Hybrid Home-Based Nutrition Education Is an Effective Alternative to In-Person Delivery

Chutima Ganthavorn, PhD; Marisa Neelon, MS, RD; Natalie Price, MPH; Tamekia Wilkins, PhD; Tammy J. McMurdo, MS, RDN

INTRODUCTION

Federal programs such as the Expanded Food and Nutrition Education Program (EFNEP) and the Supplemental Nutrition Assistance Program-Education (SNAP-Ed) promote healthy food and physical activity habits to prevent chronic disease. Traditionally, participants attended a series of community-based classes taught in person by nutrition educators. However, work schedules, child care, and lack of transportation make it challenging for some participants with low resources to attend a series of classes. The need for alternatives to in-person education became even more apparent during the onset of the coronavirus disease 2019 pandemic. Home-based programs can range from low-technology methods such as mailed newsletters to higher technology recorded or live online lessons. However, online delivery may not be feasible for some participants because of limited digital literacy, lack of up-to-date computer or mobile devices, and/or the availability of reliable internet. Although other studies have demonstrated positive participant knowledge, attitude, and behavior change outcomes of a newsletter educational program, the authors are not aware of studies that examined the effectiveness of a hybrid home-based delivery method combining mailed newsletters with in-person group lessons and personalized phone calls.

To serve participants with low resources, the University of California Cooperative Extension (UCCE) academic staff developed a home-based curriculum called UCCE Connects to You! (UCCE C2U!), consisting of 10 newsletter-style lessons modeled after the Eating Smart Being Active11 curriculum used in the UCCE, EFNEP, and SNAP-Ed, known as CalFresh Healthy Living. The newsletters were written at a sixth-grade reading level and available in English and Spanish. The newsletters contained activities and visuals similar to the Eating Smart Being Active lesson worksheets and handouts with the addition of healthy habit focus, practical tips, and small steps to make a change (Table 1). The UCCE C2U! hybrid delivery included an initial in-person group lesson, mailed newsletter lessons, and personal coaching via phone by a UCCE nutrition educator. A previous unpublished pilot study by UCCE indicated the potential effectiveness of home-based learning. After incorporating nutrition educator feedback, another study was conducted in 2018–2019 to explore modified hybrid delivery protocols that included a video chat option to assess participant readiness and/or ability to use basic technology to engage with an educator. This article aims to report results comparing 2 hybrid home-based delivery methods with traditional in-person delivery related to participant outcomes in dietary, physical activity, food safety, food resource management practices, and food security outcomes.

HYBRID HOME-BASED DELIVERY METHODS

Two methods of hybrid home-based delivery were offered: a hybrid delivery with only the first lesson in-person or a modified hybrid with the first and last lessons in-person (Table 2). Traditional EFNEP delivery favors social constructivism learning theory, which views that learning is best through social interactions. Traditional adult EFNEP classes provide a site-based, group learning environment guided by an educator. Although this method may be preferable for some, it may not be convenient or a suitable learning style for others. To meet national EFNEP requirements for in-person group learning, we included 2 hybrid methods for comparison, 1 vs 2 in-person classes. The placement of the first session in a group setting was to facilitate enrollment and rapport-building with educators. The placement of the last session was for an overview of all lessons, sharing of experience among participants, and celebration.

University of California Cooperative Extension nutrition educators recruited adults eligible for participation in EFNEP and CalFresh Healthy Living through partnering with schools and local agencies, such as Head Start, family shelters, and so on, in which they generally conduct in-person classes. For this pilot, partners were given 2 additional delivery options for their clientele. Once the delivery method was agreed on, the partners helped schedule and publicize the first class. Participants were asked to review the written program requirements in...
Lessons packet (available on request via email: caefnep@ucanr.edu) mailings occurred approximately every 2 weeks allowing participants to receive, read, set goals, and practice skills learned in each lesson before the next call. Following each mailing, UCCE educators contacted participants by phone to conduct a 1-on-1 coaching session. In the modified hybrid delivery, participants were encouraged to engage with the educator using a video chat platform; however, they were given a choice of video chat or a phone call. Regardless of the options, UCCE educators followed a phone script to help guide their conversations during the home coaching sessions. The phone script for each call is color-coded to differentiate between educator instruction and what to say to participants (Figure 2). The bilingual script included a quick review of lesson key points and encouragement to set small goals, try recipes, and ask questions. The educators were provided a 1-hour Zoom training that included a project overview and timeline, educator expectations, and use of the phone script for participant coaching. Evaluation of behavior change was assessed using the standard EFNEP prepost Food and Physical Activity Questionnaire (FPAQ).

<table>
<thead>
<tr>
<th>Why should I be active?</th>
<th><em>Tip</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Being physically active has many benefits. It helps our health and it is a great way to spend time with family.</td>
<td>Men over 40 and women over 50 should check with their doctor or health care provider before being active.</td>
</tr>
<tr>
<td><strong>Being Active:</strong></td>
<td></td>
</tr>
<tr>
<td>- Reduces risk of heart disease, high blood pressure and diabetes.</td>
<td></td>
</tr>
<tr>
<td>- Helps maintain a healthy weight.</td>
<td></td>
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<tr>
<td>- Keeps bones strong.</td>
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</tr>
<tr>
<td>- Increases energy.</td>
<td></td>
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</tbody>
</table>

**What type of physical activity do I need?**

You need three types of physical activity.

1. **Aerobic Activity** makes you breathe harder and makes your heart beat faster.
   - Riding a bike
   - Hiking
   - Dancing
   - Playing Ball
   - Swimming
   - Walking
   - Gardening
   - Running

2. **Muscle/Strength Training** makes your muscles and bones stronger.
   - Weight lifting
   - Yoga
   - Resistance work (heel raises, push-ups, carrying a child, and more)
   - Running.
   - Jumping rope
   - Basketball

**Figure 1.** Example of a University of California Cooperative Extension Connects to You! Lesson One – Get Moving!
ENROLLMENT AND GRADUATION RATE

Six educators from 5 counties participated in this project. Recruiting participants was more difficult than anticipated compared with traditional in-person groups, possibly because of the novelty of the delivery model. Total enrollment in UCCE C2U! was 95 participants; 59 enrolled in a hybrid group and 36 in a modified hybrid group (Table 3). Of those in the modified hybrid group, 21 participants agreed to use video chat; 15 declined and opted for a phone call. Thirty-two participants dropped out across the 2 hybrid groups; 19% dropped before the first call, 40% after the first call, 22% after the second, and 19% after the third call.

The graduation rate for all hybrid and modified hybrid participants is 66%, lower than the California EF-NEP graduation rate (76%) of traditional in-person delivery during the same year. However, 11 of 12 participants from 2 hybrid delivery groups dropped out after the first class. Not considering these 2 groups would bring the graduation rate of all hybrid and modified hybrids to 75%.

FOOD AND PHYSICAL ACTIVITY QUESTIONNAIRE DATA ANALYSIS AND RESULTS

To compare behavior change outcomes between participants in the traditional in-person delivery with those in the hybrid and modified hybrid delivery, a random sample of matched prepost surveys (n = 95) from the traditional classes delivered by the same educators during the same year was used for statistical analysis. One educator did not deliver any traditional classes that year and another educator with similar years of experience was used as a substitute. Participant demographics are shown in Table 4. Most participants were Hispanic, female, aged 18–59 years, lived predominately in urban areas, and had low socioeconomic status.

A 1-way analysis of covariance was run to determine if the 3 program delivery methods significantly differed from each other on each of the 5 posttest outcomes/dependent

### Table 1. A Comparison of Lesson Topics and Goals Between ESBA and UCCE C2U! Materials

<table>
<thead>
<tr>
<th>Lesson</th>
<th>ESBA Lesson Goals</th>
<th>UCCE C2U! Lesson Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Get Moving</td>
<td>Families enjoy being active</td>
<td>Healthy Habit Focus: Move your body. Find ways to be active with your family</td>
</tr>
<tr>
<td>2. Plan, Shop, Save</td>
<td>Families plan and shop for meals and snacks that are healthy and within their budget</td>
<td>Healthy Habit Focus: Plan a menu and make a grocery list each week</td>
</tr>
<tr>
<td>3. Vary Your Veggies-Focus on Fruit</td>
<td>Families increase the amount and have more than one kind of vegetable and fruit they eat every day</td>
<td>Healthy Habit Focus: Eat more than one kind of fruit and one kind of vegetable each day</td>
</tr>
<tr>
<td>4. Make Half Your Grains Whole</td>
<td>Families choose at least half of their grains as whole grains</td>
<td>Healthy Habit Focus: Eat more whole grains. Look for the word “whole grain” on your products</td>
</tr>
<tr>
<td>5. Build Strong Bones</td>
<td>Families get enough calcium from low-fat or nonfat dairy foods or other foods high in calcium</td>
<td>Healthy Habit Focus: Choose low-fat (1%) or nonfat milk products or calcium-rich foods every day</td>
</tr>
<tr>
<td>6. Go Lean with Protein</td>
<td>Families have lean protein foods and keep all food safe to eat</td>
<td>Healthy Habit Focus: Make healthy, protein-rich food choices and keep food safe to eat</td>
</tr>
<tr>
<td>7. Make a Change</td>
<td>Families limit foods high in fat, sugar, and salt</td>
<td>The lesson is divided into 3 newsletters:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Part 1-Make a Change: Fat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>○ Healthy Habit Focus: Choose the right kinds of fat. Eat less saturated fat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Part 2-Make a Change: Sugar</td>
</tr>
<tr>
<td></td>
<td></td>
<td>○ Healthy Habit Focus: Eat less added sugar. Use the Nutrition Facts label to see how much added sugar is in foods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Part 3-Make a Change: Salt</td>
</tr>
<tr>
<td></td>
<td></td>
<td>○ Healthy Habit Focus: Eat less salt. Use the Nutrition Facts Label to choose low-sodium foods</td>
</tr>
<tr>
<td>8. Celebrate! Eat Smart &amp; Be Active</td>
<td>Participants review and celebrate new knowledge and skills</td>
<td>Healthy Habit Focus: Celebrate your progress, eat healthy, and be active</td>
</tr>
</tbody>
</table>

ESBA indicates Eating Smart Being Active; UCCE, University of California Cooperative Extension; UCCE C2U!, UCCE Connects to You!
Table 2. Comparison of Traditional In-Class Delivery With Hybrid Delivery Methods

<table>
<thead>
<tr>
<th>Methods</th>
<th>Traditional Delivery</th>
<th>Hybrid Delivery</th>
<th>Modified Hybrid Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curriculum</td>
<td>Eating Smart Being</td>
<td>UCCE Connects to You!</td>
<td>UCCE Connects to You!</td>
</tr>
<tr>
<td></td>
<td>Active</td>
<td>Lessons 1–8 in 10 newsletters format</td>
<td>Lessons 1–8 in 10 newsletters format</td>
</tr>
<tr>
<td></td>
<td>Lessons 1–8: in-person group setting</td>
<td>Lesson 1: in-person group setting</td>
<td>Lesson 1: in-person group setting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lessons 2–8: by mail and phone</td>
<td>Lessons 2–7: by mail and phone or video chat</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lesson 8: in-person group setting</td>
</tr>
<tr>
<td>Delivery method</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact method</td>
<td>No additional contact</td>
<td>Phone only</td>
<td>Choice of phone or video chat</td>
</tr>
<tr>
<td>Estimated educator contact time</td>
<td>Total: 8 hours (8 h in class)</td>
<td>Total: 2–3 h (1 h in class 1–2 h by phone per participant)</td>
<td>Total: 3.0–3.5 h (2 h in class; 1.0–1.5 h by phone/video chat per participant)</td>
</tr>
<tr>
<td>Home contact</td>
<td>None</td>
<td>Call no. 1: Introduction</td>
<td>Call no. 1: Introduction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mailed: Lessons 1–3</td>
<td>Mailed: Lessons 1–3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Call no. 2: Review lessons 1–3</td>
<td>Call no. 2: Review lessons 1–3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mailed: Lessons 4–6</td>
<td>Mailed: Lessons 4–6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Call no. 3: Review lessons 4–6</td>
<td>Call no. 3: Review lessons 4–6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mailed: lessons 7–8</td>
<td>Mailed: lesson 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Call no. 4: Review lessons 7–8</td>
<td></td>
</tr>
<tr>
<td>Evaluation</td>
<td></td>
<td>Pre-FPAQ during the first in-person class</td>
<td>Pre-FPAQ during the first in-person class</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-FPAQ during the last in-person class</td>
<td>Post-FPAQ during the last in-person class</td>
</tr>
</tbody>
</table>

FPAQ indicates Food and Physical Activity Questionnaire.

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**Phone script for calls/ video chats #2 and #3**

- Record date of call or video chat
- **Introduction**
- **Ask about:**
  - Materials and their use
    - Mailed materials received and reviewed?
  - Any recipes tried?
  - Goal set in Lesson #1 or #2
  - Progress towards goal?
  - Ask about setting a new goal.
- Review next steps
- Set up time and date for next call/video chat
- Ask if participant has questions.
- Thank participant and end call
- Record rating of 2nd and 3rd contacts

**Figure 2.** Example of an educator training slide and phone script.
variables, controlling for pretest measures. Posttest measures in this study were diet quality, physical activity, food safety, food security, and food resource management. Findings indicated significant differences between the groups on 3 of the 5 posttest outcomes while controlling for pretest measures. The results indicated a significant difference between delivery methods (diet quality: $F_{2,154} = 3.08$, $P = 0.05$; physical activity: $F_{2,154} = 3.43$, $P = 0.04$; food safety: $F_{2,154} = 3.45$, $P = 0.03$). For each, post hoc analysis showed significant differences between the traditional in-person and the hybrid delivery group. More specifically, the hybrid group had significantly higher posttest means than the traditional in-person group on diet quality, physical activity, and food safety (see Table 5). No significant differences were found between delivery methods on food security ($F_{2,153} = 2.24$, $P = 0.11$) and food resource management ($F_{2,154} = 1.59$, $P = 0.21$), whereas including the pretest measures as covariates.

These findings suggest that EFNEP participants may benefit from learn-at-home delivery methods, particularly when using hybrid delivery. Because no significant differences were found between the traditional in-person and the modified hybrid delivery method, findings suggest that modified hybrid delivery could also be used.

Moreover, results of the FPAQ show that participants improved diet quality, physical activity, food safety, food security, and food resource management practices, regardless of delivery method, and these percentages are comparable to the national EFNEP data from the same year (Figure 3). Please note that food security items were not reverse coded; thus, lower means at the posttest indicate that participants were more food secure (less food insecure) at the end of the program.

### UCCE EDUCATOR FEEDBACK

A survey to capture educator experiences with the program midway through the pilot and at termination determined that educator years of experience conducting nutrition education ranged from 3 to 25 years, with a median of 19.5 years. Educators reported that average calls with program participants lasted between 15 and 30 minutes. Privacy concerns, the ability to use technology, limited data plans, and an appropriate mobile device were cited as reasons for declining the video chat option.

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**Table 3.** Enrollment and Graduation Data for Adults Enrolled in the UCCE Connects to You! Program by Delivery Type Compared With Traditional Delivery

| Enrollment | National EFNEP | Traditional Delivery | Hybrid and Modified | Hybrid Delivery$^a$ | Modified Hybrid Delivery$^b$
|------------|----------------|---------------------|---------------------|---------------------|---------------------|
| Total no. enrolled | 88,456 | 4,849 | 95 | 59 | 36
| Total no. graduated (%) | 59.254 (67) | 3,681 (76) | 63 (66) | 33 (56) | 30 (83)
| Total no. dropped (%) | 29,202 (33) | 1,168 (24) | 32 (34) | 26 (44) | 6 (17)

EFNEP indicates *Expanded Food and Nutrition Education Program*, Federal Fiscal Year 2019; UCCE, University of California Cooperative Extension.

$^a$Hybrid delivery: first lesson in-person; $^b$Modified hybrid: first and last lessons in-person.

**Table 4.** Demographic Data for Adults Enrolled in the UCCE Connects to You! Program ($n = 95$), Traditional Delivery Comparison Group ($n = 95$), California State EFNEP ($n = 4,849$) and National EFNEP ($n = 88,456$)

| Characteristics | National EFNEP | Traditional Delivery | Traditional Delivery (sampled) | Hybrid Delivery$^a$ | Modified Hybrid Delivery$^b$
|----------------|----------------|---------------------|---------------------|---------------------|---------------------|
| Total no. participants | 88,456 | 4,849 | 95 | 59 | 36
| Female (%) | 83 | 91 | 99 | 86 | 92
| Male (%) | 17 | 9 | 1 | 14 | 8
| Hispanic (%) | 38 | 77 | 88 | 63 | 97
| White (%) | 27 | 8 | 3 | 17 | 0
| Black (%) | 21 | 3 | 1 | 7 | 3
| Asian and Pacific Islander (%) | 4 | 9 | 5 | 3 | 0
| Native American (%) | 1 | 1 | 0 | 3 | 0
| Aged 18–59 y (%) | 87 | 89 | 93 | 92 | 89
| Aged > 60 y (%) | 9 | 7 | 6 | 8 | 8

EFNEP indicates *Expanded Food and Nutrition Education Program*, Federal Fiscal Year 2019; UCCE, University of California Cooperative Extension.

$^a$Hybrid Delivery: first lesson in-person; $^b$Modified Hybrid: first and last lessons in-person.
Most of those that did opt for video chat selected Facetime as their preferred platform, with WhatsApp as the second most popular. One educator reported that introducing and practicing video chatting during the first class increased the comfort level and acceptance of this option.

Educators reported that participants dropped from the program because they could not find time, were no longer interested, or lost contact. The biggest barrier to program implementation was creating a consistent call schedule and getting participants to respond to calls. One educator reported, “As much as I wanted the calls to be done on a consistent basis, the participants would forget, and sometimes, we had more than a two-week lapse between calls.” Educators also reported some hesitation by school parent coordinators and agency directors to support the UCCE C2U! program because they were concerned with participants’ reading literacy levels. However, all educators said they would use the UCCE C2U! curriculum again. Overall, UCCE C2U! participants enjoyed the course and made positive changes, as one educator reported, “I had one mother of a...girl [who was overweight]. She works, and this was very helpful for her. Last class, she took her daughter with her, and she was asking a lot of questions.” Another educator shared a key benefit of the program “Great program that will help reach people in remote areas of our large county.” Educators also expressed being able to make meaningful connections with participants that helped them support participants in achieving their health goals.

### IMPLICATIONS FOR RESEARCH AND PRACTICE

Based on the results of this pilot study, participants in both UCCE C2U! hybrid home-based delivery models achieved similar positive behavior change outcomes as their counterparts in traditional in-person classes. This supports using hybrid home-based delivery models for nutrition education programs, such as EFNEP and SNAP-Ed. The significantly higher posttest means seen in the hybrid delivery group could be attributed to the postevaluation data collection over the phone instead of in a group setting as in the other 2 deliveries. Further study is needed to confirm this explanation. The results of this pilot study are limited by the small sample size, and future research is needed to duplicate these findings on a larger scale.

Although program outcomes and educator feedback were positive, participant recruitment and retention were sometimes challenging. Because more than half (59%) of those who did not complete the program dropped out early, it is important to ensure participants understand the program format and time commitment at recruitment. Practitioners exploring hybrid delivery may need to work closely with agencies to explain the format and benefits, including personalized remote interaction with their educators, to ensure their support.

Engagement strategies such as a cooking activity and distribution of a cookbook at the initial in-person lesson may help to encourage ongoing participation and reduce early dropout. Furthermore, offering a second in-person meeting in the modified hybrid delivery model may help facilitate evaluation collection and reinforce behavior change through peer interaction. This pilot program was conducted before the coronavirus disease 2019 pandemic that necessitated remote learning for schools and other education programs. With the increase in familiarity and usage of video call platforms brought about by the pandemic, the video chat option may now be more popular with participants. Additional research is needed to determine participant needs and preferences for hybrid learning post-pandemic. Traditional phone calls with mailed lesson packets may still be a good option for participants with poor internet connectivity, a lack of technology equipment, and those with limited digital literacy.

### NOTES

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