

Article

Comparison of In-Person and Virtual Implementations of an Obesity Prevention and Culinary Nutrition Education Program for Family Care Providers

Lenora P. Goodman ^{1,*}, Mary M. Schroeder ², Kelly Kunkel ² and Katherine R. Hendel ¹

¹ Division of Epidemiology and Community Health, University of Minnesota School of Public Health, Minneapolis, MN 55415, USA; karlingh@umn.edu

² University of Minnesota Extension, University of Minnesota, St. Paul, MN 55108, USA; hedin007@umn.edu (M.M.S.); kunke003@umn.edu (K.K.)

* Correspondence: goodm315@umn.edu; Tel.: +1-612-625-6616

Abstract: Start Strong, a 4-week culinary nutrition education and obesity prevention program designed for rural family care providers in low-income areas of Minnesota, was initially an in-person training program and was recently adapted into a virtual version. Using a quasi-experimental design, this study examined within-group and between-group (in-person versus virtual) changes in culinary skill confidence and familiarity with food assistance programs after Start Strong participation. Additionally, we examined post-program participant experiences. The in-person program ($n = 12$, mean age of 45 years, September 2019) took place at community locations. The virtual program ($n = 27$, mean age of 41 years, Fall 2021–Winter 2022) used online learning and videoconferencing. Following data collection pre- and post-program, we used t -tests to examine within-group changes after Start Strong participation, repeated measures analysis of variance tests to compare outcomes between the in-person and virtual implementations, and Fisher’s exact test to compare post-survey outcomes. The in-person and virtual programs demonstrated similar improvements in cooking skill confidence and familiarity with food assistance programs. Compared to the virtual program, in-person participants reported significantly greater connection with other providers. This evaluation is relevant to addressing disparities in obesity prevention and provides an initial model for public health and community partnerships with ECE providers.

Keywords: children; obesity; nutrition; virtual learning; child care; evaluation; Extension



Citation: Goodman, L.P.; Schroeder, M.M.; Kunkel, K.; Hendel, K.R. Comparison of In-Person and Virtual Implementations of an Obesity Prevention and Culinary Nutrition Education Program for Family Care Providers. *Obesities* **2024**, *4*, 270–280. <https://doi.org/10.3390/obesities4030022>

Academic Editor: Nobuyuki Takahashi

Received: 24 June 2024

Revised: 20 July 2024

Accepted: 29 July 2024

Published: 5 August 2024



Copyright: © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The Institute of Medicine recommends that obesity prevention practices and policies begin in early childhood (before age 5) and include early care and education (ECE) settings, which provide care to nearly 82% of 2–5 year old children in a weekly non-parental care arrangement [1,2]. Given the role ECE settings play in early childhood health, the Centers for Disease Control and Prevention developed “The Spectrum of Opportunities Framework” to provide states with strategies for integrating obesity prevention initiatives into ECE settings [3]. The majority of existing strategies and public health programs aligned with this framework offer professional development and training to ECE child care centers [4]. Child care centers are located at non-residential addresses and care for large numbers of children [5]. However, in the state of Minnesota, 89% of all licensed child care providers are family care providers, which have a maximum capacity of 14 children and are typically located within a residential home [4,5]. Thus, existing training opportunities overlook the majority of child care providers in the state [4,5]. The University of Minnesota Extension (Extension) developed the *Start Strong: Cooking, Feeding, and More* program to address this gap in education opportunities available for family care providers [4].

Start Strong was a culinary nutrition education program that aimed to prevent obesity by increasing family care providers' ability to prepare nutritious foods for children and by improving their knowledge of federal food assistance programs [4]. Culinary skills have a role in obesity prevention through their association with increased intake of fruits, vegetables, whole grains, fiber, and vitamins and minerals supportive of a healthy weight [6,7]. There is some evidence to show improved child diet quality and a lower risk of obesity among children whose caregivers have cooking skill and prepare nutritious foods, and promising evidence that culinary interventions for adults and children can reduce child and adolescent body mass index [7–9]. Generally, community-based culinary obesity prevention programs include cooking skills such as knife skills, meal planning, healthy substitutions, portion size guidance, and techniques for reducing sugar and salt [10–12]. While there is little research examining the role of individual cooking skills in obesity prevention, knife skills tend to be a consistent feature across programs, as they can facilitate saving time and money and the preparation of nutritious foods, potentially reducing reliance on calorie-dense convenience foods [6,13]. To identify additional program components relevant to this population, focus groups with 19 rural family care providers and a statewide survey of ECE providers assessing unmet training needs informed curriculum development [4]. Providers indicated areas they were willing to change and areas in which they needed more education, including learning cooking techniques to use whole grains, adding flavor without salt, and tips to save cost and time [4,14].

The Start Strong curriculum was designed for family care providers in low-income areas that qualified for Tier 1 reimbursement through the Child and Adult Care Food Program (CACFP) [4]. CACFP is a federal program that reimburses the cost of meals to child care centers; centers qualifying for Tier 1 reimbursement provide care to families whose incomes are within 185% of the federal poverty guidelines [15]. Obesity disproportionately affects children and families from low-income households, who may have reduced access to nutritious foods [16]. To address this disparity, families within this income group qualify for federal food assistance programs, including the Women, Infants, and Children (WIC) program, the Supplemental Nutrition Assistance Program (SNAP), and free and reduced-price school meals. Child participation in WIC, SNAP, and free and reduced-price meals may improve diet quality and reduce obesity prevalence over time [17–19]. Further, the WIC program supports healthy weight in early childhood through additional growth monitoring and nutrition education [20]. Thus, by training providers in the preparation of nutritious foods and sharing information about food assistance programs with families, Start Strong aims to prevent obesity by improving the early childhood food environment in child care settings and at home [4]. Finally, the Learning Task Model informed the Start Strong curriculum design [4]. The Learning Task Model involves learning new information anchored in prior knowledge, practicing new skills, sharing ideas with other providers, and goal setting [21].

Preliminary data evaluating the benefits of participating in the Start Strong program were promising, and family child care providers provided qualitative evidence to support the value of the program [4]. Given that Start Strong was designed for rural family care providers, Extension was interested in developing an online learning format to reduce barriers associated with meeting at a central location. Specifically, compared to urban child care providers, rural family care providers report the training location, timing of training, and limited number of available training sessions as barriers to receiving additional training [22]. Addressing barriers to training on obesity prevention strategies is pertinent for rural family care providers, as children in rural areas are at higher risk for obesity [23]. Rural communities have played an important role in encouraging the growth of online learning programs to expand regional outreach [24]. Evidence comparing virtual and in-person teaching modalities in the context of higher education suggests there are no differences in knowledge gains and student satisfaction [25]. However, there is a dearth of information available about the implementation of different training modalities

for community-based interventions involving rural populations and the types of culinary skills taught in Start Strong.

The onset of the SARS-CoV-2 pandemic provided an impetus to engage family care providers in a virtual format and an opportunity to examine the differences between the in-person and virtual programs through an exploratory quasi-experimental design. Specifically, the aims of this analysis are to (1) examine within-group changes after participating in the Start Strong program on key culinary skills and familiarity of food assistance programs; (2) compare the differences in these outcomes between the in-person and virtual iterations of Start Strong over time; and (3) examine differences in participant experiences of participating in the in-person versus virtual versions of the program. The findings from this analysis will provide initial insight into the performance of the Start Strong intervention using different modalities (in person vs. virtual) and have relevance to the implementation of obesity prevention initiatives in family care centers, particularly among family child care providers in rural regions for whom training sessions are often less accessible.

2. Materials and Methods

Table 1 provides descriptions of the in-person and virtual iterations of the Start Strong program, including participant recruitment, implementation schemes, and curriculum details. Eligible participants were licensed family care providers from the state of Minnesota who contacted the study team after receiving an email about the study. The in-person Start Strong program took place in September 2019 at a community location determined by Start Strong facilitators. Thirteen participants registered for the course and 12 participants completed all parts of the course (92% participation rate). All 12 participants completed the in-person program, provided complete pre- and post-program data, and were included in the analysis.

The virtual cohort included participants from three separate implementations of the online program: September 2021, October 2021, and February 2022. Virtual participants were required to log into the online Canvas Learning Management System to access course materials and pre- and post-program surveys. Of the 52 participants who initially expressed interest in the online intervention, 12 individuals did not log into the online learning platform to access the intervention materials and 40 completed the training (77% participation rate). However, of these 40 completers, 13 were excluded from the analysis for providing either duplicate or incomplete data. The final analytical sample of virtual participants included 27 individuals who completed the training and provided complete pre- and post-program data. A Determination Form was completed for the University of Minnesota Institutional Review Board (IRB, project identification number STUDY00006219). Because this project evaluated a training program (i.e., program evaluation), the IRB determined it was exempt from full IRB review on 16 April 2019.

The survey questions were piloted prior to the 2019 in-person implementation of Start Strong with two child care providers who provided feedback about the length of the surveys, the sensitivity of survey questions, the format of the questions, the method of delivery, the need for clarification, and additional areas for improvement. Extension considered and incorporated this feedback into the pre- and post-program assessments prior to program implementation. The primary outcomes of the in-person and online interventions included confidence about food preparation and familiarity with food support programs, assessed at baseline (pre-program) and immediately after completing the Start Strong program (post-program).

Confidence with food preparation focused on seven key culinary skills addressed throughout the program: using a chef knife, cutting vegetables, cutting fruits, preparing whole grains, using beans and low-cost protein sources, planning menus, and using cooking techniques to reduce salt. Participants rated their confidence with each skill on a 5-point Likert scale (Strongly Disagree to Strongly Agree); “Does not Apply” was also an option.

Table 1. Description of individual and shared features of Start Strong across program delivery modalities.

| Program Characteristic | In-Person (Fall 2019) | Virtual (Fall 2021–Winter 2022) |
|------------------------------|---|--|
| Recruitment | CACFP ¹ sponsors and county child care licensing organizers contacted licensed child care providers via email to share information about Start Strong. There were an estimated ~5474 licensed family care providers in the state of Minnesota during this study [26]. Although this number of family care providers may have received information about the program at both time points, the number with interest in the in-person implementation of the program was limited by geographic location. | |
| Incentives for participating | Participants received a USD 100 gift card to compensate for travel mileage, child care, and other expenses associated with program attendance. | For completing in the program, participants chose 2 kitchen items worth a combined value of USD 25 from an online store. |
| Format of program | Participants met weekly with a facilitator for 2 h per week at an Extension office and community center, determined by the Start Strong facilitator. Facilitators led group discussions to introduce the curriculum and content of the training. Hands-on experiences, such as food preparation and cooking activities, reinforced concepts and created opportunities for group discussion and reflection. Participants set weekly goals related to curriculum topics. Educational handouts were provided in class. | Participants completed self-paced lessons provided through the learning management software, which included in the curriculum in the form of learning modules and interactive activities. Lessons were open a week prior to being due. To reinforce learning concepts, participants spent additional time independently engaging in the hands-on cooking activities provided to in-person participants. Participants attended 4 scheduled virtual meetings lasting 30 min after completing the lesson, which included group discussion led by the facilitator. Educational handouts were mailed to participants. |
| Facilitator | Two facilitators were assigned to each monthly training session. Each month (September 2019, September 2021, October 2021, and February 2022) had a different set of facilitators. At least one facilitator each month had experience teaching Start Strong. All facilitators were Extension educators in Health and Nutrition in the Department of Family, Health, and Wellbeing at the University of Minnesota. All facilitators had experience with adult education and working with child care providers. Their roles included acting as developers of the in-person class and trainers for the online class. | |
| Curriculum | Week 1: review of CACFP, knife skills for cutting vegetables, equipment to save time and money Week 2: review of SNAP ² , knife skills for cutting root vegetables, cooking techniques to decrease sodium Week 3: review of WIC ³ , exploring new choices: whole grains and lower-cost protein foods. Week 4: quick menu ideas, knife skills for cutting fruit, menu planning and school meals. | |
| Benefits of participating | Eight continuing education professional development hours approved by Develop, a Minnesota-based organization that accredits trainings for child care providers. Three books about food and nutrition valued at USD 1 each. | |

¹ CACFP = Child and Adult Care Food Program; ² SNAP = Supplemental Nutrition Assistance Program; ³ WIC = Women, Infants, and Children Program.

Participants reported their familiarity with the WIC, SNAP, and free and reduced-price school meals. The response options ranged from 1 to 4, corresponding to the following possible responses: “Not familiar at all”, “Have heard of the program, but don’t know what it’s about”, “somewhat familiar”, or “very familiar”. Participants were asked how likely they were to refer families to WIC, SNAP, or free and reduced-price school meals before and after participating in Start Strong, scored on a 5-point Likert scale (Very Unlikely to Very Likely).

Additionally, after completing the program, participants were asked a series of questions regarding their food purchasing behaviors (i.e., “After attending Start Strong trainings, do you spend more or less money purchasing food for meals and snacks in your child care?”; “After attending Start Strong trainings, do you serve more or less healthy foods in your child care?”). The response options included “Spend more money” and “More healthy foods”, respectively, and “Spend less money” and “Less healthy foods”, respectively. “No significant change” and “Other, please specify” were also options. Participants were asked about their experience with other child care providers during the program (i.e., “After attending Start Strong trainings, are you more connected with other child care providers in

your area?” and “Did you learn new ideas from other child care providers as a result of attending the Start Strong trainings?”). The response options to these questions included “Yes”, “No”, “No significant change”, “Not sure”, and “Other, please specify”. The responses were dichotomized for analysis to “spend less money” or “spend more money”, serve “more healthy foods” or “less healthy foods”, and “yes” or “no”, respectively.

Statistical analyses were performed using STATA 17 Software [27]. The baseline differences between the in-person and virtual groups were compared using independent samples *t*-tests for continuous variables and Fisher’s exact test for categorical variables. After examining the baseline characteristics between the in-person and virtual groups, there were no statistically significant different baseline demographic characteristics between groups. Within-group changes after participating in the Start Strong program were assessed using paired samples *t*-tests. Repeated measures analysis of variance (ANOVA) tests were run to compare outcomes between the in-person and virtual implementations of Start Strong. The responses were analyzed as continuous variables, with “Strong Disagree” represented by 1 and “Strongly Agree” by 5, “Not familiar at all” by 1 and “Very Familiar” by 5, and “Very Unlikely” by 1 and “Very Likely” by 5. The post-survey outcome measures were compared using Fisher’s exact test to account for some cells with sample sizes of less than five.

3. Results

3.1. Baseline

Table 2 summarizes the participant demographic characteristics. All providers identified as Non-Hispanic White and 95% percent of participants identified as female, which is generally representative of family child care providers throughout the state of Minnesota (nearly all female, average age of 42 years, 94% identify as Non-Hispanic White) [28]. The survey items showed good internal consistency pre-program (Cronbach’s alpha ranging from 0.74 to 0.92) and post-program (Chronbach’s alpha ranging from 0.87 to 0.95). Table 3 provides baseline data on in-person and virtual group participants’ confidence with seven key cooking skills, familiarity with food assistance programs, and likelihood of sharing information about food assistance programs with their families. The only statistically significant difference at baseline was familiarity with SNAP, which was significantly lower among the in-person group relative to the virtual group ($p < 0.01$).

Table 2. Demographic characteristics of child care providers; mean (SD) or count (%).

| Characteristic | Full Sample (N = 39) | In-Person (n = 12) | Virtual (n = 27) |
|---|----------------------|--------------------|------------------|
| Age | 42.2 (12.8) | 45.2 (10.0) | 41.0 (14.0) |
| Female | 37 (95%) | 12 (100%) | 25 (93%) |
| Male | 2 (5%) | 0 (0%) | 2 (7%) |
| Race/ethnicity | | | |
| Non-Hispanic/Latino White | 39 (100%) | 12 (100%) | 27 (100%) |
| Years in child care | | | |
| <5 | 11 (28%) | 2 (17%) | 9 (33%) |
| 5–15 | 12 (31%) | 2 (17%) | 10 (37%) |
| 6–25 | 7 (18%) | 3 (25%) | 4 (15%) |
| 26+ | 9 (23%) | 5 (42%) | 4 (15%) |
| Participation in CACFP | | | |
| Yes | 37 (95%) | 12 (100%) | 25 (93%) |
| No | 2 (5%) | 0 (0%) | 2 (7%) |
| Completion of child nutrition training in the past year that was not food safety- or CACFP compliance-related | | | |
| Yes | 14 (36%) | 7 (58%) | 7 (26%) |
| No | 25 (64%) | 5 (42%) | 20 (74%) |
| Number of children cared for annually | 9.60 (3.50) | 10 (4) | 9.4 (3.3) |

Table 3. Confidence in cooking and familiarity with food assistance programs by program modality; mean (SD).

| In-Person (n = 12) | | | | | |
|---|--------------------|---------------------|-------------------|--------------------|-----------------------------|
| Confidence with: ^a | Pre-Program | Post-Program | Difference | Effect Size | p-Value ^b |
| Using a chef knife | 4.08 (0.79) | 4.25 (1.22) | 0.17 (1.27) | 0.13 | 0.66 |
| Cutting vegetables | 4.50 (0.52) | 4.50 (1.17) | 0 (1.04) | 0 | 1 |
| Cutting fruit | 4.42 (0.52) | 4.33 (1.23) | 0.09 (1.08) | 0.08 | 0.80 |
| Preparing whole grains | 3.42 (1.31) | 4.50 (1.17) | 1.08 (1.31) | 0.82 | 0.02 |
| Using beans and low-cost protein sources | 3.25 (1.29) | 4.33 (1.15) | 1.08 (1.38) | 0.78 | 0.02 |
| Planning menus | 3.92 (1.00) | 4.25 (1.22) | 0.33 (1.37) | 0.24 | 0.42 |
| Using cooking techniques to reduce salt | 3.00 (0.74) | 4.33 (1.15) | 1.33 (0.89) | 0.01 | <0.01 |
| Familiarity with food assistance programs: ^c | | | | | |
| WIC ¹ | 3.17 (0.83) | 3.67 (0.49) | 0.50 (0.80) | 0.63 | 0.05 |
| SNAP ² | 1.67 (0.65) | 3.33 (0.49) | 1.66 (0.98) | 1.69 | <0.01 |
| Free and reduced-price school meals | 2.83 (1.19) | 3.67 (0.49) | 0.84 (1.03) | 0.82 | 0.02 |
| Likelihood of sharing information about food assistance programs with families: ^c | | | | | |
| WIC | 4.42 (0.67) | 4.83 (0.40) | 0.41 (0.79) | 0.52 | 0.10 |
| SNAP | 3.83 (1.27) | 4.83 (0.40) | 1.0 (1.04) | 0.96 | <0.01 |
| Free and reduced-price school meals | 4.33 (0.89) | 4.75 (0.45) | 0.42 (0.79) | 0.53 | 0.10 |
| Virtual (n = 27) | | | | | |
| Confidence with: ^a | Pre-program | Post-program | Difference | Effect Size | p-value ^b |
| Using a chef knife | 4.19 (1.04) | 4.78 (0.42) | 0.59 (1.01) | 0.58 | 0.01 |
| Cutting vegetables | 4.41 (0.80) | 4.78 (0.42) | 0.37 (0.88) | 0.42 | 0.04 |
| Cutting fruit | 4.52 (0.58) | 4.81 (0.39) | 0.29 (0.67) | 0.43 | 0.03 |
| Preparing whole grains | 4.19 (0.74) | 4.52 (0.64) | 0.33 (1.04) | 0.32 | 0.11 |
| Using beans and low-cost protein sources | 3.63 (0.97) | 4.22 (0.70) | 0.59 (1.01) | 0.58 | 0.01 |
| Planning menus | 3.85 (1.06) | 4.52 (0.70) | 0.67 (1.33) | 0.50 | 0.02 |
| Using cooking techniques to reduce salt | 3.63 (1.00) | 4.59 (0.50) | 0.96 (1.16) | 0.83 | <0.01 |
| Familiarity with food assistance programs: ^c | | | | | |
| WIC ¹ | 3.11 (0.93) | 3.63 (0.49) | 0.52 (0.80) | 0.65 | <0.01 |
| SNAP ² | 2.63 (0.84) | 3.41 (0.64) | 0.78 (0.93) | 0.84 | <0.01 |
| Free and reduced-price school meals | 3.07 (1.04) | 3.63 (0.49) | 0.56 (0.89) | 0.63 | <0.01 |
| Likelihood of sharing information about food assistance programs with families: ^c | | | | | |
| WIC | 4.26 (1.06) | 4.74 (0.45) | 0.48 (1.12) | 0.43 | 0.03 |
| SNAP | 3.96 (1.22) | 4.70 (0.54) | 0.74 (1.35) | 0.55 | 0.01 |
| Free and reduced-price school meals | 4.26 (1.06) | 4.78 (0.42) | 0.51 (1.09) | 0.47 | 0.02 |

^a Response options ranged from 1 to 5. ^b *p*-values were determined using paired samples *t*-tests with significance set at *p* = 0.05. Values in bold indicate statistically significant within-group changes. ^c Response options ranged from 1 to 4. ¹ WIC = Women, Infants, and Children Program. ² SNAP = Supplemental Nutrition Assistance Program.

3.2. Within-Group Changes in Outcomes

Providers in the in-person program significantly improved in confidence with preparing whole grains (*p* = 0.02), using low-cost protein sources (*p* = 0.02), and using cooking techniques to reduce salt (*p* < 0.01, Table 3). The virtual program had significant improvements in all confidence items (*p* < 0.05) with the exception of preparing whole grains (*p* = 0.11). Providers in the virtual group significantly increased their familiarity with all food assistance programs (*p* < 0.05), while providers in the in-person group increased their familiarity with SNAP and free and reduced-price meals (*p* < 0.05). Individuals in the virtual program significantly improved their likelihood of sharing information about all food assistance programs with families (*p* < 0.05, Table 3).

3.3. Between-Group Changes in Outcomes over Time

The results of the repeated measures ANOVA indicated statistically significant differences between the in-person and virtual groups in familiarity with SNAP (*F* = 7.29, *p* = 0.01). The in-person iteration of Start Strong demonstrated a larger mean increase in familiarity with SNAP (increase of 1.66) than the virtual group (increase 0.78). There were

no significant differences between the in-person and virtual iterations of Start Strong over time for any of the remaining outcomes.

3.4. Outcomes Assessed at Post-Program

The results of Fisher's exact test indicated no significant differences between the in-person and virtual iterations of Start Strong on post-program reports of the amount of money spent on groceries ($p = 0.68$), the amount of healthy foods served ($p = 0.73$), and learning from other child care providers ($p = 0.47$) from participating in Start Strong. The in-person group reported feeling significantly more connected with other child care providers in their area compared to the virtual group ($p < 0.001$) after participating in Start Strong.

4. Discussion

The purpose of this study was to determine the preliminary impact of the Start Strong obesity prevention program for rural family care providers, comparing in-person versus virtual implementation modalities, in an exploratory approach using existing data. Specifically, we found that both the in-person and virtual implementations of Start Strong demonstrated significant improvements in using cooking techniques to reduce salt, and the virtual group demonstrated significant improvements in familiarity with all food assistance programs. There were only two differences found between the two program modalities. First, there was a greater increase in familiarity with SNAP among the in-person group relative to the virtual group. However, this difference is likely due to significant baseline differences between groups in familiarity with SNAP, as post-program ratings of familiarity were numerically similar (the in-person group increased their familiarity rating from 1.67 to 3.33, and the virtual group increased their rating from 2.62 to 3.41). Second, participants in the in-person iteration of Start Strong reported significantly greater connection with other child care providers compared to virtual participants. While identifying revisions that encourage greater connections in the virtual modality requires further exploration, these findings provide initial evidence that both the in-person and virtual implementations of Start Strong can improve cooking skill confidence and increase familiarity with food assistance programs among family care providers.

The similar outcomes between both in-person and virtual modalities found in this study are consistent with previous literature. For example, a randomized control trial using the curriculum from the Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) found that a web-based obesity prevention training program was as effective as an in-person program at improving knowledge of child nutrition and physical activity for Child Care Health Consultants, who provide technical assistance to child care centers [29]. Similarly, when comparing the performance of online nutrition courses to in-person courses in higher education settings, online and in-person courses appear equally effective regarding satisfaction with course material and learning outcomes [30]. The online version of Start Strong used a flipped-classroom model, in which participants engaged in a learning activity independently (asynchronous) prior to meeting as a group for discussion (synchronous) [31]. Future iterations of the virtual program could benefit from examining how the intervention components perform independently (i.e., synchronous versus asynchronous components) to understand the efficacious components of program delivery [32].

Notably, while many of the providers rated their confidence in knife skills and cutting fruits and vegetables relatively high at the start of the program, providers in focus groups reported learning more about these culinary skills to be highly desired. Together, these findings may mean that this type of hands-on programming is appealing to providers, but not necessarily an area in need of improvement. However, the inclusion of these skills may facilitate the development of other culinary skills in need of improvement, such as preparing whole grains, using beans and low-cost protein sources, planning menus, and reducing salt when cooking, which can be supportive of a healthy weight [13]. Providers

rated these skills lower at baseline and most improved by roughly one full point on a five-point Likert scale. Thus, further research is needed to examine how culinary interventions can support a healthy food environment in child care settings and their effect on children's diet quality, taste preferences, and health outcomes through exposing care providers to a variety of culinary skills. For example, improving care providers' confidence in using cooking techniques to reduce salt could be impactful, as the intake of sodium-dense foods in childhood is associated with hypertension that can persist into adulthood, and with increased risk of overweight and obesity [33,34]. While beyond the scope of this study, the improvements in caregivers' confidence preparing beans and low-cost protein sources could be particularly relevant given current discussions regarding the environmental impact of food choices and plant-based protein options.

Offering in-person and virtual learning options could maximize the accessibility of Start Strong to rural family care providers, and participant preferences for a specific modality are a relevant consideration. For example, some participants may prefer to meet in person to avoid challenges with internet access and navigating online learning technology, while other participants may find in-person locations inaccessible. Additionally, some rural child care providers may value an opportunity to connect with other child care providers, particularly if they are not aware of other family care providers in their area. A portion of virtual participants interested in participating in Start Strong did not complete the program because they did not log into the online learning system (23%). As the use of videoconferencing and online learning platforms becomes increasingly popular, additional research is needed to address technology barriers and literacy, which might prevent some populations from accessing information in online formats. The Start Strong videoconferencing sessions employed techniques known to foster community throughout online nutrition interventions by offering weekly group meetings and encouraging group discussions [35]. However, the virtual group did not experience the same connection with other child care providers as the in-person group. The virtual and in-person groups were not significantly different in their ability to learn from other child care providers, suggesting that virtual platforms may better support the exchange of ideas rather than forming connections, particularly for our sample of rural family care providers. It is possible that some providers may benefit from continued connection and education through sharing ideas with each other after the intervention is complete, extending the benefits of participating in the program. Future research is needed to better understand child care provider expectations for making connections with other providers through this type of training, determine how to improve connections between providers in a virtual format, examine the impact of connection with other child care providers on long-term outcomes, and investigate how tailored intervention modalities could maximize participant success.

The Start Strong curriculum uniquely provides education on food assistance programs. The virtual program, implemented during the SARS-CoV-2 pandemic, resulted in improvements in the likelihood of family care providers recommending WIC, SNAP, and free/reduced-price school meals to families. This finding could have implications for the uptake of food assistance programs by families in need, yet more research is needed to understand how this type of intervention could translate to the utilization of food assistance programs. While familiarity with food assistance programs significantly improved, many participants still rated their level of familiarity as "somewhat familiar" instead of "very familiar" soon after being provided substantial information about these programs. Thus, improving education about food assistance programs such that providers feel confident discussing these programs with their families after training is an area for future research.

To our knowledge, this is the first study comparing the performance of an in-person versus virtual intervention focused on culinary training among a sample of rural family care providers. The evaluation of Start Strong could have implications for addressing disparities in obesity prevention, as rural children are at greater risk of developing obesity compared to children in urban settings [23]. Further, the findings from this study provide an initial model for public health and community partnerships with ECE providers that expand

training opportunities and obesity prevention efforts to reach a larger geographic area. The findings of this study include several limitations. The surveys used to assess outcomes were not designed to make rigorous comparisons, and future programs may benefit from measuring outcomes using standardized measures. The opportunity to compare in-person and virtual implementation of the program arose due to changes made following the COVID-19 pandemic. As a result, data for the in-person and virtual implementations of Start Strong were collected at different time points, and the classes were taught by different class facilitators. The small sample size further limits our ability to account for potential confounding variables in our analysis. These factors limit the conclusions that can be made regarding differences and similarities between the implementation modalities. Our sample of child care providers included individuals who identified only as Non-Hispanic White, and 95% of providers identified as female. These results are from a convenience sample recruited with the assistance of CACFP sponsors who specifically reached child care providers in rural Minnesota. Further, individuals in our sample chose to participate in this voluntary training opportunity and may have had more interest in nutrition than providers who did not choose to participate. Our sampling method limits the generalizability of our findings to other locations and among family care providers who identify differently, and in combination with our study measures, did not allow for a priori calculation of the sample size to detect a desired treatment effect prior to program implementation. Finally, since we do not have data on child growth, we were unable to determine whether Start Strong had an effect on the body mass index of children cared for by the family care providers who participated in the training. Future longitudinal research should examine changes in child growth over time following a culinary obesity prevention intervention, as well as identify specific, essential cooking skills (e.g., knife skills) supportive of a healthy weight.

5. Conclusions

Our findings provide promising preliminary evidence that both the in-person and online versions of Start Strong are impactful at improving cooking skill confidence and increasing familiarity in food assistance programs, which are factors related to obesity prevention in the short term. Notably, by eliminating the need to meet at a central location, the online version is capable of reaching audiences in wider geographic areas, particularly in rural communities, where rates of obesity in children are higher relative to urban areas. However, additional attention to the importance of connection with other child care providers is needed. Further research employing designs that are more rigorous will provide additional insights into the beneficial components of the Start Strong program that can be adapted for nutrition education initiatives in other states and child care settings.

Author Contributions: Conceptualization, M.M.S., K.K. and K.R.H.; Formal Analysis, L.P.G. and K.R.H.; Investigation, M.M.S. and K.K.; Methodology, M.M.S. and K.K.; Writing—Original Draft, L.P.G.; Writing—Review and Editing, L.P.G., M.M.S., K.K. and K.R.H. All authors have read and agreed to the published version of the manuscript.

Funding: The project described was supported by Award Number T32DK083250 from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIDDK or the National Institutes of Health. The Supplemental Nutrition Assistance Program Education program provided financial support.

Institutional Review Board Statement: This program evaluation research was determined to not be research on human subjects by the Minnesota Institutional Review Board. A Determination Form was completed for the University of Minnesota Institutional Review Board (IRB, project identification number STUDY00006219). Because this project evaluated a training program (i.e., program evaluation), the IRB determined that it was exempt from full IRB review on 16 April 2019.

Informed Consent Statement: Not applicable.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors on request.

Acknowledgments: The curriculum for Start Strong: Cooking, Feeding, and More can be accessed at <https://extension.umn.edu/school-and-child-care-nutrition/start-strong-cooking-feeding-and-more-curriculum> (accessed on 1 August 2024).

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. McGuire, S. Institute of Medicine (IOM) Early Childhood Obesity Prevention Policies. The National Academies Press: Washington, DC, USA, 2011. *Adv. Nutr.* **2012**, *3*, 56–57. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
2. Cui, J.; Natzke, L. *What Are the Most Prevalent Forms of Early Child Care and Education Environments for Children before They Enter Kindergarten?* National Center for Education Statistics: Washington, DC, USA, 2019. Available online: <https://nces.ed.gov/fastfacts/display.asp?id=4> (accessed on 20 July 2024).
3. National Center for Chronic Disease Prevention and Health Promotion. *State Obesity Prevention Efforts Targeting the Early Care and Education Setting: Quick Start Action Guide (2.0)*; Pamphlet (or Booklet); CDC: Atlanta, GA, USA, 2018.
4. Schroeder, M.; Kunkel, K.; Baltaci, A.; Hanson, C. Start Strong: A Culinary Nutrition Education Training for Family Child Care Providers. *J. Nutr. Educ. Behav.* **2021**, *53*, 900–902. [[CrossRef](#)] [[PubMed](#)]
5. *Status of Child Care in Minnesota*; Minnesota Department of Human Services, Office of Inspector General, Children and Family Services: St. Paul, MN, USA. Available online: <https://www.lrl.mn.gov/docs/2020/mandated/200311.pdf> (accessed on 20 July 2024).
6. Nelson, S.A.; Corbin, M.A.; Nickols-Richardson, S.M. A call for culinary skills education in childhood obesity-prevention interventions: Current status and peer influences. *J. Acad. Nutr. Dietetics.* **2013**, *113*, 1031–1036. [[CrossRef](#)]
7. Dimple, D.; Ramesh, G. Cooking and Its Impact on Childhood Obesity: A Systematic Review. *J. Nutr. Educ. Behav.* **2023**, *55*, 677–688. [[CrossRef](#)] [[PubMed](#)]
8. Tani, Y.; Isumi, A.; Doi, S.; Fujiwara, T. Associations of Caregiver Cooking Skills with Child Dietary Behaviors and Weight Status: Results from the A-CHILD Study. *Nutrients* **2021**, *13*, 4549. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
9. Kramer, R.F.; Coutinho, A.J.; Vaeth, E.; Christiansen, K.; Suratkar, S.; Gittelsohn, J. Healthier home food preparation methods and youth and caregiver psychosocial factors are associated with lower BMI in African American youth. *J. Nutr.* **2012**, *142*, 948–954. [[CrossRef](#)] [[PubMed](#)]
10. Franzen-Castle, L.; Colby, S.E.; Kattelman, K.K.; Olfert, M.D.; Mathews, D.R.; Yerxa, K.; Baker, B.; Krehbiel, M.; Lehrke, T.; Wilson, K.; et al. Development of the iCook 4-H Curriculum for Youth and Adults: Cooking, Eating, and Playing Together for Childhood Obesity Prevention. *J. Nutr. Educ. Behav.* **2019**, *51*, S60–S68. [[CrossRef](#)] [[PubMed](#)]
11. Fals, A.M.; Schnell, C. Innovative, multi-level nutrition education program within a hospital-based childhood obesity prevention and treatment program. *Pediatrics* **2019**, *144*, 206. [[CrossRef](#)]
12. Thang, C.K.; Guerrero, A.D.; Garell, C.L.; Leader, J.K.; Lee, E.; Ziehl, K.; Carpenter, C.L.; Boyce, S.; Slusser, W. Impact of a Teaching Kitchen Curriculum for Health Professional Trainees in Nutrition Knowledge, Confidence, and Skills to Advance Obesity Prevention and Management in Clinical Practice. *Nutrients* **2023**, *15*, 4240. [[CrossRef](#)]
13. Condrasky, M.D.; Hegler, M. How culinary nutrition can save the health of a nation. *J. Ext.* **2010**, *48*, 1–6. [[CrossRef](#)]
14. Nanney, M.S.; Larowe, T.L.; Davey, C.; Frost, N.; Arcan, C.; O'Meara, J. Obesity Prevention in Early Child Care Settings. *Health Educ. Behav.* **2017**, *44*, 23–31. [[CrossRef](#)] [[PubMed](#)]
15. Hamilton, W.L. *Reimbursement Tiering in the CACFP: Summary Report to Congress on the Family Child Care Homes Legislative Changes Study*; Economic Research Service; US Department of Agriculture: Washington, DC, USA, 2002.
16. Traore, S.S.; Bo, Y.; Kou, G.; Lyu, Q. Socioeconomic inequality in overweight/obesity among US children: NHANES 2001 to 2018. *Front. Pediatr.* **2023**, *11*, 1082558. [[CrossRef](#)] [[PubMed](#)]
17. Daepf, M.I.; Gortmaker, S.L.; Wang, Y.C.; Long, M.W.; Kenney, E.L. WIC food package changes: Trends in childhood obesity prevalence. *Pediatrics* **2019**, *143*, e20182841. [[CrossRef](#)] [[PubMed](#)]
18. Kenney, E.L.; Barrett, J.L.; Bleich, S.N.; Ward, Z.J.; Craddock, A.L.; Gortmaker, S.L. Impact Of The Healthy, Hunger-Free Kids Act On Obesity Trends: Study examines impact of the Healthy, Hunger-Free Kids Act of 2010 on childhood obesity trends. *Health Aff.* **2020**, *39*, 1122–1129. [[CrossRef](#)] [[PubMed](#)]
19. Hudak, K.M.; Racine, E.F. Do additional SNAP benefits matter for child weight?: Evidence from the 2009 benefit increase. *Econ. Hum. Biol.* **2021**, *41*, 100966. [[CrossRef](#)]
20. Carlson, S.; Neuberger, Z. WIC works: Addressing the Nutrition and Health Needs of Low-Income Families for More Than Four Decades. *Cent. Budg. Policy Priorities.* **2021**. Available online: <https://www.cbpp.org/research/food-assistance/wic-works-addressing-the-nutrition-and-health-needs-of-low-income-families> (accessed on 20 July 2024).
21. Norris, J.A. *A Dialogue Approach to Adult Learning: From Telling to Teaching*; Learning by Dialogue: Myrtle Beach, SC, USA, 2003.
22. Larson, N.; Loth, K.A.; Nanney, M.S. Staff Training Interests, Barriers, and Preferences in Rural and Urban Child Care Programs in Minnesota. *J. Nutr. Educ. Behav.* **2019**, *51*, 335–341. [[CrossRef](#)] [[PubMed](#)]
23. Johnson, J.A., 3rd; Johnson, A.M. Urban-rural differences in childhood and adolescent obesity in the United States: A systematic review and meta-analysis. *Child. Obes.* **2015**, *11*, 233–241. [[CrossRef](#)] [[PubMed](#)]

24. Austin, G.A. Administrative challenges and rewards of online learning in a rural community college: Reflections of a distance learning administrator. *New Dir. Community Coll.* **2010**, *2010*, 27–36. [CrossRef]
25. He, L.; Yang, N.; Xu, L.; Ping, F.; Li, W.; Sun, Q.; Li, Y.; Zhu, H.; Zhang, H. Synchronous distance education vs traditional education for health science students: A systematic review and meta-analysis. *Med. Educ.* **2021**, *55*, 293–308. [CrossRef]
26. CACFP Participation in Minnesota. Child Care Aware of America. Available online: <https://storymaps.arcgis.com/stories/8cc7613f80cb421b9a0d776785f12748> (accessed on 20 July 2024).
27. *Stata Statistical Software: Release 17*; StataCorp LLC.: College Station, TX, USA, 2021. Available online: <https://www.stata.com/support/faqs/resources/citing-software-documentation-faqs/> (accessed on 20 July 2024).
28. Chase, R.; Moore, C.; Pierce, S.; Arnold, J. *Child Care Workforce in Minnesota: 2006 Statewide Study of Demographics, Training and Professional Development Summary*; Wilder Research: St. Paul, MN, USA, 2007.
29. Benjamin, S.E.; Tate, D.F.; Bangdiwala, S.I.; Neelon, B.H.; Ammerman, A.S.; Dodds, J.M.; Ward, D.S. Preparing Child Care Health Consultants to Address Childhood Overweight: A Randomized Controlled Trial Comparing Web to In-Person Training. *Matern. Child Health J.* **2008**, *12*, 662–669. [CrossRef]
30. Miller, M.E.; Newton, K.; Stover, S.; Miller, B.; Buttolph, J. Comparing Delivery Methods of an Introductory Nutrition Course Using the Community of Inquiry. *J. Nutr. Educ. Behav.* **2020**, *52*, 401–406. [CrossRef] [PubMed]
31. Stöhr, C.; Demazière, C.; Adawi, T. The polarizing effect of the online flipped classroom. *Comput. Educ.* **2020**, *147*, 103789. [CrossRef]
32. Vandelanotte, C.; Müller, A.M.; Short, C.E.; Hingle, M.; Nathan, N.; Williams, S.L.; Lopez, M.L.; Parekh, S.; Maher, C.A. Past, Present, and Future of eHealth and mHealth Research to Improve Physical Activity and Dietary Behaviors. *J. Nutr. Educ. Behav.* **2016**, *48*, 219–228.e1. [CrossRef] [PubMed]
33. Lava, S.A.; Bianchetti, M.G.; Simonetti, G.D. Salt intake in children and its consequences on blood pressure. *Pediatr. Nephrol.* **2015**, *30*, 1389–1396. [CrossRef] [PubMed]
34. Zhao, L.; Ogden, C.L.; Yang, Q.; Jackson, S.L.; Loria, C.M.; Galuska, D.A.; Wiltz, J.L.; Merritt, R.; Cogswell, M.E. Association of Usual Sodium Intake with Obesity Among US Children and Adolescents, NHANES 2009–2016. *Obesity* **2021**, *29*, 587–594. [CrossRef] [PubMed] [PubMed Central]
35. Haar, M. Increasing Sense of Community in Higher Education Nutrition Courses Using Technology. *J. Nutr. Educ. Behav.* **2018**, *50*, 96–99.e1. [CrossRef]

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.