Research Square

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Burden and attitude acceptability constructs are associated with usage of a meal kit subscription service delivered to families in an interdisciplinary education intervention

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Abstract

Background/Objectives:

Food security is a multidimensional public health crisis experienced by families nationwide, often addressed by community-based initiatives that combine educational programming and food provisioning. Meal kits are a relatively new and growing food provisioning approach for addressing food security and associated public health concerns like poor diet quality; however, the acceptability of meal kits is not well understood in these contexts. **Methods**: Books & Cooks is a six-week, community-based family program that delivered literacy and nutrition education as well as meal kits to families with low income. In the fall 2024 and spring 2025 Books & Cooks program, families (n = 150) completed weekly feedback surveys to assess the acceptability of meal kits. **Results**: Most participating families (94%) and children (78%) used the meal kits in some capacity for at least four of the six intervention weeks. Although families reported some meal kit-associated burdens, their attitudes were primarily positive. Participant burden was negatively associated (family-level: $R=-0.411$, $p < 0.001$; child-level: $R=-0.191$, $p = 0.019$) and positive attitudes were positively associated (family-level: $R = 0.318$, $p < 0.001$; child-level: $R = 0.198$, $p = 0.015$) with meal kit usage. **Conclusions**: These findings indicate that families with low income are willing to use and are highly accepting of meal kits. Future investigations should incorporate more acceptability constructs, qualitative interviews, and food security and diet quality assessments to provide further support for meal kits.

Introduction

Food insecurity is experienced by 17.9% of households with children and 38.4% of households with low income in the United States [1]. Food insecurity is a complex and multidimensional issue defined by the United States Department of Agriculture (USDA) as “a household-level economic and social condition of limited or uncertain access to adequate food” [2]. A myriad of interventions have been empirically tested with the mission of combating food insecurity for those with low income. Multicomponent systems-level and community-based interventions, including educational and behavioral programs that incorporate a food provisioning and/or food discount component, have been successful in increasing food security for individuals [3, 4]. Multicomponent programs are especially effective in increasing both self-sufficiency and food security, with some estimates reducing very low food security rates by up to 50% [5].

However, programs are not equally effective for all demographics and in all settings, as individual contexts inform whether food security interventions are appropriate and acceptable. For instance, a secondary analysis of a voucher-based food security intervention revealed that the larger the household size, the less effective the standardized voucher amount was at increasing fruit and vegetable (FV) intake due to these households’ needing additional support [6]. A similarly structured program analyzing redemption rates of printed grocery vouchers across geographic areas found that families in Austin (67%) and Houston (61%), Texas had higher redemption rates than Dallas, Texas (45%), Southwest Florida (41%), and Washington D.C (22%) [7]. Participants from this study reported that the vouchers

were very easy to use (93.94%) and very helpful in improving their family's FV intake (96.84%); however, it is unclear why redemption rates varied so greatly across regions. Thus, despite emergent success, further investigation is warranted to establish programmatic approaches that can be widely adapted, are accepted by participants in diverse contexts, and simultaneously improve diet quality.

Meal Kits Subscription Service(s) (MKSS) are for-profit services that "deliver predominantly fresh, pre-measured ingredients paired with recipes" [8] to prepare at home. Meal kits have proven to be effective tools for increasing household food security, improving health outcomes, and supporting positive family dynamics [8–11]. For example, a healthy meal kit intervention that provided ingredients, recipes, and nutrition education to families with low income increased overall food security and FV intake, with sustained results at long-term follow-up [9]. The popularity of MKSS has continued to rise, with recipients reporting a reduction in common barriers associated with home cooking and healthy eating [8, 10]. For example, families who reported utilizing MKSS reported that meal kits were convenient, had financial benefits, inspired them to cook, enhanced family-based meal preparation, and increased their FV intake [10–12].

By design, meal kits support at-home meal preparation, which is associated with an overall healthier diet [13–17]. A cohort study investigating the relationship between at-home cooking and health concluded that individuals who frequently cooked their primary meal at home exhibited a lower body mass index (BMI), less excess body fat, better nutrition status (i.e., FV intake, plasma vitamin C levels, Dietary Approaches to Stop Hypertension (DASH) scores, and Mediterranean Diet Scores (MDS)), and improved indicators of cardio-metabolic health [15]. Multicomponent nutrition education programs for adolescents that incorporate meal preparation have elicited improvements in FV intake, fish intake, and overall food choice [18]. Furthermore, children who engage in hands-on meal preparation consume a wider variety of food groups and have an overall healthier diet [19].

Concurrent with improved health, studies have shown that children who regularly engage with hands-on meal preparation activities have broader food preferences and higher self-efficacy for cooking and making healthy choices [19]. For example, after-school community-based nutrition and cooking education programs elicit improvements in students' cooking self-efficacy and the frequency in which they cook at home – essential skills and experiences for preparing healthy meals in adulthood [13, 20]. Including children in meal preparation has also been demonstrated to nurture familial connections [21]. For example, families who participated in a cooking and nutrition program that included ingredient delivery, nutrition education, and synchronous, virtual recipe preparation, reported bonding more over shared experiences, working collaboratively to complete meal preparation activities, and using cooking as distraction-free, dedicated family time [21]. Similarly, a family meal kit intervention that provided meal plans and recipes to make five healthy meals a week for four weeks elicited an increase in the frequency of family meals, with parents reporting ease of familial participation in preparation [17].

Various interventions have demonstrated the impact of home cooking facilitated by meal kits; however, it is unclear which programmatic components aid the acceptability of meal kits and thus the elicitation of

improved outcomes. Furthermore, previous meal kit interventions have reported associated barriers that may compromise acceptability, including distaste or unfamiliarity with ingredients, lack of adherence to cultural norms, repetitive menu options, and insufficient portions to feed larger families [11, 13, 22]. To date, few studies have explicitly assessed the acceptability of meal kits in community-based programming using a theoretical framework. Previous meal kit interventions have used self-reported surveys to assess participants' acceptability of ingredients, taste, and preparation procedures as well as participants' willingness-to-pay for meal kits, perceived healthfulness of meal kits, their likelihood of remaking provided recipes on their own, and if they would recommend the meals to others [12, 22]. Other associated measures have included meal kits' impact on participants time, nutrition self-efficacy, home cooking behaviors, access to healthy foods, perceived helpfulness of the program, perceived usefulness of foods provided, grocery spending pre- and post- program, usefulness of provided educational materials, and if participants would return to the program [23, 24]. In addition to self-reported survey data, other acceptability measures that programs have used include program attendance and pounds and variety of foods selected by participants [23]. Although insightful, each study took a different approach to assessing acceptability, indicating a need to root investigations of meal kit acceptability within an established theoretical framework for progressing the use of meal kits as tools for addressing food insecurity and diet quality concerns.

Given that there is no established theoretical framework for assessing the acceptability of food provisioning mechanisms in community-based programming, alternative approaches must be used. The acceptability of healthcare interventions framework describes acceptability as a multi-faceted construct that includes seven subconstructs: affective attitude, burden, ethicality, intervention coherence, opportunity costs, perceived effectiveness, and self-efficacy [25]. In order to establish conceptual continuity, connect previous meal kit interventions to this theoretical framework, and progress meal kit acceptability investigations, this study examined affective attitude and burden constructs:

- Affective attitude is described as participants' feelings toward an intervention.
- Burden is described as participant's perceived effort associated with intervention participation.

This theoretical framework has been widely used and applied to various diet-related investigations. Examples include: 1) a randomized controlled trial aiming to improve Mediterranean diet adherence by providing multi-dimensional programming, which included food provisioning [26], 2) a scoping review analyzing the acceptability of federal food assistance programs among Indigenous peoples [27], and 3) a feasibility study investigating the acceptability of a teacher-delivered nutrition education program within primary schools [28]. As this theoretical framework has been demonstrated to be widely applicable, grounding our investigation of meal kit acceptability in these concepts may enhance the robustness and utility of the findings from this study.

Purpose

This investigation assessed the acceptability and usage of commercial meal kits as a method of food provisioning in a community-based program delivered to families with low income. Using components from a theoretical acceptability framework, we describe participants' acceptability of meal kits via their satisfaction with the meal kits (i.e., affective attitude) and barriers associated with preparing the meal kits (i.e., burden). We hypothesized that participants' affective attitudes and the barriers they experienced would be correlated (positively and negatively, respectively) with meal kit usage.

Materials and Methods

Research Design

Data were collected for this study during the fall 2024 – spring 2025 schoolyear. All subjects were participants in Books & Cooks, an educational program conducted across Florida under the Institute of Food and Agricultural Sciences at the University of Florida (UF). Approval for this study was obtained from the UF Institutional Review Board (IRB) on September 18th, 2023 (IRB202301058).

The Books & Cooks program is a six-week interdisciplinary nutrition, literacy, and parenting education program. During the six weeks of programming, weekly feedback and process evaluation data were collected to assess the acceptability of meal kits that were provided in conjunction with educational delivery [29]. Throughout programming, families were provided with home-delivered meal kits each week. Meal kits included detailed recipe cards with concise instructions and accompanying photos, as well as precise ingredients for three meals for a family of four. Meal kits were delivered to participants by a for-profit MKSS that advertises variety, flexibility, and affordability, and valued at $85/week/family.

Meal Selection

Each week, the commercial meal kit company sent a list of potential meals with ingredients and nutritional values to the research team for selection. All meals were reviewed and three per week were selected based on cultural appropriateness and healthfulness, using the company's "Nutrition Value" resource posted for reference. Additionally, one of the three meals selected was vegetarian in efforts to promote plant-based protein intake as an affordable, healthy, and delicious meal option. Although nutrition standards were set by Registered Dietitians to guide meal selections, most selectable meal options did not meet all standards put in place. Therefore, meals were analyzed based on the established standards and prioritized based on the number of standards met: 500–800 calories per serving (25–40% of daily value based on a 2000 calories per day diet), 7 grams or less of saturated fat per serving (33% or less of daily value based on 22 grams per day), and 760 mg of sodium or less per serving (33% or less of daily value based on 2300 mg per day).

Sample

All participants in this study were enrolled in Books & Cooks, a family-based multidisciplinary nutrition, literacy, and parenting intervention targeted to families with low income and children in grades kindergarten through fifth (K-5). Program eligibility included being 18 years or older, having at least one child enrolled in grades K-5, and residing in a county where Books & Cooks was facilitated. Program enrollment preference was given to those who had a household income less than 200% of the federal poverty line and to those who had a child enrolled in New Worlds Reading, a Florida state initiative indicating that their child is reading below grade level.

Data Collection

Participant data were collected via Qualtrics surveys. All consented participants received weekly feedback surveys to evaluate the acceptability and use of meal kit meals delivered the week prior. Surveys were distributed via email exactly one day before their subsequent in-person class and an additional reminder was sent the day of class. To assess participants' usage and acceptability of the meal kits, adult participants completed a weekly feedback survey modeled after a patient-centered acceptability framework [25]. To ensure that surveys were brief and that they captured meaningful data, the surveys included four items to capture meal kit usage as well as two (burden and affective attitude) of the seven acceptability constructs (Table 1).

Table 1
Weekly feedback survey items follow an acceptability framework

Construct	Weekly Feedback Survey Item	Weekly Feedback Survey Answer Options
Meal Kit Usage	Did your family prepare meals from the meal kit you received?	Yes, all of the meals using the recipes provided. Yes, some of the meals using the recipes provided. Yes, but we used the ingredients to prepare our own recipes. No, none of the meals.
Meal Kit Usage	Did your child(ren) enrolled in Books and Cooks participate in preparing the meal kit?	Yes No
Burden	Did your family experience any of the following? (select all that apply)	The meal kit was not appealing to my family. We didn't have time to cook our meal kit. We forgot to use our meal kit. We didn't feel confident that we could cook the recipes in our meal kit. We didn't have the right kitchen tools to prepare the recipes in our meal kit. We were concerned about the healthfulness of the meals. We gave the meals away to someone else. Other (please describe).
Affective Attitude	Overall, how much did your family like this week's meal kit?	Disliked a great deal Disliked somewhat Neither liked nor disliked Liked somewhat Liked a great deal

Data Analysis

Data were exported into SPSS for analysis. Demographics were assessed using frequencies and means. Participant acceptability of meal kits was assessed using frequencies and sums. Pearson's R

correlations between participants' usage of meal kits (family-level and child-level), participants' affective attitude, and participants' burden were used to identify associations between constructs of acceptability and meal kit usage.

Results

Of the 242 families who participated in the fall 2024 to spring 2025 cohorts of the Books & Cooks program, 150 head-of-household adults from each family completed at least four of the six weekly feedback surveys and were included in this study. Of those 150 participating head-of-household adults, 33 (22%) completed the weekly feedback survey four of the six weeks, 53 (35%) completed the weekly feedback survey five of the six weeks, and 64 (43%) completed the weekly feedback survey each of the six weeks. In total, 729 responses were collected from participants across all six weeks. Most participants in this study were female, between the ages of 36 and 45, White, non-Hispanic, married, and had a household income below $80,000 (Table 2).

Table 2
Demographics of the 150 adults who participated in the nutrition, literacy, and parenting Books & Cooks family-based education program, which included home-delivered meal kits

Gender	**n**	**%**
Male	3	2
Female	143	95
Other	4	3
Age		
18–25 years	1	1
26–35 years	47	31
36–45 years	80	53
46–55 years	19	13
56 + years	3	2
Race		
White	79	53
Black or African American	48	32
Asian	2	1
Multi-racial	10	7
Other	11	7
Ethnicity		
Non-Hispanic	88	59
Hispanic	62	41
Marital Status*		
Married	70	47
Widowed	1	1
Divorced	18	12
Separated	5	3
Never Married	38	26

Gender	n	%
Living with a Partner	16	11
Total Household Income Before Taxes**		
Less than $10,000	6	4
$10,000 - $19,999	9	6
$20,000 - $29,999	28	19
$30,000 - $39,999	16	11
$40,000 - $49,999	22	15
$50,000 - $59,999	18	12
$60,000 - $69,999	10	7
$70,000 - $79,999	4	3
$80,000 or more	34	23

**Data is missing from two participants.*

***Data is missing from three participants.*

Meal Kit Usage

Most families used the meal kits for the majority of programming, with 94% of families having used the meal kits in some capacity, and 78% of children having participated in meal preparation at least four of the six programming weeks. All families used the meal kits in some capacity, with one (1%) family having used the meal kits two of the six weeks, eight (5%) families having used the meal kits three of the six weeks, 44 (29%) having used the meal kits four of the six weeks, 52 (35%) having used the meal kits five of the six weeks, and 45 (30%) families having used the meal kits all six weeks (Fig. 1).

Additionally, Books & Cooks families were encouraged to use the meal kits as an opportunity to cook together in efforts to improve their family mealtimes. According to their parents, three (2%) children did not help prepare the meal kits at all, four (3%) helped one of the six weeks, eight (5%) helped two of the six weeks, 19 (13%) helped three of the six weeks, 40 (27%) helped four of the six weeks, 48 (32%) helped all but one week, and 28 (19%) helped every week.

Affective Attitude

Most families reported liking the meal kits “a great deal” or “somewhat” each week, with fewer families disliking the meals “somewhat” or “a great deal” (Fig. 2

Pearson's R correlations determined that participants' affective attitude toward meal kits was moderately and positively correlated with meal kit usage ($R = 0.318$, $p < 0.001$). Additionally, participants' affective attitude was weakly and positively correlated with child participation in meal kit preparation ($R = 0.198$, $p = 0.015$).

Burden

Across all 729 weekly surveys completed, issues or concerns with home-delivered meal kits were reported 305 times, or in 42% of surveys (Fig. 3). In other words, 58% of survey responses did not report any issues. Of the issues reported, approximately 15% of surveys mentioned a lack of time to prepare meals, 12% mentioned lack of meal appeal, and 8% mentioned delivery issues. Participants were not restricted to reporting one burdensome instance each week but could report multiple burdensome instances as needed.

Of the 14 responses categorized under "Other unexplained issues or concerns" (Fig. 2), participants wrote-in various explanations for not preparing the meal kits, which included illness, loss of power, and struggling to piece together enough ingredients to feed families larger in size. Because "Other" responses were not a reflection of the meal kits themselves, these reports were not included in analyses that determined associations between burden and meal kit usage. Similarly, reports of not using the meal kits because participants forgot to use them (6 instances) and because they gave the meal kits away to someone else (9 instances) were not included. Pearson's R correlations determined that the number of burdensome instances reported was moderately and negatively correlated with meal kit usage ($R=-0.411$, $p < 0.001$). Additionally, the number of burdensome instances reported was weakly and negatively correlated with children's participation in meal kit preparation ($R=-0.191$, $p = 0.019$).

Discussion

This study demonstrates both the acceptability and challenges of using commercial meal kits to address nutrition security among families with low income. Most families in this study reported using the meal kits, with 94% of families using meal kits in some capacity, and 78% of children helping with meal kit preparation at least four of the six intervention weeks. Furthermore, most families reported being satisfied with their meal kits each week. Despite their usage of and satisfaction with the meal kits, 42% of survey responses included at least one burdensome instance. As hypothesized, participant burden was negatively associated with meal kit usage, and participant satisfaction was positively associated with meal kit usage, both on a family and a child-participation level. Collectively, these results reveal that families with low income are willing to use meal kits and that they have generally positive attitudes toward them; however, addressing barriers may improve the acceptability of meal kits as a food provisioning tool for families.

Usage

Prior to conducting this study, we anticipated that program participants would require support for utilizing the meal kits and thus implemented a variety of strategies to ensure program fidelity. A study investigating the feasibility of meal kits for African American and Hispanic families with low incomes reported that participants expressed a high interest in meal kits, suspecting that meal kits could be beneficial for their health and save them time [30]. In contrast, participants also expressed some concerns including cost and portion sizes. In this study, we attempted to address these anticipated concerns by 1) covering the cost of meal kits for families during the intervention and 2) providing recommendations for making the meals go further, such as adding side dishes. Another study that utilized meal kits to improve nutritional outcomes for families with adolescents saw success by implementing a variety of strategies targeted at improving meal kit usage, including addressing household barriers related to home cooking and shared mealtimes, providing cooking equipment, discouraging electronic device usage, and removing associated costs [17]. The Books & Cooks program implemented similar strategies, including in-class discussions surrounding screentime boundaries for children. Additionally, a “Meal Kit How-to” video was published on YouTube for participants to easily access and use as a guide [31]. Collectively, these strategies may have contributed to our relatively high meal kit usage rates, where 94% of families and 78% of children participated in meal kit preparation at least four of the six programming weeks. These usage rates indicate that families perceived meal kits to be an acceptable food provisioning tool for their households, as most families utilized meal kits as intended by preparing the contents and by including their child in meal kit preparation.

Affective Attitude

We anticipated that participants’ attitudes would be associated with meal kit usage based on various theoretical propositions, including the Social Cognitive Theory [32] and the Theory of Planned Behavior [33], that describe how important attitudes are when encouraging or describing certain behaviors and emphasize the importance of this construct within participant acceptability. We confirmed our hypothesis that participants’ positive attitudes toward meal kits would be positively associated with meal kit usage. These associations were moderately but significantly present on a family level, indicating that families’ satisfaction with the meal kits was associated with higher usage rates; other studies have attributed such findings to the convenience, ease, and time-saving nature of meal kits, in addition to their ability to involve the whole family in meal preparation [10]. Similar, but weaker, associations were established on a child level, indicating that families’ satisfaction with the meal kits is associated with child participation in meal preparation. These analyses demonstrate that meal kits may be effective tools for encouraging both at-home meal preparation and child participation in meal preparation. Additionally, several studies investigating predictors of family food preparation have noted the importance of attitudes for engaging in this behavior [20, 34]. In combination, the positive attitudes as well as the positive associations illustrated in this study demonstrate the utility of the affective attitude construct in assessing participant acceptability of meal kits.

Burdens

We confirmed our hypothesis that the burden associated with meal kits would be negatively associated with meal kit usage. These associations were moderately but significantly present at the family level, and weakly but significantly at the child level. The most prevalent point of burden reported in this study was not having enough time to use the meal kits (109 out of 729 possible instances, or 15%). In previous studies, primary meal preparers commonly report experiencing time poverty, especially in households with low income [35, 36]. In studies that have used meal kits as a strategy to improve mealtimes, families have reported that meal kits saved them time as they were a resource to lean on during stressful life events, allowed them to simplify decision making thus minimizing cognitive load, and enabled them to focus on other important family activities [10]. For these reasons, we anticipated that providing meal kits would give participants more time to engage in meal preparation and thus did not expect that of the burdens reported that time would be the most prevalent one. It is, however, unclear if families in this study who did not have time to prepare the meal kits prepared other foods at home, meaning that families perceived meal kits to require more time compared to other home-cooked meals, or if they chose to eat outside the home. Given the variety of barriers that households with low income face, it is possible that these families require support in addition to meal kits that would provide them with enough time to use such resources [36].

The second highest point of burden reported by participants was perceiving the meal kits to be unappealing (90 out of 729 possible instances, or 12%). We anticipated this to be a reported burden, as other studies have had similar findings, with taste, repetitive menu options, bland foods, and unfamiliar ingredients being reported as a barrier in various meal kit investigations [11, 13, 22]. Additionally, lack of adherence to cultural norms and preferences have been reported as meal kit associated burdens [13, 30]. As part of the Books & Cooks program, we attempted to address these anticipated concerns by 1) encouraging the usage of spices and herbs, 2) selecting meals within the allotted options that were culturally appropriate for families, and 3) prioritizing menu options that participants had not already received in previous kits. Further investigation is required to determine which meal kit qualities families found to be unappealing specifically, and if recipes can be revised to promote higher consumption.

Burdensome instances we did not anticipate include delivery issues and families lacking kitchen supplies. Few families (8%) reported receiving boxes with spoiled food, dysfunctional box contents (i.e., ice packs), and disrupted delivery schedules, although it is understandable why these issues inhibited meal kit preparation. Even fewer families (2%) reported not having the kitchen supplies to prepare meal kit recipes. In the pilot study for this Books & Cooks intervention, families reported having very low tangible barriers that would prevent them from preparing meals [37]. Because these burdensome instances were rarely reported, we do not consider them to be a primary disruptor of meal kit usage and acceptability, despite other meal kit interventions having found benefits in providing program participants with necessary cooking tools [17].

Strengths

This program includes several strengths, including our ability to minimize burden for families, provide a satisfactory experience for families, enhance meal kit utility, and deliver meals in which minimal confidence-to-prepare-related burdens were reported. Overall, most (58%) weekly feedback responses did not include any burdensome instances associated with meal kits, most families were satisfied with the meal kits, most (94%) families prepared the meal kits at least four of the six weeks, and most (78%) children participated in meal preparation at least four of the six weeks. Furthermore, just 13 of the 729 responses (2%) included reports of a lack of confidence in preparing the meals. With the understanding that self-efficacy is a barrier to meal preparation [20, 34, 38], Books & Cooks was designed with participants' cooking confidence at the center of its programming by providing in-class nutrition lessons and cooking demonstrations [29] as well as explicit, step-by-step instructions alongside each recipe included within the meal kit [10]. These successes demonstrate that families with low income are mostly accepting of meal kits as a food provisioning resource and suggests that future research should consider utilizing these resources in nutrition programming.

Limitations

This study includes several limitations, which may have constrained the assessment of participants' acceptability of meal kits. First, this study included only 62% of families who participated in the fall 2024 to spring 2025 Books & Cooks program and may not encompass the entirety of families' experiences. Second, this study used only two of the seven constructs within Sekhon et al.'s (2017) acceptability framework to align with previous investigations; however, this limited the extent to which intervention acceptability can be fully understood. Although rooting this investigation in two well understood constructs begins to establish replicability in meal kit acceptability studies, including all seven constructs in data collection instruments would have provided more insight into the acceptability of meal kits for this demographic. Furthermore, the quantitative nature of this study limited our capacity to understand how these constructs informed acceptability – a limitation that could be addressed by incorporating qualitative assessments in future work. Lastly, it is unclear whether other MKSS may elicit different results; therefore, a comparison of various MKSS' provided to a similar demographic may provide a better understanding of families' acceptability of meal kits.

Considerations

Across all the meals offered for selection, 61% exceeded sodium standards, 83% exceeded saturated fat standards, and 33% exceeded caloric standards (see methods for standards). In order to balance budgetary concerns with nutrition and cultural considerations, 33% of the meals chosen by our team exceeded sodium standards, 80% exceeded saturated fat standards, and 18% exceeded caloric standards. Despite this, concern regarding the healthfulness of meals was the least reported issue. Sourcing nutritionally adequate meal kits that meet sodium, saturated fat, and caloric standards would provide essential insight into the acceptability and utility of this food provisioning mechanism as a means to improve nutritional health.

Conclusion

Investigating the acceptability of meal kits as a strategy for improving diet quality and food security is a vital step in establishing meal kits as an evidence-based approach for addressing nutritional health. Given that meal kits 1) are a strategy used in clinical programming and education interventions and 2) can be purchased by individual consumers, investigating the acceptability of meal kits is important for clinicians, researchers, and for-profit companies alike. Looking forward, researchers should investigate ways to address reported burdens, enhance satisfaction, and promote meal kit acceptability in efforts to enhance the utility of these resources. Additionally, future studies should conduct more comprehensive acceptability studies that incorporate all seven constructs in efforts to determine how various constructs play into acceptability.

Compared to other food provisioning mechanisms such as the Supplemental Nutrition Assistance Program or grocery stipends, meal kits are a relatively new approach for addressing public health concerns such as diet quality and food security. Although previous studies have used meal kits in attempts to improve nutritional outcomes [8, 10, 37], the acceptability of this method is less understood. This study adds to the growing body of literature investigating meal kits as a food provisioning vessel for families with low income – a population that may need these food provisioning resources the most. We determined that families with low income will use meal kits, but when burdens prevail, families are less likely to incorporate them into their mealtime routines, and when they enjoy them, they are more likely to use them.

Declarations

Author Contributions: Conceptualization, M.B. and A.P.; Methodology, M.B., A.P., K.S., and A.M.; Software, M.B., A.P., M.M., and D.D.; Formal Analysis, M.B. and A.P.; Investigation, M.B., D.D., K.S., and A.M.; Resources, D.D., K.S., and A.M.; Data Curation, M.B., A.P., and D.D.; Writing – Original Draft Preparation, M.B., A.P., and M.M., Writing – Review & Editing, D.D., K.S., and A.M.; Visualization, M.B., Supervision, D.D. and A.M., Project Administration, M.B., A.P., D.D., K.S., and A.M.; Funding Acquisition, D.D., K.S., and A.M..

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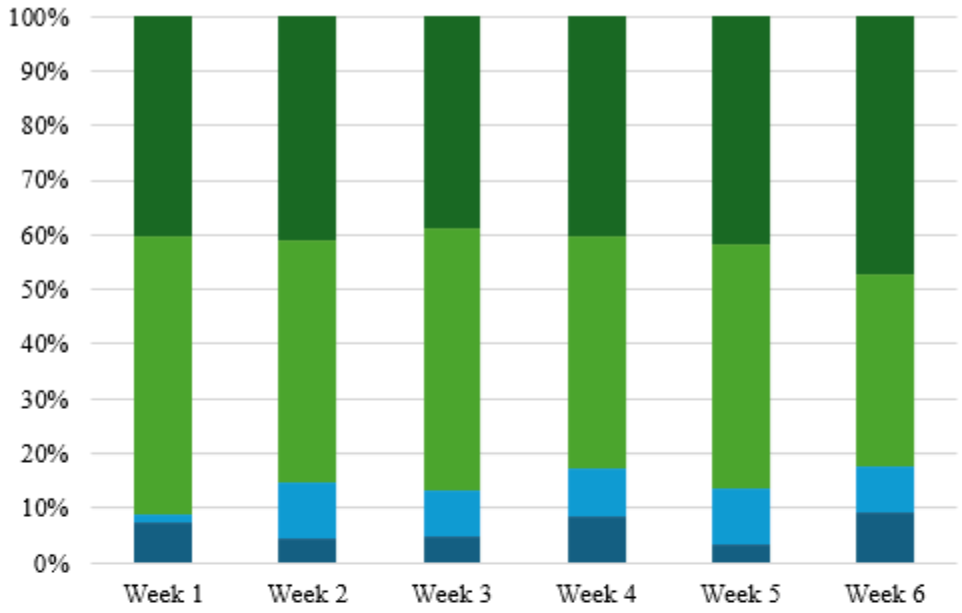
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Figures



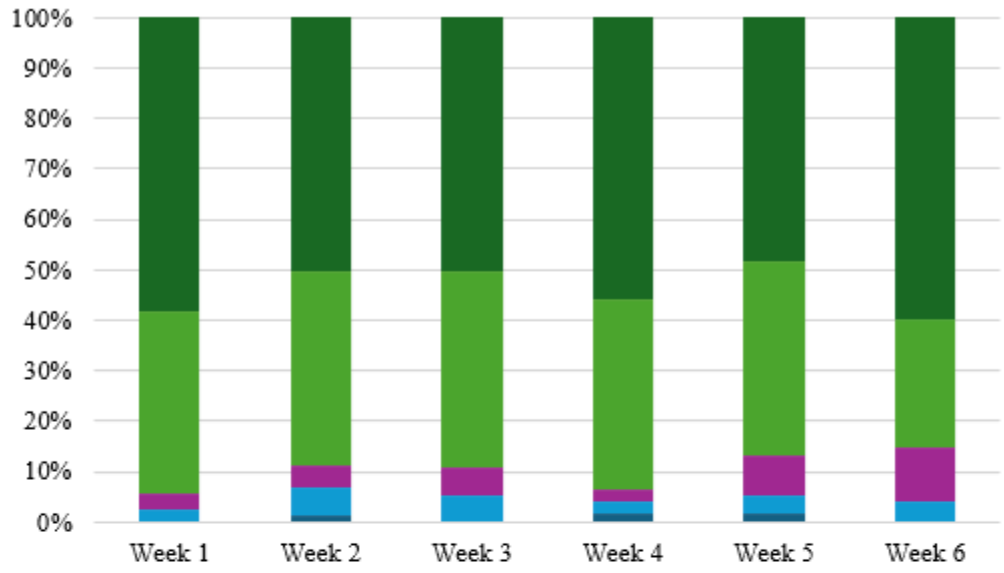
	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Yes, all of the meals using the recipes provided.	55 (40.1%)	56 (40.9%)	55 (38.7%)	56 (40.3%)	49 (41.5%)	51 (47.2%)
Yes, some of the meals using the recipes provided.	70 (51.1%)	61 (44.5%)	68 (47.9%)	59 (42.4%)	53 (44.9%)	38 (35.2%)
Yes, but we used the ingredients to prepare our own recipes.	2 (1.5%)	14 (10.2%)	12 (8.6%)	12 (8.6%)	12 (10.2%)	9 (8.3%)
No, none of the meals.	10 (7.3%)	6 (4.4%)	7 (4.9%)	12 (8.6%)	4 (3.4%)	10 (9.3%)

Figure 1

Participants' usage of the weekly home-delivered meal kits as reported by the 150 adults participating in the nutrition, literacy, and parenting Books & Cooks education program

Additionally, Books & Cooks families were encouraged to use the meal kits as an opportunity to cook together in efforts to improve their family mealtimes. According to their parents, three (2%) children did not help prepare the meal kits at all, four (3%) helped one of the six weeks, eight (5%) helped two of the

six weeks, 19 (13%) helped three of the six weeks, 40 (27%) helped four of the six weeks, 48 (32%) helped all but one week, and 28 (19%) helped every week.



	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Liked a Great Deal	74 (58.3%)	68 (50.4%)	66 (50.4%)	71 (55.9%)	55 (48.2%)	57 (60.0%)
Liked Somewhat	46 (36.2%)	52 (38.5%)	51 (38.9%)	48 (37.8%)	44 (38.6%)	24 (24.3%)
Neither Liked nor Disliked	4 (3.1%)	6 (4.4%)	7 (5.3%)	3 (2.4%)	9 (7.9%)	10 (10.5%)
Disliked Somewhat	3 (2.4%)	7 (5.2%)	7 (5.3%)	3 (2.4%)	4 (3.5%)	4 (4.2%)
Disliked a Great Deal	0 (0.0%)	2 (1.5%)	0 (0.0%)	2 (1.6%)	2 (1.8%)	0 (0.0%)

Figure 2

Participants' affective attitude toward the weekly home-delivered meal kits as reported by the 150 adults participating in the nutrition, literacy, and parenting Books & Cooks education program

Pearson's R correlations determined that participants' affective attitude toward meal kits was moderately and positively correlated with meal kit usage ($R=0.318$, $p<0.001$). Additionally, participants' affective attitude was weakly and positively correlated with child participation in meal kit preparation ($R=0.198$, $p=0.015$).

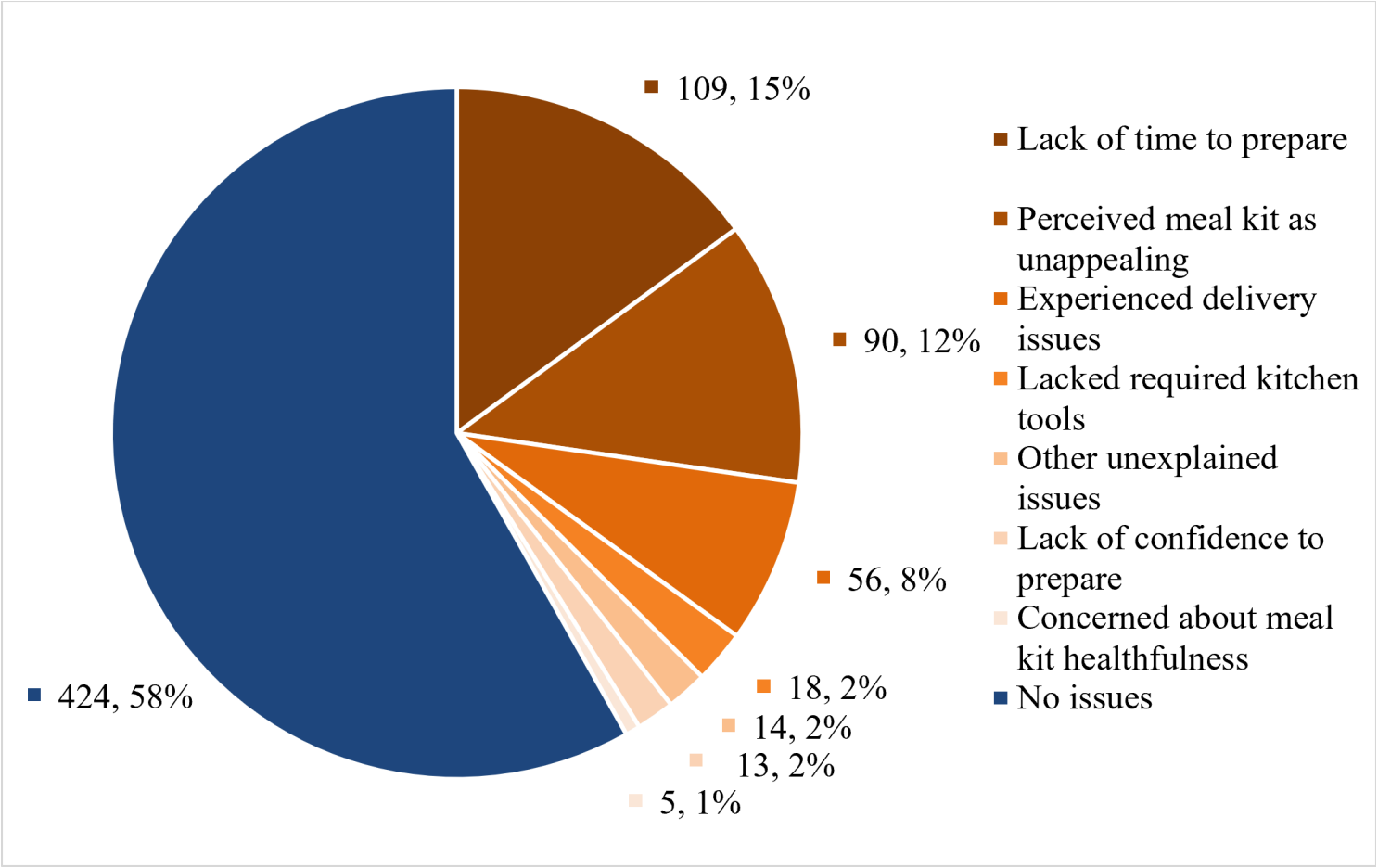


Figure 3

Issues or concerns with the home-delivered meal kits experienced by the 150 participating families across all six weeks of the Books & Cooks education program used to assess the burden associated with meal kits