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Self-Efficacy Domains by Gender

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Food insecurity, the inconsistent access to adequate and nutritious food, continues to be a significant public health concern among college students, with 42 percent of students impacted in the United States. Cooking self-efficacy, defined as an individual's confidence to prepare healthy and balanced meals and the ability to modify recipes for personal or cultural values, plays an important role in the development of food security, but many students lack the skills, confidence, and support systems to be effective cooks (Morgan, 2021). This study explored whether self-efficacy differed between genders, yielding the research question: What intrapersonal and sociocultural factors influence men and women to cook? Understanding these patterns was vital in identifying where gaps in confidence, safety awareness, and nutrition knowledge might exist—factors that can influence long-term health and eating behaviors.

Using a convergent parallel mixed methods design, data were collected from 45 undergraduate students at Binghamton University via a Qualtrics survey. Recruitment was conducted through tabling, fliers, and digital outreach. Composite self-efficacy scores were calculated for three areas: cooking confidence (SELFCONF), cooking safety (SELFSAFE), and nutrition knowledge (SELFNUTRI). Gender was treated as a binary variable using men and women, excluding other respondents, for the purpose of analyzing relatively equal group sizes.

Data was analyzed using NVivo for qualitative responses and R for quantitative analysis. Women reported slightly higher mean self-efficacy scores in all three domains, with a statistically significant difference in cooking confidence (t = -2.67, = .70, p = .016). These findings suggested that gender shaped how students perceived their cooking abilities. Overall, the results supported previous studies showing gender-based differences in food-related self-efficacy and highlighted the need for inclusive, skill-building cooking programs that help all students feel capable and confident in the kitchen for future studies..

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1 Introductions

1.1 Significance

The lack of access to sufficient amounts of good-quality and nutritious food, known as food insecurity, is a national public health issue. In 2023, the United States Department of Agriculture (USDA) estimated 13.5% of U.S. households experienced food insecurity (Nagata et al., 2021). On college campuses specifically, an estimated forty-two percent of college students report experiencing food insecurity (Bruening et al., 2017). While issues related to financial strain are important causes of food insecurity, studies are increasingly showing that limited cooking self-efficacy and sociocultural determinants such as gender norms, stigma, and socioecological barriers also contribute to disparities in cooking confidence and availability of healthy food options.

Food insecurity is a concern among college students; it can negatively influence their physical and mental health, as well as their academic performance. Students who struggle to access nutritious meals often experience more stress, fatigue, and difficulty concentrating. These challenges can interfere with their ability to learn and succeed academically. Along with negative impacts on their academic performance, food-insecure individuals are at heightened risk of developing numerous physical ailments (i.e., diabetes, cardiovascular disease, and obesity) and declining mental health conditions (i.e., stress, depression, and anxiety; Levi et al., 2023). Given the prevalence of this issue across college campuses, food insecurity remains an important and harmful public health issue within college populations.

1.2 Knowns and Unknowns

Within the field of public health, food insecurity is divided into four subcategories based on severity. In 2006, the United States Division of Agriculture (USDA) categorized food insecurity into 1) high food security, 2) marginal food security, 3) low food security, and 4) very low food security, with those in the former two categories being food secure, and those categorized as "low" and "very low" are considered food insecure (USDA, 2025). This framework allows us to better understand the access people have to food in quantity and quality. There is consistent literature showing that among students, food insecurity is linked with low confidence in cooking and low food literacy. For example, Knol et al. (2019) noted that students experiencing low or very low food security lack the ability to prepare healthy and affordable meals due to barriers like time, space in the kitchen, and proper cooking utensils. Due to these barriers, students frequently rely on fast or processed foods, maintaining trends of low diet quality and poor health.

Food insecurity is a complex issue influenced by factors at many levels, from national policy to individual behaviors. Large models of health, such as the socioecological framework, allow for a fully encompassing and multidimensional view of the topic. To effectively address this issue, interventions must cover the full spectrum of the socioecological model—including policy, community, institutional, and individual levels (Sogari et al., 2018). While broader efforts to improve food access and institutional support are essential, individual-level strategies, such as cooking education, play a critical role in helping students manage their daily food needs. The socioecological perspective recognizes that students' food insecurity not only depends on the students' own behavior, but also on different levels. Additionally, Boek et al. (2012) identified how gendered norms shape food choices and behaviors, specifically that men are often more focused on convenience when assessing food choices, and women focus more on nutrition. However, there is little research that examines how cultural expectations, stigma, and gendered norms converge to affect decisions to cook or acquire cooking skills. The interaction of these social behavioral factors is unclear and has left a gap in knowledge about how identity and confidence affect food insecurity among college students.

There has not been a meta-analysis, systematic review, or randomized controlled trial (RCT) specifically conducted on the topic of college-level cooking interventions addressing food insecurity and cooking efficacy.

1.3 Research Aims

The existing literature on college food insecurity reveals several interconnected gaps—contextual, empirical, practical, and evidence-based—that together highlight the need for more comprehensive,

theory-informed interventions. A contextual gap exists because findings in the literature cannot be generalized due to differences in focus groups across multiple studies. There has not been a cohesive approach that examines a consistent focus group with measurable outcomes. This gap is also evident as the existing literature neglects to discuss how gendering, cultural, or stigma-driven contextual barriers may deter one's motivation or ability to cook healthy, affordable meals. From this, we know relatively little about the experiences of a diverse college population, let alone individuals experiencing multiple layers of inequity. A practical gap exists because the existing literature neglects to discuss how gendering, cultural, or stigma-driven contextual barriers may deter one's motivation or ability to cook healthy, affordable meals. We know relatively little about the experiences of a diverse college population, let alone individuals experiencing multiple layers of inequity. An evidence gap exists because there is a lack of studies evaluating how students utilize campus resources and how those resources impact their eating habits. More research is needed to see how effective these resources are in helping students with nutritional behaviors and food security.

The main purpose of this research examination is to answer the question: What intrapersonal and sociocultural factors influence men and women to cook? This research utilizes a convergent parallel mixed methods design (Bishop, 2015) to combine quantitative and qualitative data from the intervention. The purpose of mixed methods is to achieve complementarity and triangulation (Javdani et al., 2023) and provide context for statistical evidence of differences in cooking efficacy with qualitative comments from participants about their confidence, culture, and access. Integration will occur at the time of interpretation, when both strands of data will be put together to illustrate how cooking interventions promote food literacy and equity for diverse college students.

2 Methods

2.1 Participants and Sampling

The study was approved by the Institutional Review Board of a public higher education institution in New York. Research was conducted ethically to protect the rights, welfare, confidentiality, and privacy of participants. Also, participants were informed of the project and provided their consent before beginning the survey. Participants were eligible to participate if they were at least 18 years of age and were Binghamton University undergraduate students. Individuals were recruited through the use of tabling in high-traffic areas on the Binghamton University campus (i.e. tabling at the University Union and Bartle Library). Participants were also recruited through paper fliers, B-Line posts, email threads, word-of-mouth, and advertisements. These various forms of advertisement included a QR code to an informational video regarding the content and duration of the survey, as well as the purpose of the research. The survey reached 45 individuals. Among respondents, 34 identified as women (75.6%) and 11 as men (24.4%). Compared to the general Binghamton University student population, which is approximately 51.9 % women and 48.1 % men (Data USA, 2025), this sample over-represents women. Consequently, while inferential tests can provide insight into potential gender differences, the findings should be interpreted cautiously when generalizing to the broader student population, given the gender imbalance in the sample. Data was collected via a survey using Qualtrics.

2.2 Measures

2.2.1 Cooking Self-Efficacy

Cooking self-efficacy is defined as a person's perceived confidence in their ability to prepare balanced, nutritious meals with the use of appropriate cooking skills (Murray et al., 2016). The construct of cooking efficacy is one's perceived competency of cooking independently, following a recipe, and using nutritional knowledge for food preparation in real-life situations. In the Qualtrics survey, the Cooking Self-Efficacy portion of the survey, split into three cooking self-efficacy domains (Cooking Confidence, Nutrition Knowledge, and Cooking Safety), included Likert-type statements that assessed how confident participants felt in cooking from scratch, using appliances, and adjusting the flavor of food. These questions were measured on an eight-point scale where one represents "Strongly Disagree," and six represents "Strongly Agree." Participants may also choose options such as "I do not know," coded as negative fifty, and "Prefer not say," coded as negative ninety-nine, and excluded from analysis. The cooking self-efficacy items were averaged for a composite cooking self-efficacy score, with higher averages indicating more self-reported efficacy in their cooking skills.

2.2.2 Gender

Gender, known as one's internal sense of self (gender identity) and how they present themselves (gender expression), is socially constructed (WHO, 2025). Participants' gender was asked under the sociodemographics portion of the Qualtrics survey. The question was measured on a two-point scale with "Girl or woman" coded as one and "Boy or man" coded as two. Furthermore, respondents had the option to choose "Nonbinary, genderfluid, or genderqueer," coded as three, and "I am not sure or questioning," coded as four; however, all respondents fell into the binary category of gender.

2.3 Mixed Methods

This research adopts a convergent parallel mixed-methods study design (Bishop, 2015), exploring both measurable and experiential outcomes of the Cooking for Change intervention. Quantitative and qualitative data are collected simultaneously and analyzed independently and collaboratively for integration and interpretation. The quantitative strand comprises pre- and post-intervention survey data collected for cooking self-efficacy, food literacy, and food insecurity, while the qualitative strand analyzes student open-ended responses to cooking self-efficacy, cultural connections to food, and barriers to healthy eating. This methodological design allows the research team to capture both the depth of behavioral change and the rationale behind the change to provide a robust understanding of the impact of the intervention.

The aim of using the mixed methods design is to achieve complementarity and triangulation (Javdani et al., 2023), where numerical outcomes can be used along with narrative outcomes to help achieve the richness of interpretation of results. Integration will happen at the interpretation level (Onwuegbuzie et al., 2022), where quantitative trends such as increases in efficacy of cooking survey scores and qualitative themes related to sentiments of empowerment and cultural connection will be observed. In quantitative analysis, paired t-tests will be used, and in qualitative analysis, content analysis will be conducted using a conventional approach to emergent themes. These findings will provide insight into how overall statistical improvements relate and align with the lived experiences

of participants, contributing to a higher socioecological understanding of food security and health equity related to college students.

2.4 Qualitative Data Analysis Plan

The qualitative data were analyzed using NVivo. Data analysis was conducted through a careful analysis of responses to the open-ended question asked in the Qualtrics survey. Each response was input into NVivo and carefully categorized into specific codes based on themes that emerged through responses as a whole. Data screening was conducted, and responses that were incomplete or non-serious were discarded. Codes were developed for two open-ended questions in the survey. The first question asked, "In what ways do these expectations affect how you think about cooking?" Three codes emerged from the responses to this question: Not Impacted, Obligation, and Voluntary. The second question asked, "If these societal expectations about your gender did not exist, how would that change your perspective on cooking or learning how to cook?" Three codes emerged from the responses to this question: Enjoyment, Not Cook, and No Change. When examining the responses, keywords associated with each code were identified and were the basis for categorization. Gender is the comparative variable and the basis of cross-comparing qualitative data.

2.5 Quantitative Data Analysis Plan

Data was exported from the Qualtrics platform in numerical format, manually cleaned to only include those who indicated themselves as a woman or man for gender, and imported into Posit Cloud. R code provided in the data science workflow (Grolemund, 2023) was modified to install R packages (see install.R), import data (11.10.2025.pre.not.data.team4.clean.xlsx) using readxl, clean taking out any "I don't know" and "Prefer not to say" responses, transform the three self-efficacy domains into composite scores (SELFCONF, SELFNUTRI, SELFSAFE) and transform into long format for visualization, visualize data in a overlapped box plot and violin plot using ggplot2, and model using an independent samples Welch t-test from the stats package to examine self-efficacy domains between women and men.

We analyzed 11 self-efficacy items, covering three different self-efficacy domains (cooking confidence (EFFCONF), nutrition knowledge (EFFNUTRI), and cooking safety (EFFSAFE)). Our primary goal was to assess differences across different self-efficacy domains and gender (GENDER). We ran independent t-tests for each self-efficacy domain. This test provides the t-statistic, p-value, and means of both women and men. Then the reliability scores were calculated (alpha value).

Further, to consider other sociocultural factors besides gender, we conducted a correlation table. We saw how social status (SOCIALSTATUS) correlates with frequency of skipped meals (FOODSKIPF) and cooking barriers (BARRCOOK1, BARRCOOK3, BARRCOOK5).

Using this integrative modeling framework, we provide both explanatory and predictive models for classifying cooking self-efficacy (in three different domains).

2.5.1 Load

```r
library(readxl)
library(dplyr)
library(ggplot2)
library(stats)
library(tidyr)
library(psych)
library(knitr)
library(tidyverse)
library(naniar)
library(ggpol)
library(corrplot)
library(rmarkdown)

#source: Introduction to Data Import (Silhavy & McCarty, 2025)
#explanation: packages for code
```

2.5.2 Import

```r
## note: the df was cleaned manually to remove after intervention responses

# load data in
pre_not_data <- readxl::read_excel("11.10.2025.pre.not.data.team4.clean.xlsx")

#source: Import Data Once (Silhavy & McCarty, 2025)
#explanation: reading in the data once
```

2.5.3 Transform

2.5.3.1 Exclude -99 and -50 as NA values

```r
# replace with NA
pre_not_data <- pre_not_data %>%
  replace_with_na_all(condition = ~.x %in% c(-99, -50))

#source: Transforming Your Data (Silhavy & McCarty, 2025)
#explanation: Making -99 ("Prefer Not to Say") and -50 ("I don't know") NA
```

2.5.3.2 Creating Keys & Composite Scores

```r
# define keys (no reverse items assumed example)
keys <- list(
  SELFCONF  = c("EFFCONF1", "EFFCONF2", "EFFCONF3", "EFFCONF4"),
  SELFSAFE  = c("EFFSAFE1", "EFFSAFE2", "EFFSAFE3", "EFFSAFE4"),
```

```
  SELFNUTRI = c("EFFNUTRI1", "EFFNUTRI2", "EFFNUTRI3")
)
## note: if you have reverse-coded items, you would prefix them with a "-" in the keys list -

#source: Creating Composite Scores from Multi-Item Measures (Silhavy & McCarty, 2025)
#explanation: this creates a list called keys which tells R which survey questions belong to wh
```

```
## another way is rowMeans(select(data, one_of(keys$SELFCONF)), na.rm = TRUE) etc - but you lo

# compute composites and reliability
# the scoreItems() function handles missing values and gives you alphas
scores <- scoreItems(keys, pre_not_data, impute = "mean")

# view reliability
# scores$alpha # take the '#' away to run this line

# add the composite scores to the data frame
pre_not_data <- pre_not_data %>%
  mutate(
    SELFCONF  = scores$scores[ , "SELFCONF"],
    SELFSAFE  = scores$scores[ , "SELFSAFE"],
    SELFNUTRI = scores$scores[ , "SELFNUTRI"]
  )

## note the data is currently in wide format

#source: Creating Composite Scores from Multi-Item Measures (Silhavy & McCarty, 2025)
#explanation1: this creates the actual composite scores
#explanation2: can view view reliability using scores$alpha
```

2.5.3.3 Factor Gender

```
# 2 = man, 1 = woman
pre_not_data <- pre_not_data %>%
  mutate(GENDER = factor(GENDER,
                         levels = c(2, 1),
                         labels = c("Man", "Woman")))

#source: R Code, Example 1 (Silhavy & McCarty, 2025)
#explanation: factor() used for gender to be categorical variable
```

2.5.3.4 Make Data Long Format

```
# make data to long format for visualizing
longdata <- pre_not_data %>%
```

```r
  select(GENDER, SELFCONF, SELFSAFE, SELFNUTRI) %>%
  pivot_longer(
    cols = c(SELFCONF, SELFSAFE, SELFNUTRI),
    names_to = "SelfEfficacy",
    values_to = "Score"
  )

## note: check the structure using the line of code below
# head(longdata) # take '#' and run this line

#source: Long Form (Silhavy & McCarty, 2025)
#explanation1: reading in the data once
#explanation2: when errors occurred, I ran the lines below to check
#names(data) # check if I am addressing the name of the columns correctly
#str(scores) # I saw that there were NAs so that means ScoreItems() was not running properly
```

3 Results

3.1 Descriptive Statistics

Variable	n	Mean	Median	SD	Min	Max
SOCIALSTATUS	45	6.45	7	2.04	1	10
SELFCONF	45	4.32	4.32	0.91	2.5	6
SELFNUTRI	45	4.51	4.33	0.74	2.67	6
SELFSAFE	45	4.66	4.5	0.8	2.75	6

The sample consisted of undergraduate students from Binghamton University between the ages of 18 to 21. Among respondents, 34 identified as women (75.6%) and 11 as men (24.4%). Participants reported a mean perceived social status of 6.45 (SD = 2.04) on a one-to-ten scale, indicating substantial variability in socioeconomic perception within the sample. Cooking self-efficacy scores were generally high across domains. Confidence (SELFCONF) had a mean of 4.32 (SD = 0.91), Nutrition self-efficacy (SELFNUTRI) had a mean of 4.51 (SD = 0.74), and Safety self-efficacy (SELFSAFE) showed the highest mean at 4.66 (SD = 0.80); all were rated on the one-to-six agreement Likert scale. Medians were similar to means across domains, suggesting relatively symmetric distributions. Minimum and maximum values indicate the full range of the scale was used, with some participants reporting low levels of confidence (i.e., minimum of 2.5 for Confidence) while others reported the highest possible agreement (maximum of 6 for all three domains). Overall, the descriptive statistics reflect high perceived cooking self-efficacy with modest variability and wide variability in perceived social status among students.

3.2 Qualitative Findings

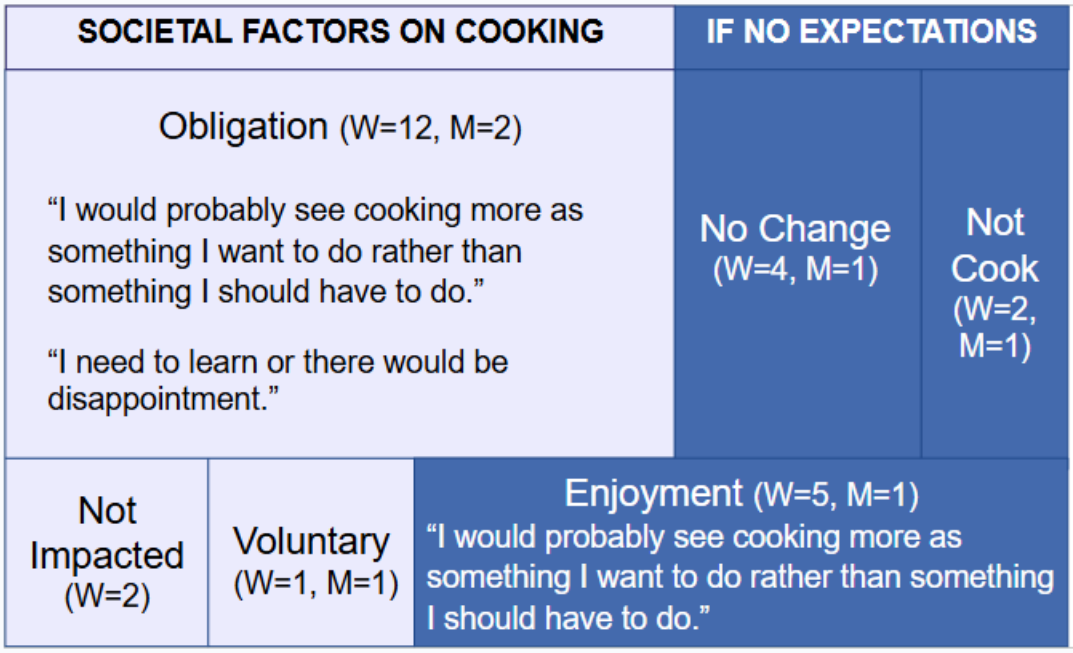

Figure 1: Figure 1. Tree map displaying frequency of code words used in responses. Light blue represents responses on how societal factors affect cooking behavior. Dark blue represents responses on how perspective changes if expectations did not exist (W=Women M=Men).

A review of the qualitative data identified themes consistent across respondents. These themes are important in understanding the role of gender and cultural expectations and beliefs in students' confidence and cooking-related behaviors. We looked at the answers provided for two questions in the survey, which are visually represented by Figure 1 through a treemap displaying the frequency of coded responses. For the first question, themes were identified through the use of open-ended questions in the Qualtrics survey. The question was "In what ways do these expectations affect how you think about cooking?" and responses were represented by the light blue section of the tree map. Codes that emerged from the question included Not Impacted, Obligation, and Voluntary. Participants expressed their views on how societal expectations influenced their views on cooking. The majority of participants reported cooking to be more of an obligation, which is shown by the larger area of the map. For example, one participant reported, "I need to learn or there would be disappointment," and another reported, "I feel like I'm supposed to know how to cook as a woman." Moreover, another participant stated, "I want to learn how to cook to ensure I'm an eligible woman ready for marriage."This exemplifies that gender and cooking expectations often frame cooking as a duty among women, which shapes students' behaviors and attitudes towards cooking.

Participants also reported that with the expectations, they saw cooking as completely voluntary. This is reflected in the tree maps' smaller light blue "Voluntary" section. A participant reported, "I don't like being told I need to cook because I'm a woman even though I enjoy cooking." Another participant stated, "I would not be as passionate about going against that narrative, both cultural gender and societal gender expectations, but I feel I would still have a similar perspective, just not

as fueled or intensified."Together, these quotes show students asserting agency by framing cooking as a voluntary choice, even while recognizing the pressure of gendered norms.

A few participants reported that they were not impacted by societal expectations, "i think society puts expectations on cooking by gender roles but i don't feel affected by this" and "I don't usually cook." This minority population, which is represented by the smallest light blue section, highlights that while significant, societal expectations do not proportionally affect all participants.

For the second question, themes were identified through the same method, including Not Impacted, Obligation, and Voluntary. The second question we analyzed was "If these societal expectations about your gender did not exist, how would that change your perspective on cooking or learning how to cook?" Three codes emerged from the responses: Not Cook, Enjoyment, and No Change. Participants expressed how they would view cooking differently if societal expectations had no influence on cooking. Some reported that without expectations, they would view cooking as more enjoyable, which is represented by the largest dark blue section of the treemap. Participants stated, "Do it for fun." Another participant stated, "Maybe I would focus more on its benefits for me." A different participant reported, "I would probably see cooking more as something I want to do rather than something I should have to do." These responses collectively demonstrated that the removal of these societal expectations would allow students to find intrinsic motivation for cooking, rather than begrudgingly complying to meet expectations.

Other participants reported that they would simply choose not to cook, which can be seen in the smallest dark blue portion of the treemap. A participant stated, "i wouldnt be cooking as much." Moreover, another participant shared, "I would not want to cook." Furthermore, "I would not cook." Some participants reported that they would experience no change, this is reflected in the dark blue "No Change" section. Quotes that were found to support this are "it wouldn't change anything because I like cooking already," "It would stay the same because I think knowing how to cook is important for living by yourself and living a healthy lifestyle," and "I still would probably be interested." With some participants expressing that expectations would not alter their attitude or behaviors, it underscores that lifting expectations does not uniformly increase participation in cooking.

3.3 Quantitative Findings

```
longdata <- longdata %>%
  mutate(
    SelfEfficacyConstruct = recode(SelfEfficacy,
                                   "SELFCONF" = "Confidence",
                                   "SELFSAFE" = "Safety",
                                   "SELFNUTRI" = "Nutrition")
  )

# plot
plot_gender_selfeff <- ggplot(
  longdata,
  aes(x = SelfEfficacyConstruct, y = Score, fill = GENDER)
) +
```

```
  geom_violin(trim = TRUE, alpha = 0.6,
              position = position_dodge(width = 0.8)) +
  geom_boxplot(width = 0.1, outlier.shape = NA,
               position = position_dodge(width = 0.8)) +
  geom_jitter(
    position = position_jitterdodge(jitter.width = 0.1,
                                    dodge.width = 0.8),
    alpha = 0.4
  ) +
  scale_fill_manual(values = c(
    "Man" = "#f4b400",
    "Woman" = "#8d14c1"
  )) +

  # Likert scale labels for Y-axis
  scale_y_continuous(
    breaks = 1:6,
    labels = c(
      "1: Strongly Disagree",
      "2: Disagree",
      "3: Slightly Disagree",
      "4: Slightly Agree",
      "5: Agree",
      "6: Strongly Agree"
    )
  ) +

  labs(
    x = "Cooking Self-Efficacy Domains",
    y = "Agreement Level",
    fill = "Gender",
    title = "Difference in Self-Efficacy Due to Gender"
  ) +
  theme_minimal(base_size = 14)

plot_gender_selfeff
```

Figure 2: Figure 2. A violin and boxplot depicting the relationship between gender and three types of self-efficacy (Cooking Self-Efficacy, Cooking Safety Self-Efficacy, and Nutrition Knowledge).

```
#source: 12.6 Example: Violin Plot (Silhavy & McCarty, 2025)
#explanation: this makes violin plots with box plots
```

```
ggsave("plots/plot_gender_selfeff.png",
       plot = plot_gender_selfeff,
       width = 10, height = 8, dpi = 300)

#source: Step 6: Save your plot using ggsave() (Silhavy & McCarty, 2025)
#explanation: this makes the visualization into a png; note: have to assign it to be plot name
```

Figure 2 illustrates gender differences across three cooking self-efficacy domains—Confidence, Nutrition, and Safety. Across all domains, both men and women reported high median scores (around five, "Agree"), indicating generally strong self-efficacy. Women consistently showed slightly higher medians and tighter interquartile ranges, suggesting more uniform confidence within the group.

Men displayed greater variability, particularly in the Nutrition domain, where their responses ranged more widely despite having a similar median. In the Confidence and Safety domains, women's distributions extended more strongly toward the maximum of the scale, with several individuals reporting the highest possible agreement. Minimum scores were lower for both groups but represented a small portion of responses. The interquartile ranges (IQRs) were narrow to moderate, suggesting limited variability within each gender. Nevertheless, women consistently exhibited slightly higher

medians than men across all three domains, reflecting marginally stronger self-perceived cooking self-efficacy.

Overall, the figure suggests that while both groups endorsed strong cooking self-efficacy, women's responses were slightly higher and more consistent, whereas men's self-efficacy scores were more dispersed across domains.

3.3.1 Self-Efficacy Domains by Gender

```
# note: wide format data needed for statistical test
# the data was originally in wide format


# run t-tests
t_conf  <- t.test(SELFCONF ~ GENDER, data = pre_not_data)
t_safe  <- t.test(SELFSAFE ~ GENDER, data = pre_not_data)
t_nutri <- t.test(SELFNUTRI ~ GENDER, data = pre_not_data)

#source: Example: Gender and Zero-Sum Beliefs (Hei, 2025)
#explanation: running t-tests
```

Independent-samples t-tests were conducted to examine whether self-efficacy scores differed significantly between men and women participants across three domains: self-confidence, self-safety, and self-nutrition.

3.3.2 Confidence Self-Efficacy

```
cat("Self-Confidence t-test:")
```

```
Self-Confidence t-test:
```

```
print(t_conf)
```

```
    Welch Two Sample t-test

data:  SELFCONF by GENDER
t = -2.6625, df = 16.915, p-value = 0.01646
alternative hypothesis: true difference in means between group Man and group Woman is not equal
95 percent confidence interval:
 -1.4123700 -0.1633098
sample estimates:
  mean in group Man mean in group Woman
           3.725979            4.513819
```

```
#source: Example: Gender and Zero-Sum Beliefs (Hei, 2025)
#explanation: t-test for confidence
```

```
#explanation: for errors run these lines of code below (can be used for any of the self-effica
#str(data_gendered$GENDER) # check the name
#levels(data_gendered$GENDER) # check levels
#table(data_gendered$GENDER, useNA = "ifany") # check values in each
```

```
# select items
confidence_items <- pre_not_data[, c("EFFCONF1", "EFFCONF2", "EFFCONF3", "EFFCONF4")]

# reliability
a_result_conf <- alpha(confidence_items)

# view output
a_result_conf
```

An independent-samples t-test revealed a statistically significant difference in self-confidence scores between genders (t = -2.67, = .70, p = .016). Women participants (M = 4.51) reported higher levels of cooking self-confidence compared to men participants (M = 3.73). The 95% confidence interval for the mean difference ranged from 0.16 to 1.41, suggesting that this effect is likely meaningful in the broader population. These findings indicate that women students may feel more confident in their cooking abilities than men.

3.3.3 Nutrition Knowledge Self-Efficacy

```
cat("Self-Nutrition t-test:")
```

```
Self-Nutrition t-test:
```

```
print(t_nutri)
```

```

    Welch Two Sample t-test

data:  SELFNUTRI by GENDER
t = -1.3442, df = 16.092, p-value = 0.1975
alternative hypothesis: true difference in means between group Man and group Woman is not equal
95 percent confidence interval:
 -0.9058064  0.2026326
sample estimates:
  mean in group Man mean in group Woman
           4.240850            4.592437
```

```
#source: Example: Gender and Zero-Sum Beliefs (Hei, 2025)
#explanation1: t-test for nutrition
```

```
# select items
nutrition_items <- pre_not_data[, c("EFFNUTRI1", "EFFNUTRI2", "EFFNUTRI3")]

# reliability
a_result_nutri <- alpha(nutrition_items)

# view output
a_result_nutri
```

For self-nutrition efficacy, the independent-samples t-test also showed no statistically significant difference between genders (t = -1.34, = .67, p = .198). Women participants (M = 4.59) reported higher average nutrition self-efficacy than men (M = 4.24), but the 95% confidence interval (–0.20, 0.91) again crossed zero. Thus, while women tended to score higher, the difference was not statistically significant.

3.3.4 Cooking Safety Self-Efficacy

```
cat("Self-Safety t-test:")
```

```
Self-Safety t-test:
```

```
print(t_safe)
```

```
    Welch Two Sample t-test

data:  SELFSAFE by GENDER
t = -1.7562, df = 22.468, p-value = 0.09268
alternative hypothesis: true difference in means between group Man and group Woman is not equal
95 percent confidence interval:
 -0.90185557  0.07426173
sample estimates:
  mean in group Man mean in group Woman
           4.351032            4.764829
```

```
#source: Example: Gender and Zero-Sum Beliefs (Hei, 2025)
#explanation: t-test for safety
```

```r
# select items
safety_items <- pre_not_data[, c("EFFSAFE1", "EFFSAFE2", "EFFSAFE3", "EFFSAFE4")]

# reliability
a_result_safe <- alpha(safety_items)

# view output
a_result_safe
```

Results from the independent-samples t-test for self-safety scores indicated no statistically significant difference between genders (t = -1.76, = .68, p = .093). Women (M = 4.76) scored slightly higher than men (M = 4.35), but this difference did not reach conventional significance levels. The 95% confidence interval (–0.07, 0.90) includes zero, suggesting that perceived safety efficacy while cooking does not differ reliably by gender in this sample.

3.4 Subjective Social Class

```r
# Select relevant variables
corr_data <- pre_not_data %>%
  select(
    SOCIALSTATUS,
    FOODSKIPF,
    BARRCOOK1,
    BARRCOOK3,
    BARRCOOK5
  )

# Convert all variables to numeric
corr_data_num <- corr_data %>%
  mutate(across(everything(), as.numeric))

# Compute correlation matrix
corr_results <- corr.test(corr_data_num, use = "pairwise")
```

```
Warning in corr.test(corr_data_num, use = "pairwise"): Number of subjects must
be greater than 3 to find confidence intervals.
```

```r
# Extract correlation matrix
corr_matrix <- corr_results$r

# Plot correlation matrix
corrplot(
  corr_matrix,
  method = "color",
```

```
  type = "upper",
  tl.col = "black",
  addCoef.col = "black",    # add correlation values
  number.cex = 0.7,
  tl.cex = 0.8
)
```

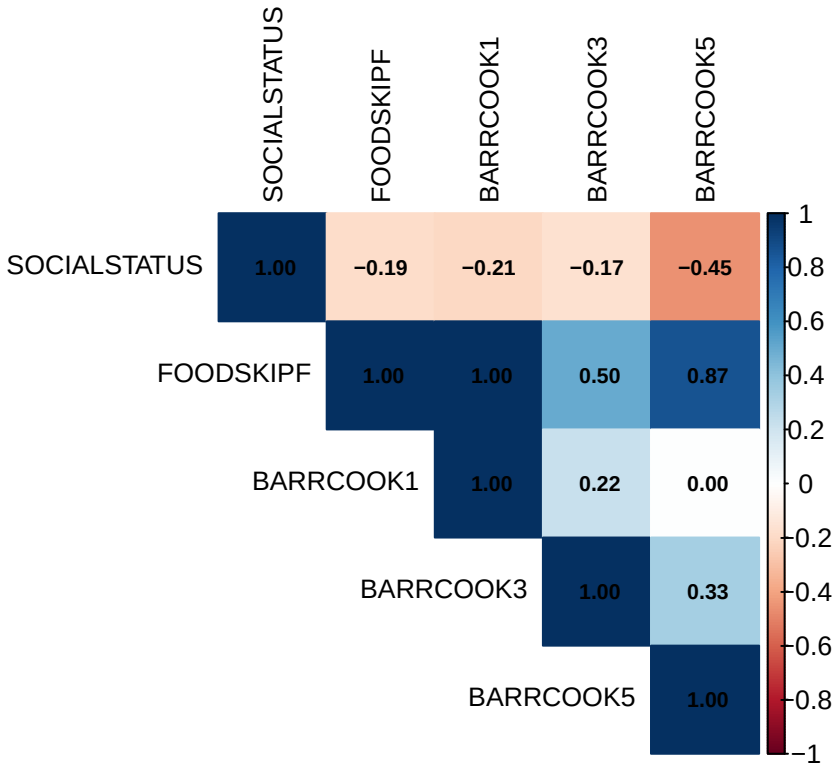

Figure 3: Figure 3. Correlation matrix showing the relationships among perceived social status (SOCIALSTATUS), frequency of meal skipping (FOODSKIPF), and three cooking barrier items (BARRCOOK1, BARRCOOK3, BARRCOOK5). Color intensity reflects the strength and direction of the correlation (blue = positive, red = negative).

Differences in cooking confidence may also be explained by other sociocultural factors. We found that perceived social status may also contribute to cooking disparities. This was measured using the MacArthur Scale of Subjective Social Status, a 10-point scale with one representing the lowest social status in terms of money, education, and jobs. Correlations between subjective social status and different food insecurity measures (frequency of meals skipped (FOODSKIPF), time constraint (BARRCOOK1), lack of equipment (BARRCOOK3), and lack of money (BARRCOOK5)) show negative correlations; the correlations found between social status and each item were -0.19, -0.21, -0.17, and -0.45, respectively. All the correlations were negative, indicating an inverse relationship between the variables. This showed that the lower a person's perceived social status, the more likely they are to experience external barriers to cooking self-efficacy.

3.5 Results Summary

Overall, the analyses partially support the hypothesis that women would score higher cooking self-efficacy levels than men. A significant difference was observed for self-confidence, indicating that gender may influence confidence in cooking tasks. However, differences in safety and nutrition efficacy were not statistically significant. As shown in Figure 2, both genders generally reported moderately high levels of cooking-related self-efficacy, with women displaying slightly higher median and overall distributions across domains. Furthermore, perceived socioeconomic levels measured through the MacArthur's Ladder Scale convey that differing levels may result in more external socioecological barriers to food security and cooking self-efficacy.

4 Discussion

4.1 Main Findings

This study examined how gender influences three areas of cooking-related self-efficacy—Cooking Confidence, Nutrition Knowledge, and Cooking Safety—among undergraduate students at Binghamton University. The results showed that women students reported significantly higher cooking confidence than men students, while there were no significant gender differences in cooking safety or nutrition knowledge. Overall, both groups demonstrated moderately high levels of self-efficacy across all domains, suggesting that most students viewed themselves as fairly capable of cooking in the kitchen.

Through the open-ended questions in the survey, the first question revealed that women reported seeing cooking as more of an obligation than men did; these results were found by looking for words such as "sole cook", "expect", and "I need to cook". The second question showed that people would more often cook for enjoyment rather than obligation if societal expectations had no influence; these results were found by looking for words such as "do it for fun", "more fun and experimental", and "something I want to do". Women viewed cooking as an obligation placed upon them simply because they were born as women, while men viewed cooking as a helpful skill linked to enjoyment and autonomy. These findings support previous literature indicating that gender expectations are influential determinants of food behaviors (Boek et al., 2012), and extend that literature by exposing how these expectations are conveyed within multicultural university contexts.

4.2 Additional Factors

While not being a focal point of our project, the perceived socioeconomic status participants exhibited through the (SOCIALSTATUS) item displayed that participants who perceived themselves to be in a lower socioeconomic bracket (on a 10-point scale) were more likely to be met with more external socioecological barriers to cooking self-efficacy and food security than their high socioeconomic level counterparts. Thus, besides gender, there are other factors to consider in one's cooking self-efficacy.

4.3 Broader Context and Continuity

Understanding gender-based differences in cooking self-efficacy is important because college students are in a period of transition, developing independence and learning to make their own food choices. Prior research shows that cooking confidence and self-efficacy strongly influence diet quality and food security (Knol et al., 2018; Morgan et al., 2021). The present findings add to this literature by showing that gender may shape confidence more than knowledge or safety skills, indicating an area where targeted interventions could make a difference.

These results were also similar to the results given in a different article, where women who exclusively stayed at home or were unemployed viewed themselves as the person responsible for cooking in their homes. They cooked for their families as a way to contribute to the household and to prevent disapproval from their husbands and family members (Da Silva Oliveira et al., 2022). These results coincide with our own, that women view cooking as more of an obligation than men do, and that societal expectations do influence their views about cooking.

4.4 Theoretical Findings

Using the socio-ecological model of health behavior as a basis, we can see that there were statistically significant improvements in cooking confidence at the individual level, as the intervention served to target individual students' cooking behaviors. Boone et. al (2021) explains how food insecurity poses a severe issue for college students, reflecting an ongoing need for campus resources and educational programs that teach students about cooking. This exemplifies the importance of intervention at multiple SEM sectors, namely at a community level.

4.5 Limitations

While the results of this study provide valuable insight for the research field, there are some limitations. The study was done on a small sample of college students, the majority women, which may affect its ability to represent the college population as a whole. The depth and number of responses were also very limited. Despite these limitations, there are still ways improvements can be made in order to contribute more to research fields.

4.6 Impact and Future Work

The findings in this study provide information on gender expectations and their influence on how men and women view cooking. By addressing the influence gender has on cooking confidence, universities, the public, and other public health professionals can design interventions to try and speak more about these gender expectations. Other interventions can change the cultural perception of cooking from duty-driven to wellness and enjoyment. These findings contribute to the growing research being done on food literacy, gender roles, and cultural expectations.

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