes related to food acceptance. (See the Appendix for the numbers of respondents associated with each domain's respective sub-codes.) The quotes in Table 2 illustrate the types of responses that are representative of the domains and highlight some of the differences between EC and non-EC responses. Further discussion of the results are divided by domain.

Table 2. Illustrative quotes from EC and non-EC respondents, organized by EC domain

	<u>Eating Competent</u>	<u>Not Eating Competent</u>
Contextual skills	"*I have had more time to cook for myself/my family and that has made me more intentional about eating healthy foods.*" - #1754	*"struggling to eat regularly. will follow a good plan of eating 3 or 4 small meals a day but then will randomly break the good habit because of stress or lack of energy. i struggle to eat a lot because i do not have a large appetite and it makes it hard to gain weight."* - #756

	"My meal times have changed and become more flexible because I am home so much and don't have to eat at any specific times." - #702	*"I think I've been eating less, which is a bad thing for me. If I don't have a structured eating routine, I end up not eating as much because I don't get hungry. In addition, I sometimes have felt guilty for spending money on food, even if it is a good deal."* - #1383
Internal regulation		
	"I have been doing my best to eat healthier and listen to my body about what feels good and gives me energy." - #1595	*"I became more aware of my eating and with more time on my hands I became fixated on weight and body image."* - #1835
	"Trying to only eat until I feel satisfied since I am not as physically active as I used to be." - #1086	*"Since COVID-19 began, I felt the need for control in some aspect of my life and that turned into counting calories and restricting what I eat."* - #1230
<u>How much</u>		
	"I've been eating a bit less because instead of walking around campus a lot every day I am just sitting in my house basically." - #1828	*"As money is more tight and I try not to go to the grocery store very often, I have intentionally limited my intake each day. I often choose not to eat a meal in order to allow my food to last longer[...]"* - #804
	"I eat more often and/or larger quantities since covid started and we've been encouraged to stay home. I guess out of boredom and comfort. I still eat relatively healthy but I have gained a bit of weight (also less physical activity) since quarantine." - #1579	*"I try to eat less because I don't want to gain weight from staying at home. I usually only eat a fruit for the day and a regular dinner"* - #284
Eating attitudes		

	"At first, I was scared to be home so much and have access to the pantry whenever. Now, I've discovered that I actually feel more comfortable around food. I eat when I am hungry and stop when I am full. I don't look or count calories like I obsessively had in the past. It's really nice actually, a lot less stressful." - #1706	*“More disordered being alone more often. Many people have done glow up diets and workouts in quarantine and TikTok really fuels disordered eating.”* - #1984
	"It is much harder to plan ahead for my meals, i eat more packaged foods in general, but I still love cooking and eating the same amount as always[...]" - #1009	*"Spending more time at home I've found myself more likely to begin restricting food and going back to disordered eating patterns. This might be because of the lack of control/routine in other parts of my life."* - #539
Food acceptance		
	"I have tried more foods and eaten at home more than I normally would." - #229	*"I monitor my calories very closely and have become vegan"* - #75
	"I've been eating healthier and making a wider variety of meals" - #35	*"I don't order food as often, which makes me eat way less. I skip lunch sometimes because nothing appeals to me"* - #567

Contextual skills

Changes related to contextual skills were the most-reported changes in eating habits (Appendix). Both EC and non-EC respondents who reported a change in their meal routine or eating less regularly also frequently mentioned that the timing or number of their meals had changed due to their altered schedules. Often, this change was accompanied by a change in sleep pattern and lack of structure, usually in the context of being at home. Many EC and non-EC respondents discussed increased snacking, as well. While EC respondents tended to be more matter-of-fact about the changes in their meal routines, non-EC respondents repeatedly mentioned that the changes in their meal routine or regularity were accompanied by forgetting to eat, stress or other mental-health-related changes, and eating less overall. Among this non-EC subset, there were also mentions of eating more processed/prepared foods, eating less vegetables, and some disordered eating behaviors.

Both EC and non-EC respondents who reported cooking more often typically reported eating healthier, eating less takeout, and eating more at home. Many respondents qualified this as a positive change. Non-EC respondents frequently discussed increased time spent cooking as part of a dietary pattern they were following (e.g., pescatarian, vegan, vegetarian). Although respondents generally associated eating at home more often with overall positive changes and more control over what they were eating, other respondents reported increased eating at home as a negative change. Among both EC and non-EC groups, some respondents discussed losing control or autonomy over what they were eating; many also

associated boredom with eating greater amounts of food while at home. Some non-EC respondents who reported contextual skills-related changes also reported that being at home increased their disordered eating behaviors.

Internal regulation

Respondents who reported changes related to internal regulation often described eating with increased awareness and/or attention. Excerpts from EC respondents had a generally positive tone, as many of them linked this behavior change to being more mindful while eating. Although some non-EC respondents shared this positive tone, many who reported increased awareness discussed needing to track calories or their intake due to body image and weight concerns. Some EC respondents also reported tracking calories or overall intake due to concerns around weight and/or decreased activity. While tracking calories is implicitly a way to exert control, many non-EC respondents who discussed tracking calories explicitly mentioned the need for control alongside calorie-tracking behavior.

There was also a notable difference between EC and non-EC respondents who specifically reported weight concerns. EC respondents who reported weight concerns often discussed weight gain, including intentionally eating more to gain weight. In contrast, non-EC respondents frequently expressed concerns about gaining weight due to increased stress or anxiety, eating too much, and/or decreased activity.

Another frequently reported change was decreased appetite. Many EC and non-EC respondents reported decreased appetite related to decreased activity, with respondents like #1086 (Table 2) mentioning that they were taking care to eat only until satisfied. In addition, a subset of non-EC respondents discussed decreased appetite in relation to increased stress and/or anxiety, with some of these respondents reporting that they felt too ill to eat.

How Much

19.0% of respondents in the overall sample reported a change in the amount they were eating (Appendix). Both EC and non-EC respondents who reported eating less discussed this change in relation to decreased activity, an altered schedule, and changes in appetite due to stress. Non-EC respondents had more varied reasons for eating less, including financial constraints, fears of COVID exposure, lack of motivation to eat, weight concerns, and forgetting to eat (which was coded as skipping meals).

Of those who reported eating more overall (usually in quantity but sometimes described only as “eating more” without further detail), the common threads among both EC and non-EC respondents were eating more due to boredom and being at home. Non-EC respondents often reported eating more due to stress and anxiety, but a few non-EC respondents mentioned eating more due to having meals more regularly.

Eating attitudes

Disordered eating and binge eating were the most frequently reported behavior changes related to eating attitudes (Appendix). Some respondents who reported disordered eating or binge eating also discussed fluctuation, with these behaviors changing over the course of the pandemic. A handful of EC and non-EC respondents who reported disordered eating indicated that they were in the process of resolving their disordered eating habits. Non-EC respondents often reported that the pandemic had either caused them to relapse into disordered eating or that they felt they were fighting off a relapse. Of those who reported a reason for the increase in their binge eating, EC and non-EC respondents related this change to increased stress, altered schedules, and/or boredom in the context of being at home.

A small subset of EC and non-EC respondents reported listening to their body, exemplified by a more relaxed eating attitude, as illustrated by #1706 (Table 2). Another behavior that some EC and non-EC respondents reported was increased stress eating. There were no notable differences in the way that EC and non-EC respondents discussed these behaviors.

Food acceptance

Respondents who mentioned changes related to food acceptance frequently discussed initiating a diet at some point since the start of the pandemic. Of the respondents who mentioned initiating a diet, EC respondents more prevalently reported eating pescatarian, vegetarian, or cutting down on meat, while non-EC respondents more often reported initiating a vegan diet. In both groups, some respondents also mentioned initiating a diet in order to address health concerns.

A small subset of respondents reported eating a greater variety of foods, but eating a smaller variety of foods was more frequently reported (Appendix). In terms of eating a diet with less variety, non-EC respondents reported more issues with food access and financial constraints, compared to EC respondents who reported the same behavior change. EC respondents often mentioned repetitiveness in their meals but did not specify this change as being related to food access or financial constraints.

Changes in eating habits reported among all respondents, regardless of EC status

Among all respondents, common themes emerged that were predominantly illustrative of being in college during the COVID-19 pandemic and less related to EC status. Of the 1,529 total respondents, 185 respondents reported that their eating habits had not changed since the start of the pandemic, 313 respondents reported reasons for the changes in their behavior, and 298 respondents reported eating more or less of specific types of foods. (See the Appendix for the numbers of respondents associated with each theme and its respective sub-codes.) The quotes in Table 3 illustrate the types of responses given for each respective theme, with further discussion of the results divided accordingly.

Table 3. Illustrative quotes for other behaviors reported by respondents, including reasons for change and changes in types of foods consumed.

Other behaviors			
	No change	*"They haven't changed much; I still eat food from home and minimize eating out/takeout as much as possible."* - #1302	*"It's been normal, just now I'm learning to cook myself food I like."* - #16
	Fluctuation	*"Early on in the COVID outbreak, I was over-eating as a way to cope with stress. Now, my eating has returned to normal and I feel that most of the time I eat until I am full, but not past that."* - #1403	*"Will have a stretch of time where I'm strictly dieting and working out, but will find myself bingeing because I end up craving the foods that I eliminate."* - #140
	Eating healthier	*"I eat healthier because I never really eat out anymore. I eat a little less, but not intentionally, I think I'm just not quite as hungry because I'm not as physically active as I was pre-covid.*" - #676	*"With more free time from being stuck at home, I have become more aware of my eating habits. I would say I eat the same amount but am more conscious about eating healthier."* - #1392

	Eating less healthily	*"I feel like I have eaten less healthy food as I am less motivated to cook for myself"* - #1933	*"I eat more unhealthy food because it is cheaper and easier to make."* - #1602
Reason for change			
	Decreased activity	*"Ate less because I felt less hungry from not being active or had to delay meals due to Zoom meetings."* - #449	*"I've been more concerned about gaining weight since I'm not as active. Also with the stress my nausea has been really bad making it really hard to keep food down a good amount of the time."* - #1963
	Related to mental health and/or stress	*"I find it more difficult to eat healthy due to anxiety and depression. It is difficult for me to care about my health as much as in the past."* - #361	*"I cook for myself more because I am not eating on campus. I also eat out less because of covid. However I snack way more because I am at home all day bored and eat a lot of comfort foods, because I am sad and anxious about myself and the world."* - #842
	Altered schedule	*"Because of a lack of routine and schedule, meals became more erratic-- the amount of meals and times I ate began fluctuating drastically between days."* - #170	*"The lack of schedule means that I would only manage to remember to eat 1 meal a day. Sometimes I would remember to eat more, but I didn't eat much during the quarantine."* - #944
What			
	Less takeout	*"I have been eating much healthier foods because I eat out a lot less than I did before the pandemic. Since I eat all meals from home now, I can better monitor the things I am eating and cook for myself more often. I am eating less and healthier!"* - #1945	*"I find that I am eating more homemade food instead of eating out all the time. However, due to the fact that I am home all the time, there are a lot of snacks at my disposal, so I snack a lot."* - #404
	More takeout	*"I started to eat a lot more than what was normal for me and ate takeout and fast food a lot more."* - #1841	*"I eat a lot more pre-packaged foods, premade foods, and takeout than I used to because I do not have the motivation to cook as much now."* - #1314

More prepared and/or processed foods	*"Increased consumption of junk food. Less healthy food. Irregular meal times. and much less exercising"* - #964	*"Eating more junk foods/snacks. I would normally not eat these because I would be busy outside of the home like with an internship or job. But just sitting at home, I tend to start snacking."* - #1920
More home-cooked meals	*"I feel like I have been eating more since I'm at home and my parents cook often, so there is more food available and I don't have to worry spending money on it like when I'm at school. I don't think I'm overweight but I have noticed myself gaining more weight/fat than I've usually been able to in the past"* - #1326	*"Changed from regular eating out to almost always eating home cooked meals. Since moving in to the dorms, my eating habits have gotten worse."* - #919

Other Behaviors

Respondents who reported no change in their eating habits generally did not provide further details regarding reasons for the lack of change. Fluctuation was another commonly discussed theme, with respondents often comparing how they ate at the beginning of the pandemic to how they were eating later on (presumably around the time of the survey was administered). Overall, many respondents discussed oscillating between what they perceived to be healthy and unhealthy habits, and some attributed this to being at home versus in the dorms at different time points. Others discussed alternating between binge eating and restricting behaviors, as well as changes in weight, appetite, and stress.

Respondents generally discussed eating healthier in relation to eating at home and cooking more often. Those who discussed eating less healthily referenced what they considered to be unhealthy foods or meals. Some respondents also explained that they were eating more unhealthy food because it was cheaper or that they were experiencing a lack of motivation to cook.

Reasons for change

The most commonly reported reasons for change were related to decreased activity, an altered schedule, mental health, and/or stress. Respondents who reported that their behavior had changed due to decreased activity generally were eating less overall, with some reporting that they felt less hungry.

A majority of mental-health-related changes were related to stress, with the remainder attributed to anxiety or other conditions. Mental health conditions and stress had notably mixed effects on how much respondents were eating, with some eating more and some eating less overall. Some respondents who reported increased stress discussed how this stress had exacerbated a health condition and how they had responded by making dietary changes.

Respondents who reported that their eating habits had changed due to an altered schedule generally reported eating breakfast later, sleep schedule changes (e.g., sleeping in later), and losing track of time. Accordingly, most of these respondents also reported a change in meal routine, as previously discussed in the Contextual Skills section. Other reasons for change, including boredom and ease of access, were

often discussed in relation to eating more, being at home, and increased snacking. One subset of respondents reported externally restricted choices, which included having lost control over what they were eating as a result of their living situation (usually at home or in dormitories), financial restrictions, and lost income. Another subset discussed how their habits had changed as a result of fears around COVID exposure. These respondents primarily reported eating more takeout, more prepared foods, and grocery shopping less often to reduce potential exposure.

What

Eating less takeout or restaurant food (also phrased as eating out less) was the most commonly reported change in type of food consumed (Appendix). Respondents who reported eating less takeout or eating out less often cited risk of COVID exposure and less opportunities to go out. Increased cooking and eating at home were frequently mentioned by those eating less takeout. Some respondents mentioned increased snacking behavior, often as a contrast to eating less takeout. On the other hand, respondents who reported eating more takeout often mentioned eating more fast food, qualified the food they were eating as less healthy, and reported not cooking as frequently. In addition, many of these respondents mentioned emotional eating and indulging, as well as affordability issues.

Eating more prepared and/or processed foods (including frozen foods and “junk food”) was the second most commonly reported change. Respondents who reported eating more prepared and/or processed foods frequently discussed this change alongside increased snacking behavior (usually due to being at home and bored) and changed meal routines, with many reports of eating snacks in place of meals.

Less frequently reported changes included eating more or less sugar/sweets, more or less fruits and vegetables, and more or less home-cooked meals. Of these, eating more sugar, more fruits and vegetables, and more home-cooked meals were the most discussed. Those who reported eating more home-cooked meals often mentioned eating healthier or better at home than they did at school. Respondents eating more fruits and vegetables repeatedly discussed making an effort to eat healthier, while respondents who ate more sugar/sweets discussed eating for comfort, eating less restrictively, or simply eating more in general.

Changes in drinking habits: Open to interpretation

The main finding with regard to changes in drinking habits was that respondents’ answers varied according to interpretation of the open-ended question, “In what ways have your drinking habits changed since the U.S. coronavirus outbreak?” Of the 1,464 respondents who provided an answer, 669 (45.7%) respondents wrote “I don’t drink,” “I drink less,” “I drink more,” or some variation thereof and were presumed to have interpreted the question as pertaining strictly to alcohol intake (Table 4). 332 (22.7%) respondents made mention of other beverages, with or without an explanation of how their consumption had changed, and were presumed to have interpreted the question as pertaining to all types of beverages. Interpretation was not apparent for 463 (31.6%) respondents, which included respondents who simply reported “no change” or responses like “N/A,” “no,” or “none” without further explanation.

There were a notable number of respondents who reported changes like drinking more alcohol, less alcohol, and more water, but the reported drinking habits were not ultimately robust enough for further qualitative analysis.

Table 4. Changes in drinking habits (with most reported for each interpretation)

Drinking habits (n=1464)		n	%
Interpretation: Alcohol only		**669**	**45.7**
	More alcohol	185	12.6
	No change	37	2.5
	Less alcohol	157	10.7
	Alcohol assumed, no other detail given	290	19.8
Interpretation: All types of beverages		**332**	**22.7**
	No change	31	2.1
	More caffeine/coffee	29	2.0
	More soda and/or sugary drinks	24	1.6
	Less soda and/or sugary drinks	27	1.8
	Less water	60	4.1
	More water	145	9.9
Interpretation: Not apparent		**463**	**31.6**
	No change reported	373	25.5

Discussion

This study aimed to describe eating- and drinking-related behavior changes reported by U.S. undergraduate students during the COVID-19 pandemic and to investigate whether these changes differed among students who were and were not eating competent. In the context of the COVID-19 pandemic, both EC and non-EC students reported similar types of eating-habit changes, but students in each subset often discussed these changes in different ways.

Consistent with other studies of eating competence in college students (28,29), a majority of our sample was female and not classified as eating competent. Because the ecSI 2.0™calculates subscale scores for the four domains of ecSatter and classification of eating competence is measured by the sum of these scores, respondents may exhibit EC behaviors for some domains but not others. Such a consideration may partly explain why some EC respondents reported behaviors that were not fully consistent with eating competence, with the reverse being true for non-EC respondents.

Most responses were assigned multiple codes, representing overlap between EC domains, in addition to pandemic-related changes. The overlapping nature of the ecSatter model is such that each domain is theorized to impact the others. For example, attitudes about eating – whether positive or negative – may affect behaviors related to food acceptance, regulation of intake, and managing the eating context (11). Consistent with 72.0% of our sample reporting living off-campus, the eating context changed for many respondents, who widely reported eating and being at home more often during the pandemic, regardless of EC status. For some respondents, being at home increased cooking frequency and improved dietary

quality, evidenced by reports of eating healthier and eating less takeout. This change in eating context affected and overlapped with changes in the other EC domains. As highlighted in the excerpts in Table 2, many EC respondents discussed leaning into the changes in context and structure by trying more foods, cooking more often, and listening to their body's hunger cues. Such changes are consistent with the psychometric properties of higher EC scores in the food acceptance, contextual skills, and internal regulation domains (16). These changes are also consistent with previous findings that some students were able to take advantage of the quarantine period to develop healthy habits (4) and that those students who more frequently cooked at home produced healthier meals (10).

In our study, eating at home was not a positive change for all respondents, with some reporting eating more prepared or processed foods – whether out of boredom, stress, or issues with food access. Others discussed how they had lost control or autonomy over what they were eating at home, and non-EC respondents, in particular, discussed how being at home increased their disordered eating behaviors – a negative change in eating attitude overlapping with a change in the eating context. Previous studies of how COVID-19 affected students' mental health and well-being found that many students expressed difficulty transitioning back to their family homes (6), as well as feelings of decreased autonomy and less perceived parental acceptance (4). Such findings may explain, in part, the underlying reasons for respondents in our study reporting negative changes in relation to being at home.

Both EC and non-EC respondents in this study often reported eating with increased awareness or attention. Being at home and altered schedules affected internal regulation for some respondents, who reported changes like listening to their body cues or noticing that their appetite had decreased due to decreased physical activity. While some respondents reported listening to their body, which is characteristic of a higher internal regulation subscale score (16), many respondents came to rely more on external regulation, overruling their internal regulatory processes and focusing on calorie counting or tracking their intake. Increased attention was frequently reported alongside increased concerns about weight – either weight loss or weight gain. Pandemic aside, weight gain and body weight dissatisfaction are commonly reported during college years (28). Attitude about weight, rather than weight itself, has been found to be relevant in determining an individual's eating competence, with individuals who were more satisfied with their weight having a higher EC score than individuals who were less satisfied with their weight (29). Consistent with these findings, non-EC respondents in this study more frequently discussed dissatisfaction with their weight and body image. An important caveat is that there was noticeably more discussion of interest in weight gain among some EC respondents in this study, which would require some overriding of internal regulatory cues.

Non-EC respondents frequently attributed the changes in their eating habits to stress, forgetting to eat, and financial concerns. The way that non-EC respondents related financial concerns to inconsistent eating, in particular, is partly mirrored by pandemic-related findings that financial difficulties were associated with varying degrees of unhealthy weight control behaviors and eating to cope in young adults (9). The presence of financial concerns around food among non-EC respondents is also consistent with previous findings that worry about money for food is significantly greater among respondents who score lower on the ecSI 2.0™internal regulation subscale (16). This concept is further reflected in Satter's Hierarchy of Food Needs, in which needs at lower levels – like getting enough food – must be satisfied before one can advance to higher levels of the pyramid – like eating novel food, which is both rewarding and varied (34).

Additional contextual changes were related to timing and frequency of meals and snacks and, potentially, to eating attitudes. Eating more due to boredom and binge eating (assuming those describing it were using the term colloquially rather than to refer to binge-eating disorder) may have been an expression of flexible eating attitudes and food acceptance among some respondents, as these behaviors – along with increased snacking – implicitly acknowledge the hedonic rewards associated with eating good-tasting food. Our findings regarding increased snacking, changes in timing or number of meals, and eating out of boredom align with previous pandemic-related findings that students were snacking more often, reducing the number of meals consumed, and eating more junk food (10). Respondents in the present study frequently attributed these changes in eating behaviors to stress or anxiety, altered class and sleep schedules, and a general lack of structure, also consistent with the findings of Powell et al (10).

Given the unprecedented nature of the COVID-19 pandemic, it is unsurprising that many respondents explicitly reported increased stress and anxiety. Increases in perceived stress may have been an underlying driver of many of the changes reported by respondents in this study. In a study of sleep quality among college students during the COVID-19 pandemic, about two-thirds of students reported their perceived stress had worsened during the pandemic, and about one-third of students reported worsened diet and sleep quality (35). Sleep quality mediated the relationship between perceived stress and dietary behavior, even with students exceeding the minimum recommended sleep duration (7 hours per day) (35). Furthermore, psychological resilience weakened the relationship between perceived stress and dietary behaviors, which suggests that improving students' resilience and sleep quality could help to reduce poor dietary behaviors during stressful situations such as a pandemic (35).

EC-related studies conducted prior to the pandemic highlight some of the psychological benefits associated with being eating competent. In a study of the relationship between eating competence and sleep quality, EC college students were more likely to have better overall sleep quality compared to non-EC students (13). In a cluster analysis of college students in a weight-gain prevention study, students in the "psychosocially secure cluster" had higher EC scores, along with less weight-related concerns, lower levels of uncontrolled and emotional eating, and low cognitive restraint and psychological stress scores (12). These studies highlight the relationship between eating competence, higher sleep quality, and lower psychological stress. Given the relationship between psychological resilience and sleep quality (35), it is feasible that EC students may also exhibit higher resilience. In consideration of our findings that non-EC respondents frequently discussed increased stress and inconsistent eating behaviors, we suggest the connection between eating competence and psychological resilience could be explored in future research.

Limitations

We captured a large variety of themes and changes from responses to the open-ended questions in the original survey, but the findings could have been more focused on EC-related qualities if the format had been such that we could have followed up with respondents to conduct more focused interviews.

Due to the abbreviated nature of most of the open-ended responses analyzed in the study, eating attitudes were the most difficult to qualify. Positive, relaxed, and flexible eating attitudes may have been more clearly exhibited in lengthier responses, but because we built this code structure around explicit – rather than implicit – responses, we were only able to glimpse these types of attitudes through other codes, like "listening to body" or "increased awareness/ attention." Mentions of behaviors like binge eating, restricting, and stress eating were more easily coded, but mentions of behaviors like binge eating were not always associated with disordered eating, as binge eating is often culturally synonymous with indulging. For this reason, we only coded specific mentions of binge eating and chose not to double-code binge eating as disordered eating.

The nature of the open-ended responses also limited our ability to explain other eating and drinking behavior changes. Due to inconsistent interpretations of the question regarding drinking habits, we were also unable to fully analyze changes in drinking habits and cannot make assumptions or conclusions about the healthfulness of those changes. Respondents who reported no change in their eating habits were particularly brief and usually did not provide further details, which prevented us from explaining why these respondents did not experience a change and comparing their responses with those who reported changes. Fluctuation was another eating behavior that was difficult to analyze fully. While common thematic elements were among those who reported fluctuation, as described in the results section, the reasons for these fluctuations were not always clear. We were thus unable to generalize whether or not respondents who reported fluctuation had adapted and adjusted to their altered schedules and environments. However, the fact that respondents reported fluctuations in eating habits as part of this study highlights the time point at which the original survey was distributed and is a theme that differentiates our study from others conducted early in the pandemic.

Eating habits are formed over time, and the COVID-19 pandemic cannot be understood as a singular force that shaped students' eating habits. In our study, respondents' discussion of decreased physical activity, altered schedules, increased stress, and changes in types of foods consumed may be informed, in part, not only by respondents' experience of the COVID-19 pandemic but also by the general college experience.

Conclusion

We aimed to describe pandemic-related changes in eating habits among college students and to add contextual nuance to our understanding of what it means to be eating competent. Based on our results, it can be concluded that changes related to the eating context and contextual skills, as well as underlying stress, were primary drivers of the changes in eating habits that respondents experienced during the pandemic. Our qualitative analysis confirmed change-related themes that had appeared in previous studies related to eating behavior and dietary quality and revealed new connections between changes through the lens of eating competence.

Changes discussed often spanned more than one EC domain, mirroring the overlapping nature of the ecSatter model. The ability to view the overlap between domains in responses is a benefit of qualitative analysis, as this overlap contextualizes our understanding of eating competence in a way that quantitative subscale scores cannot. We hypothesized that EC and non-EC respondents might describe eating behavior changes in different ways. With the open-ended nature of the responses, we observed how characteristics of the domains aligned and resonated with EC and non-EC respondents. We also observed nuances within responses that did not fully align with our assumption of how respondents would relate to the domains based on their EC status.

While we were not able to provide further contextual nuance by posing and analyzing additional questions, as one might do in a focus group setting, we were able to highlight qualitative differences between EC and non-EC students. The existence of such differences strengthens the case that qualitative analysis offers a useful methodology for expanding our understanding of theoretical frameworks like the ecSatter model and may be considered in future studies of eating competence in students and other populations.

This study demonstrated that undergraduate students experienced changes related to the eating context and contextual skills amidst the pandemic. Future directions could explore the potential of EC-based education as part of a multi-factorial approach to improving students' ability to cope with high-stress challenges like the COVID-19 pandemic and the general college experience. Findings from a pre-pandemic, seven-semester longitudinal study of college students suggest that fruit and vegetable consumption and physical activity are not optimal throughout students' time in college (5). Students are also regularly challenged with making time to eat, eating regular meals, meal planning, and considering nutrition when making food choices, regardless of the pandemic or EC status (28). College nutrition courses could be enhanced by addressing practical aspects of feeding oneself, including time management and meal preparation skills (28). Teaching the EC-related contextual skills of meal planning and cooking may improve students' overall dietary quality, as cooking and more frequently preparing meals from basic ingredients has been associated with greater fruit and vegetable intake among college students (36).

Decreasing stress among students may also offer a pathway to increased eating competence. Acknowledging that concerns about money and food shortage are greater among students with the lower internal regulation EC-subscale scores (16), improving students' access to healthy food, as with a campus food pantry, may increase students' food security, sleep sufficiency, and perceived health (37). Teaching students techniques to decrease perceived stress, improve sleep quality, and increase psychological resilience may also indirectly improve dietary quality and eating competence (35). Future research could investigate the connection between eating competence and resilience to understand

whether eating competence may be associated with resilience – an important consideration in addressing high-stress challenges like the COVID-19 pandemic.

References

1. Balta V. UW classes will no longer meet in person through end of quarter. UW News. March 6, 2020. Accessed June 20, 2022. https://www.washington.edu/news/2020/03/06/uw-classes-moving-online-beginning-march-9/
2. Taguchi K. Video: UW students move into residence halls. UW News. September 23, 2020. Accessed June 20, 2022. https://www.washington.edu/news/2020/09/23/video-uw-students-move-into-residence-halls/
3. Cauce AM, Richards M. How the pandemic will affect autumn quarter learning (Message to students from the United States). University of Washington: Novel coronavirus information. August 6, 2020. Accessed June 20, 2022. https://www.washington.edu/coronavirus/2020/08/06/autumn-quarter-learning-message-to-students-from-the-united-states/
4. Hall SS, Zygmunt E. "I Hate It Here": Mental Health Changes of College Students Living With Parents During the COVID-19 Quarantine. *Society for the Study of Emerging Adulthood*. 2021;9(5):449-461. doi: 10.1177/21676968211000494
5. Small M, Bailey-Davis L, Morgan N, Maggs J. Changes in eating and physical activity behaviors across seven semesters of college: living on or off campus matters. *Health Educ Behav*. 2013;40(4):435-441. doi:10.1177/1090198112467801
6. LaCaille LJ, Hooker SA, Marshall E, LaCaille RA, Owens R. Change in Perceived Stress and Health Behaviors of Emerging Adults in the Midst of the COVID-19 Pandemic. *Ann Behav Med*. 2021;55:1080-1088. doi: 10.1093/abm/kaab074
7. Du C, Wang W, Hsiao PY, Ludy MJ, Tucker RM. Insufficient Sleep and Poor Sleep Quality Completely Mediate the Relationship between Financial Stress and Dietary Risk among Higher Education Students. *Behavioral Sciences*. 2021;11(5):69. doi:10.3390/bs11050069.
8. Olfert MD, Wattick RA, Saurborn EM, Hagedorn RL. Impact of COVID-19 on college student diet quality and physical activity. *Nutrition and Health*. 2022; Mar 18. doi: 10.1177/02601060221086772
9. Simone M, Emery RL, Hazzard VM, Eisenberg ME, Larson N, Neumark-Sztainer D. Disordered eating in a population-based sample of young adults during the COVID-19 outbreak. *Int J Eat Disord*. 2021;54(7):1189-1201. doi:10.1002/eat.23505
10. Powell PK, Lawler S, Durham J, Cullerton K. The food choices of US university students during COVID-19. *Appetite*. 2021;161:105130. doi:10.1016/j.appet.2021.105130.
11. Satter E. Eating Competence: Definition and Evidence for the Satter Eating Competence Model. *J Nutr Educ Behav.* 2007;39(5S):S142-152. doi: 10.1016/j.jneb.2007.01.006
12. 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;111:394-400. doi:10.1016/j.jada.2010.11.011
13. Quick V, Shoff S, Lohse B, White A, Horacek T, Greene G. Relationships of eating competence, sleep behaviors and quality, and overweight status among college students. *Eat Behav*. Dec 2015;19:15-19. doi:10.1016/j.eatbeh.2015.06.012
14. Quick V, Byrd-Bredbenner C, White A, Lohse B. Eat, sleep, work, play: Associations of weight status and health-related behaviors among young adult college students. *Am J Health Promot*. 2013:e64-e72.
15. Krall JS, Lohse B. Validation of a measure of the Satter eating competence model with low-income females. *Int J Behav Nutr Phys Act*. Apr 07 2011;8:26-36. doi:10.1186/1479-5868-8-26.
16. Lohse B, Satter E, Horacek T, Gebreselassie T, Oakland MJ. Measuring eating competence: psychometric properties and validity of the ecSatter Inventory. *J Nutr Educ Behav*. 2007;39:S154-66. doi:10.1016/j.jneb.2007.04.371

17. Krall JS, Lohse B. Interviews with Low-Income Pennsylvanians Verify a Need to Enhance Eating Competence. *J Am Diet Assoc.* 2009;109:468-473. doi: 10.1016/j.jada.2008.11.032
18. Queiroz FLNd, Nakano EY, Botelho RBA, Ginani VC, Raposo A, Zandonadi RP. Eating Competence among Brazilian Adults: A Comparison between before and during the COVID-19 Pandemic. *Foods*. 2021;10(9):2001. doi: 10.3390/foods10092001
19. Hsieh HF, Shannon SE. Three Approaches to Qualitative Content Analysis. *Qualitative Health Research*. 2005;15(9):1277-1288. doi: 10.1177/1049732305276687
20. Washington U. UW Student Data. *Quick Stats of Student Enrollment* 2021; https://studentdata.washington.edu/quick-stats/. Accessed January 22, 2021.
21. Harris PA, Taylor R, Theilke R, Gonzalez N, Conde JG. Research electronic data capture (REDCap) – A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform.* 2009;42(2):377-381.
22. Harris PA, Taylor R, Minor BL, et al. The REDCap consortium: Building an international community of software partners. *J Biomed Inform.* 2019;May 9.
23. Godleski S, Lohse B, Krall JS. Satter Eating Competence Inventory Subscale Restructure After Confirmatory Factor Analysis. *J Nutr Educ Behav.* 2019;51(8):1003-1010.
24. Stotts JL, Lohse B. Reliability of the ecSatter Inventory as a tool to measure eating competence. *J Nutr Educ Behav.* 2007;39:S167-170.
25. Krall JS, Lohse B. Validation of a measure of the Satter eating competence model with low-income females. *Int J Behav Nutr Phys Act.* 2011;8:26-32.
26. Lohse B. The Satter Eating Competence Inventory for low-income persons is a valid measure of eating competence for persons of higher socioeconomic position. *Appetite.* 2015;87:223-228.
27. Quick V, Shoff S, Lohse B, White A, Horacek T, Greene G. Relationships of eating competence, sleep behaviors and quality, and overweight status among college students. *Eat Behav.* 2015;19:15-19.
28. Brown LB, Larsen KJ, Nyland NK, Eggett DL. Eating competence of college students in an introductory nutrition course. *J Nutr Educ Behav.* 2013;45(3):269-273.
29. Clifford D, Linda A, Keeler LA, Gray K, Steingrube A, Neyman Morris M. Weight attitudes predict eating competence among college students. *Fam Consum Sci Res J.* 2010;39(2):184-193.
30. *Sociodemographics*: El Zein A, Shelnutt KP, Colby S, et al. Prevalence and correlates of food insecurity among U.S. college students: a multi-institutional study. *BMC Public Health.* 2019;19(1):660.
31. Elo S, Kyngäs H. The qualitative content analysis process. *Journal of Advanced Nursing*. 2008;62(1):107-115. doi: 10.1111/j.1365-2648.2007.04569.x
32. Harris JE, Gleason PM, Sheean PM, Boushey C, Beto JA, Bruemmer B. An Introduction to Qualitative Research for Food and Nutrition Professionals. *J Am Diet Assoc.* 2009;109:80-90. doi:10.1016/j.jada.2008.10.018
33. Morse JM, Barrett M, Mayan M, Olson K, Spiers J. Verification Strategies for Establishing Reliability and Validity in Qualitative Research. *International Journal of Qualitative Methods*. 2002;1(2):13-22. doi:10.1177/160940690200100202
34. Satter E. Hierarchy of Food Needs. *J Nutr Educ Behav*. 2007;39:S187-S188. doi: 10.1016/j.jneb.2007.01.003
35. Du C, Zan MCH, Cho MJ, et al. The Effects of Sleep Quality and Resilience on Perceived Stress, Dietary Behaviors, and Alcohol Misuse: A Mediation- Moderation Analysis of Higher Education Students from Asia, Europe, and North America during the COVID-19 Pandemic. *Nutrients*. 2021;13:442. doi: 10.3390/nu13020442
36. Hanson AJ, Kattelmann KK, McCormack LA, Zhou W, Brown ON, Horacek TM, Colby SE. Cooking and Meal Planning as Predictors of Fruit and Vegetable Intake and BMI in First-Year College Students. *Int J Environ Res Public Health*. 2019;16(14). doi: 10.3390/ijerph16142462
37. Martinez SM, Chodur GM, Esaryk EE, Kaladijian S, Ritchie LD, Grandner M. Campus Food Pantry Use Is Linked to Better Health Among Public University Students. *J Nutr Educ Behav*. 2022;54(6):491-498. doi: 10.1016/j.jneb.2022.03.001

Appendix

Parent code and sub-code frequency, organized by EC domain and other behaviors, out of the total sample (n=1529). Number of respondents who were and were not EC are also reported for each sub-code.

	n		n
Eating attitudes	**93**	**Food acceptance**	**83**
Disordered eating	47	Initiated a diet	49
EC	7	EC	21
Not EC	40	Not EC	28
Stress eating	22	More variety	10
EC	15	EC	5
Not EC	7	Not EC	5
Binging	24	Less variety	24
EC	6	EC	5
Not EC	18	Not EC	19
Contextual skills	**594**	**Internal regulation**	**244**
Change in meal routine	101	Increased attention/ awareness	69
EC	29	EC	20
Not EC	72	Not EC	49
Eating more regularly	20	Listening to body	17
EC	13	EC	7
Not EC	7	Not EC	10
Eating less regularly	87	Calorie counting/ tracking	28
EC	25	EC	10
Not EC	62	Not EC	18
Skipping meals	34	Weight concerns	65
EC	9	EC	23
Not EC	25	Not EC	42
Increased snacking	110	Body image concerns	17
EC	51	EC	4
Not EC	59	Not EC	13
More cooking	84	Decreased appetite	48
EC	54	EC	13

Not EC	30
At home	133
EC	56
Not EC	77
More time	25
EC	10
Not EC	15
Other behaviors	**426**
Fluctuation	118
EC	29
Not EC	89
No change	185
EC	118
Not EC	67
Eating healthier	86
EC	47
Not EC	39
Eating less healthily	37
EC	9
Not EC	28
Reason for change	**313**
Mental-health-related	71
EC	18
Not EC	53
>> Stress (sub-code)	50
EC	16
Not EC	34
Decreased activity	71
EC	33
Not EC	38
Altered schedule	44
EC	23
Not EC	21
COVID-exposure-related	22
Not EC	35
How much	**290**
Eating less overall	183
EC	43
Not EC	140
Eating more overall	107
EC	43
Not EC	64
What	**298**
More takeout	42
EC	14
Not EC	28
Less takeout	60
EC	32
Not EC	28
More comfort food	14
EC	6
Not EC	8
More prepared/ processed foods	51
EC	20
Not EC	31
Less prepared/ processed foods	15
EC	9
Not EC	6
More sugar/ sweets	33
EC	10
Not EC	23
Less sugar/ sweets	14
EC	7
Not EC	7
More fruits and vegetables	27
EC	19
Not EC	8
Less fruits and vegetables	13

EC	5	EC	7
Not EC	17	Not EC	6
Ease of access	33	More home-cooked meals	24
EC	15	EC	14
Not EC	18	Not EC	10
Externally restricted choices	37	Less home-cooked meals	5
EC	8	EC	2
Not EC	29	Not EC	3
Boredom	35		
EC	15		
Not EC	20		