

THE NUMBER OF LESSONS NEEDED TO
MAXIMIZE BEHAVIOR CHANGE AMONG
COMMUNITY NUTRITION EDUCATION PROGRAM
(CNEP) PARTICIPANTS

By

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CHAPTER I

INTRODUCTION

During the 1960's, the awareness of hunger and poverty in America came to the forefront of the media. Americans were startled to know that these conditions existed in the United States when it was supposed to be a land of plenty. In response to the American public demanding the government take responsibility for the hunger and poverty, the Expanded Food and Nutrition Education Program (EFNEP) was developed.

The EFNEP became a part of the Cooperative Extension Service in 1968. The goal of the EFNEP was “to assist limited-resource audiences in acquiring the knowledge, skills, attitudes, and changed behavior necessary for nutritionally sound diets, and to contribute to their personal development and the improvement of the total family diet and nutritional well-being” (United States Department of Agriculture, 2007a). This goal was to be attained by employing paraprofessionals to teach participants on a one-to-one basis or in small group settings.

In Oklahoma, The Community Nutrition Education Program (CNEP) administers the EFNEP in conjunction with the Food Stamp Nutrition Education Program (FSNEP). The FSNEP is a newer program with a start in 1988. By 2004, the FSNEP was integrated into each of the 50 states through the cooperation of land-grant universities. The FSNEP was designed to help supplement the EFNEP, not duplicate its efforts.

In CNEP, participants are enrolled in either EFNEP or FSNEP, both of which

utilize the same lesson series. The programs are differentiated by their target audience. The EFNEP serves low-income families with young children while the FSNEP serves food stamp eligible persons. As a result, both programs meet program goals and constituent needs.

The question of how many lessons are required to produce a positive behavior change has been asked many times before; however, the current research literature is somewhat inconclusive. Multiple studies have shown a range of 6 to 17 lessons taught to participants in the EFNEP are all associated with a positive behavior change (Dollahite and Scott-Pierce, 2003; Dollahite, Olson, and Scott-Pierce, 2003; Arnold and Sobal, 2000; and Brink and Sobal, 1994). This shows a wide variance in the number of lessons needed to produce a positive behavior change. The studies also indicate an increased number of lessons yield a greater behavior change. However, because of the transient nature of low-income individuals, the larger number of lessons may not be a realistic graduation goal for the population. For this reason, there is need to further investigate the minimum level of lesson “dosage” needed to create beneficial behavior change in the targeted Oklahoma populations. The findings will provide CNEP administrators and paraprofessionals with guidance for program planning and delivery to maximize enrollment and graduation rates and resource management.

Purpose

The purpose of this study was to determine the number of lessons needed in the Oklahoma CNEP to produce a positive behavior change among participants. The results of this study will help CNEP personnel with program planning and delivery.

Hypothesis

More than six lessons are needed to achieve behavior change in participants enrolled in the CNEP.

CHAPTER II

REVIEW OF LITERATURE

The Need for Nutrition Education

During the 1960s the awareness of hunger and poverty began to increase creating concern among the American public. The Spring 1965 U.S. Department of Agriculture (USDA) Food Consumption Survey supported the public's concerns. The survey findings revealed that "among households with incomes less than \$3,000, 36 percent had poor diets as compared to 3 percent with incomes more than \$10,000" (Brink, 2000, p. 27). The government responded by implementing several new programs including the Expanded Food and Nutrition Education Program (EFNEP).

The Cooperative Extension Service (CES) was called upon to implement EFNEP. According to then Secretary of Agriculture, Orville Freeman, Cooperative Extension was the "only USDA agency with qualified personnel to provide programmatic leadership for the expanded homemaking program" (Brink, 2000, p.12). The CES was already well established and was the only United States Department of Agriculture (USDA) agency that had a direct link to each state. CES bridges state land-grant universities to the local governmental level. As such, the CES had access to research-based information and expertise at each university and had the mechanism to deliver programs to targeted populations. The success of CES was based on staff development opportunities.

Local educators and volunteers participated in continuing educational workshops rather than just one initial orientation. CES staff had experience in working with multi-level programming and delivering programs through volunteers. Since this was already a part of the CES, adding the EFNEP to the CES was a logical conclusion.

Nutrition Education Programs

Since the 1960s Congress has legislated multiple nutrition education programs to address disparities in hunger related to poverty. Two of these programs are the Expanded Food and Nutrition Education Program (EFNEP) and the Food Stamp Nutrition Education Program (FSNEP). While the two programs are very closely related, their efforts are not duplicated. Participants may only be enrolled in one program. Funding sources for each program are separate with FSNEP funded through the USDA Food and Nutrition Service and EFNEP funded through the USDA Cooperative State Research, Education, and Extension Service. Participants in each program are generally based on age with the younger individuals in EFNEP and older individuals in FSNEP. In Oklahoma, FSNEP and EFNEP are administered by the Community Nutrition Education Program (CNEP). As a result, participants in both programs receive the same educational protocol.

Expanded Food and Nutrition Education Program. EFNEP is the largest federally funded program geographically exclusively offering nutrition education with units in all 50 states, American Samoa, Guam, Micronesia, Northern Marianas, Puerto Rico, and the Virgin Islands (Arnold and Sobal, 2000). EFNEP is one of only two programs legislated to solely teach nutrition education. In 1974, EFNEP's target audience changed from

adults to "...families, especially those with young children, living in poverty or near poverty..." (Brink, 2000, p. 60). This change was facilitated by the idea that families with young children would be more likely to have greater improvement over time than elderly individuals. In 2006, nationally, EFNEP affected 150,270 adults directly and more than ½ million family members indirectly (United States Department of Agriculture, 2006).

Another change that occurred within EFNEP in the 1970s, was the idea that participants needed to become self-sufficient rather than remaining in the EFNEP for an indefinite amount of time. Participants in EFNEP were to graduate and move to other Cooperative Extension programs. This concept was part of EFNEP guidelines, but by December 1973, the percentage of adult participants who had been in the program for three or more years was 14.5 (Brink, 2000). As a result, the Progression Model was introduced in 1976 to help paraprofessionals gauge participant's behavior change using the 24-hour food recall and a food behavior checklist. These two measurements are still in use today.

The goals of the program remain unchanged since its beginning in 1968. They are "to assist limited-resource audiences in acquiring the knowledge, skills, attitudes, and changed behavior necessary for nutritionally sound diets, and to contribute to their personal development and the improvement of the total family diet and nutritional well-being" (United States Department of Agriculture, 2007a).

To help with the attainment of these goals, EFNEP identified the following objectives:

1. Improved diets and nutritional welfare for the total family.
2. Increased knowledge of the essentials of human nutrition.

3. Increased ability to select and buy food that satisfies nutritional needs.
4. Improved practices in food production, preparation, storage, safety, and sanitation.
5. Increased ability to manage food budgets and food resources such as food stamps (University of Florida, 2007).

While there have been revisions in the objectives over the years, the overarching theme of each one has remained the same.

Food Stamp Nutrition Education Program. The Food Stamp Nutrition Education Program (FSNEP) is a larger funded federal program than EFNEP. FSNEP's beginnings are more recent than those of EFNEP. FSNEP was developed in 1988 as a result of findings from Cooperative Extension agents in Brown County, Wisconsin. They found that "by committing state and local funding and contracting with the state food stamp [administering] agency, an equal amount of federal dollars could be secured to expand the reach of nutrition education to low-income persons in that area" (United States Department of Agriculture, 2007b). By 2004, FSNEP was in all 50 states through the help of land-grant universities.

The goal of FSNEP is "to provide educational programs and conduct social marketing campaigns that increase the likelihood that people eligible for food stamps will make healthy food choices within a limited budget and choose physically active lifestyles consistent with the Dietary Guidelines for Americans and Food Guidance System" (United States Department of Agriculture, 2007b).

Program Delivery

Weimer (1996) found that successful nutrition education programs have the following characteristics:

- (1) While mass media cause participants to become more aware of new information, interpersonal channels (such as one-on-one or small-group approaches) produce more favorable behavioral outcomes;
- (2) interventions lasting more than 3 months are more successful in producing behavioral change than those in effect for less time; and
- (3) successful interventions are designed such that specific and measurable behavioral changes can be documented. (p. 43)

CNEP implements these characteristics in both EFNEP and FSNEP. As a result, these programs have been successful in providing effective nutrition education to low-income individuals.

Paraprofessionals. The use of paraprofessionals has been in place since the beginning of EFNEP. Because EFNEP serves diverse populations, the use of indigenous paraprofessionals proves to be quite effective. In a pilot study conducted in Alabama, the use of indigenous peoples was found to be successful in teaching nutrition education to low-income rural homemakers (Oliver, 1967). They were able to establish rapport with the members of the community resulting in fewer communication barriers and better improvement in nutrition practices such as improved food buying practices, food preparation skills, and eating habits.

Not only do paraprofessionals have a unique ability to establish and maintain successful relationships with the participants in the EFNEP, they are able to improve their own well-being. Many paraprofessionals increase their self-esteem, become self-sufficient, find better jobs, improve nutritional status, earn General Equivalency Diplomas (G.E.D.), and complete undergraduate and graduate degrees (Randall, Brink, and Joy, 1989). With these positive life changes, they serve as role models for not only the participants with whom they are working, but also others in the community.

Individual vs. Group Instruction. Initially, individual instruction was the primary delivery method of instruction. However, as more and more individuals became enrolled in the program, groups were formed. Both types of nutrition education offer several advantages and disadvantages.

Some advantages of group education “include larger caseloads per paraprofessional, lower lesson costs per individual and increased numbers of graduated homemakers” (Chipman and Kendall, 1989, p. 266). Chipman and Kendall go on to point out that when group education is utilized, friendships and cohesiveness can develop within the group making it easier to teach and making the effectiveness higher.

Disadvantages of group instruction include difficulty in keeping the group together, transportation, language barriers, babysitting needs, finding suitable meeting venues, and lack of cooperation.

The advantages of individual instruction include the ability of the paraprofessional to develop a trusting and safe relationship with the participant, ease of access for the participant, and better communication. Some disadvantages include participants not keeping appointments, participants feeling intimidated by the paraprofessional, safety of the paraprofessional, and ease of access for the paraprofessional. One problem with individual instruction was that participants would not keep the appointments or would be late (Brink, 2000). Paraprofessionals had limited time to give thorough lessons because they scheduled several appointments in the same day. Another difficulty that arose with individual instruction, especially in urban areas, was the safety of the paraprofessionals going into the participants homes (Brink, 2000).

The shift from primarily individual to group instruction began after EFNEP had been in existence ten years (Chipman and Kendall, 1989). A review of the EFNEP in 1979 looked at the cost effectiveness and led to the conclusion that the costliness of one-to-one teaching was hindering the attainment of the EFNEP goal (Chipman and Kendall, 1989). Since personal interaction was still a necessity to accomplish the EFNEP goal, the use of mass media, television, and large groups were not found to be as effective. Consequently, small group instruction was cited as the recommended method of teaching that would still yield the desired results. In 2005, the majority of participants (81%) were taught in small groups, 14% were taught one-on-one, and 5% received a combination of the two methods (Montgomery and Willis, 2006). In addition, group lessons were used more frequently in urban compared to rural areas.

As a result of the shift, the effectiveness of small group lessons has been questioned. The extent of behavior change is related to the type of instruction and not necessarily the number of lessons provided to participants according to a study done by Dollahite, Olson, and Scott-Pierce (2003). Dollahite and Scott-Pierce (2003) found there was significantly greater improvement in those participants taught individually from entry into EFNEP to graduation. Similar findings were apparent in studies done by Dicken, Dollahite, and Habicht (2005) and Cason, Scholl, and Kassab (2002).

Number of lessons. The number of lessons taught to EFNEP participants enrolled in groups has been found to be lower than the number taught to those receiving individual instruction (Dicken, Dollahite, and Habicht, 2005). This can be accounted for in the fact that when taught individually, paraprofessionals have a better sense of where the

participant is in regard to the curriculum. If a participant is struggling with certain parts of the curriculum, the paraprofessional can teach more lessons on those specific topics.

In contrast, other studies have found that there is no difference in the number of lessons given to participants taught individually or in group settings (Dollahite, Olson, and Scott-Pierce, 2003; Dollahite and Scott-Pierce, 2003). In the Dollahite, Olson, and Scott-Pierce (2003) study, the average number of lessons given to participants in both individual and group instruction was 8.5. Dollahite and Scott-Pierce (2003) also found that there was no difference in the number of lessons given to those participants taught individually versus in a group setting.

Comparison of state curricula and outcomes. The EFNEP in Oklahoma is similar to programs in other states. Through 2007, there was a minimum requirement of six lessons to graduate with the option of completing more lessons as desired. As a result of participating in EFNEP, 91% of Oklahoma graduates demonstrated a positive change in their diets with documented improvement in fruit, vegetable, and dairy/calcium consumption. Other impacts of the Oklahoma EFNEP include: 43% of participants less often running out of food before the end of the month and 41% reporting that their children eat breakfast more often (Oklahoma State University, 2007b).

Georgia's current curriculum was developed at the national level. The adult curriculum consists of 15 lessons with only 12 being considered the core lessons. The remaining three lessons are considered "special topic lessons." The minimum number of lessons needed to graduate from the Georgia EFNEP is six. At the time of enrollment, most participants are deficient in milk and dairy products and vegetable and fruit consumption, but within three to eight months after graduation, the consumption of these

foods more than doubled over the time of enrollment (Hanula and Bryant, 2007). This shows that at least six lessons are effective in producing a positive behavior change in participants.

The North Carolina EFNEP has a significant impact on its participants with 93% improving in one or more nutrition practices, 91% improving in one or more food resource management practices, and 34% improving in one or more of the food safety practices (North Carolina State University Cooperative Extension, 2005). Significant improvements were also made in meeting the recommendations of the Food Guide Pyramid and increasing the consumption of protein, iron, calcium, and vitamins A, C, and B. North Carolina's curriculum consists of 22 lessons with a minimum of nine required to graduate.

Dollahite, Olsen, and Scott-Pierce (2003) found in New York State approximately 36% of the graduates received six lessons, 19% received seven or eight lessons, 31% received nine or 10 lessons, and 15% graduated after receiving 11 or more lessons. The authors' main objective was to assess the food insecurity status of participants in the EFNEP after graduation. They found the number of lessons was significantly associated with a change in the food insecurity score of participants. Further, additional educational lesson dosage was associated with a significant decrease in food insecurity score (Dollahite, Olsen, and Scott-Pierce, 2003).

Reports from other states also show a wide range of required lessons for graduation. Virginia requires the least with six lessons while Alabama, Florida, and Louisiana require a minimum of 10 lessons to graduate and Arkansas requires a minimum of 12 lessons to graduate (Garrard, 2007).

Methods of Evaluation

Two nutritional assessment instruments, the 24-hour food recall and food behavior checklist, serve as the major evaluation components of EFNEP and FSENP in Oklahoma.

24-hour food recall. The 24-hour food recall has been a measure of dietary intake for EFNEP since its beginnings. However, there has been some question of the validity of the tool in accurately assessing the intake of individuals. Multiple studies have consistently found the most prevalent problem with its use to be under-reporting of energy intake when compared to basal metabolic rate (Robertson et al., 2005; Lof and Forsum, 2004; Cook, Pryer, and Shetty, 2000; Pryer, Vrijheid, Nichols, Kiggins, and Elliot, 1997; and Black et al., 1991). Robertson et al. (2005) suggest the following tactics be used to improve recall accuracy:

- identifying linguistic choices possibly associated with inaccurate reporting (for example, use of ‘probably’ or ‘it depends’);
- dealing carefully with sensitive topics...and
- responding appropriately to cues related to accuracy of reporting (p. 593).

An important point to remember when conducting 24-hour recalls is that under-reporting is specific to certain groups of people. Some of the attributes that have been identified with under-reporting are gender (females under-report more often than males), body mass index (obese individuals tend to under-report more often), dietary restraint (individuals on “diets” tend to under-report), and age (children and adolescents tend to under-report) (Hill and Davies, 2001). As a result, the 24-hour recall itself is not necessarily a faulty tool to determine the intakes of individuals; rather it is the characteristics of the persons being interviewed that make a difference to the accuracy of

the recall. For this reason, it is critical to have trained personnel conduct the recall to ensure the highest levels of accuracy.

While EFNEP typically does four 24-hour recalls for each participant by the time they graduate, the most prevalent problem of under-reporting energy intake would not likely be changed if more recalls were performed. This is evidenced in the third National Health and Examination Survey where 55% of men and 58% of women who under-reported dietary intake the first time, also under-reported when a second recall was conducted (Briefel, Sempos, McDowell, Chien, and Alaimo, 1997). This was also evidenced in studies conducted by Price, Paul, Cole, and Wadsworth (1997) and Kroke et al. (1999).

An evaluation of the California EFNEP was conducted by Tredici, Joy, Omelich, and Laughlin (1988) using the 24-hour food recall data. The study included 355 EFNEP participants and 328 control participants. Both groups had similar characteristics with the average participant being low income, female and 29 years old. Results of the study showed that there were no differences in the food recall scores at the beginning of the study between the two groups. However, after 6 months in the EFNEP group, there was a significant difference in the scores of the EFNEP participant when compared to the control group in which no change occurred. Improvements in the EFNEP group included increased intakes of the milk, protein, fruit and vegetable groups. These changes are attributed to three different factors including length of the EFNEP visit, the number of visits, and the EFNEP instruction topics.

The cited literature suggests the 24-hour food recall serves its intended purpose. Positive attributes of the 24-hour food recall include ease of use, relative low-cost when

compared to other means of dietary assessment, low burden, and its ability to be used as an evaluation tool in determining whether or not the nutritional intake of individuals is improved.

Food behavior checklist. The food behavior checklist was developed as a result of the Family Progression Model. The objectives of EFNEP were transformed into behavioral statements that were then developed into the food behavior checklist (Munger and Jones, 1976). The Family Progression Model was introduced in 1976 as a way to help paraprofessionals know when a participant was ready to exit the program. The model has since been incorporated into the computerized Evaluation/Reporting System (ERS) used by EFNEP.

The initial food behavior checklist included 70 items and the paraprofessionals were to complete the checklist by observation. This was difficult for paraprofessionals to do because of the length of the checklist. Another difficulty was that the paraprofessional would have to determine if the participant had actually performed the behavior. The current food behavior checklist includes ten required questions from the national level with each state having the option of adding one or more questions from a national database. The ten required items focus on food resource management, nutrition practices, and food safety. The optional questions measure behavior in 21 different areas. In 2007, Oklahoma's food behavior checklist consisted of the 10 required questions. It is either filled out by the participant or with the assistance of a paraprofessional. While this makes it easier for the paraprofessional it places responsibility for accurate reporting on the participant.

National Reporting System. The national reporting system for EFNEP is called the Evaluation/Reporting System (ERS). It is designed to record demographic, nutritional, perinatal and behavioral impact data. ERS can generate a variety of reports to assist educators in tailoring the education to the specific needs of participants in EFNEP at all levels. Data flow into the reporting system sequentially from three levels. The sequence is from federal to state to local and back again. One of the most crucial items associated with accuracy of the system is the data entry at the local level. There are safeguards in place that help ensure the most accurate data are entered such as warnings when dates are out of the expected range, sessions canceled and started again as needed, and a mechanism for replacing erroneously imported files.

Summary

The EFNEP and FSNEP have provided nutrition education to low-income individuals since 1968 and 1988, respectively, to address hunger related to poverty. While lesson delivery has shifted from individual to small group settings the literature indicates better outcomes for persons receiving personalized attention. The number of lessons provided to individuals enrolled in the program varies greatly from state to state. The literature reviewed remains inconclusive concerning the number of lessons needed to maximize behavior change. Consequently there is a great deal of variance between states in program design. These results suggest that further research is needed to identify the number of lessons needed to produce the maximum behavior change.

CHAPTER III

METHODOLOGY

The purpose of this study was to determine the number of lessons needed to produce a positive behavior change among CNEP participants. This was accomplished using a quantitative, non-experimental design. Historical data for 2007 was obtained from the Oklahoma CNEP national reporting system. Data included demographic information and pre and post scores from the CNEP survey (Appendix A). The data obtained was de-identified and was considered as non-human research based on criteria from the Oklahoma State University IRB.

Population

All participants enrolled in the Oklahoma CNEP during FY 2007 were included in the study with the exception of Jackson and Comanche County units. These two units were excluded because the paraprofessionals were piloting new curriculum. As a result, behavior change may have been different when compared to those receiving the old curriculum.

The study included 4,185 participants of which 2,139 had complete data. Inclusion criteria for data included having complete pre- and post-CNEP survey scores

for each item on the survey. The CNEP surveys were administered by the paraprofessionals to program participants at entry to the program and again when the participant graduated from the program. The dependent variable was the behavior change as measured by the CNEP survey. The CNEP survey consisted of 10 items covering three areas: food resource management (four items), food safety (two items), and nutrition practices (four items). Participants respond to each item using a five point Likert scale. Response options include 1=Never, 2=Seldom, 3=Sometimes, 4=Most of the time, and 5=Almost always. Responses for item 3, 5, and 6 were reversed because they were items participants should do less often after completing the program. The differences between the pre- and post-CNEP survey scores were calculated for each question to determine the amount of behavior change in each participant. These differences were summed to produce the mean behavior change for all participants. The independent variable was the number of lessons taught to the participant. The number of lessons was separated into four quartiles to allow for participants to be divided evenly: (1) six to eight lessons, (2) nine to 12 lessons, (3) 13 to 16 lessons, and (4) more than 16 lessons. Participants were stratified into the appropriate quartile based on the number of lessons they received for analysis.

Statistical Analysis

Analyses were performed using SPSS 14.0 for Windows. Frequencies were run on all variables to check for data entry errors. Questionable entries were matched with the original data received and verified as correct or excluded from analysis. Descriptive analysis provided demographics for age, number lessons received, and number of months

in the program. Frequencies provided information for race, gender, and program type for each participant. Frequencies and descriptive statistics were performed on data from those participants not having complete data. A factor analysis was performed to identify correlated items on the survey and reduce the number of dependent variables. A one-way analysis of variance (ANOVA) with significance level set at $p = 0.05$ was performed to test for differences in behavior change dependent on the number of lessons taught. A Tukey's HSD post hoc test was performed to identify pair-wise significance between quartiles of lessons taught and the amount of behavior change.

CHAPTER IV

FINDINGS

The purpose of this study was to determine the number of lessons needed to maximize behavior change in the Oklahoma CNEP. The results of the statistical analysis and demographics are reported in this chapter.

Descriptive Analysis

The Oklahoma CNEP consisted of 4,185 participants during FY 2007. Of those, 2,139 had complete data. Demographic characteristics are summarized in Table 4.1. The mean age was 33.6 years with the youngest participant 13 years and the oldest 99 years. The number of lessons received ranged from one to 48 with the average at 13.9 lessons. The number of months in the program averaged 5.9 ranging from one week to 23 months. The majority of participants (n=1,586) were in the FSNEP program and more females (n=1,819) than males (n=320) were enrolled in the CNEP. Just over half of the participants (50.8%) were white, 23.6% American Indian/Alaskan Native, 18.1% black, 6.7% Hispanic, and 0.8% Asian/Pacific Islander.

Table 4.1 Profile of Population

	Mean \pm SD n=2,139	Percentage
Age	33.6 years \pm 18.7	
Number of lessons received	13.9 lessons \pm 6.4	
Number of months in the program	5.9 months \pm 3.8	
Nutrition Education Program		
FSNEP	1,586	74.1
EFNEP	553	25.9
Gender		
Female	1,819	85.0
Male	320	15.0
Race		
White	1,087	50.8
American Indian/Alaskan Native	505	23.6
Black	387	18.1
Hispanic	143	6.7
Asian/Pacific Islander	17	0.8

Data for excluded participants is shown in Table 4.2. Visual inspection of the data showed that there were no differences in the age, type of program, gender, or race in the excluded participants compared to those included in the study. There were differences seen in the average number of lessons taught to participants and the average number of months in the program. Those included in the study averaged almost 14 lessons while those not included averaged only five lessons. The average number of months in the program was almost six months for those included and only two months for those not included in the study.

Table 4.2 Profile of Excluded Participants

	Mean \pm SD n=2,046	Percentage
Age	35.4 years \pm 20.2	
Number of lessons received	5.7 lessons \pm 5.5	
Number of months in the program	2.3 months \pm 3.4	
Nutrition Education Program		
FSNEP	1,653	80.8
EFNEP	393	19.2
Gender		
Female	1,751	85.6
Male	295	14.4
Race		
White	1,065	52.1
American Indian/Alaskan Native	466	22.8
Black	341	16.7
Hispanic	167	8.2
Asian/Pacific Islander	7	0.3

Factor Analysis

The factor analysis produced two components which were used to comprise two scales. The two scales were defined as meal planning and shopping habits and food safety, accounting for 27% of variance in behavior, and insecurity, which accounted for 12.5% of variance. The factor loadings are summarized in Table 4.3. A rotated component analysis was conducted and yielded the same results. The meal planning and shopping habits scale consisted of items 1, 2, 4, 7, and 9 from the CNEP survey. The food safety and insecurity scale consisted of items 3, 5, and 6 from the survey. Due to the large sample size, items with a correlation of 0.55 or higher were considered to be significantly correlated to each component (Stevens, 2002). A rotated component matrix was performed and yielded the same results.

Table 4.3 Factor Analysis Component Matrix

CNEP Survey Items	Component	
	1	2
1. How often do you plan meals ahead of time?	.622	-.195
2. How often do you compare prices before you buy food?	.555	-.268
3. How often do you run out of food before the end of the month?	.278	.619
4. How often do you shop with a grocery list?	.635	-.180
5. This question is about meat and dairy foods. How often do you let these foods sit out for more than two hours?	.355	.565
6. How often do you thaw frozen foods at room temperature?	.341	.615
7. When deciding what to feed your family, how often do you think about healthy food choices?	.651	-.168
8. How often have you prepared foods without adding salt?	.455	-.118
9. How often do you use the “Nutrition Facts” on the food label to make food choices?	.629	-.060
10. How often do your children eat something in the morning within 2 hours of waking up?	.381	.008

Extraction Method: Principal Component Analysis.

One-Way Analysis of Variance

Data summarizing mean scores by lesson quartiles for each behavior scale are in Table 4.4. Mean scores were the sum of the difference in pre- and post-behavior checklist responses for items on the survey. The ANOVA analysis identified significant differences ($p < 0.05$) in behavior change depending upon the number of lessons received for both the meal planning and shopping habits scale ($p < 0.001$) and the food safety and insecurity scale ($p < 0.001$). The Tukey’s HSD showed the meal planning and shopping habits scale produced significant differences between participants receiving six to eight lessons and those receiving nine to 12 lessons ($p \leq 0.001$), 13 to 16 lessons ($p \leq 0.001$)

and more than 16 lessons ($p \leq 0.001$). Significant differences were also seen between participants receiving nine to 12 lessons and more than 16 lessons ($p = 0.005$). There was no significant difference seen between persons receiving nine to 12 lessons and those receiving 13 to 16 lessons.

Table 4.4 Mean Scores for Meal Planning and Shopping Habits and Food Safety and Insecurity Scales by Lesson Quartiles

Scales	Quartile 1 6-8 lessons n=482 Mean \pm SD	Quartile 2 9-12 lessons n=513 Mean \pm SD	Quartile 3 13-16 lessons n=571 Mean \pm SD	Quartile 4 > 16 lessons n=556 Mean \pm SD	Total n=2122 Mean \pm SD
Meal planning and shopping habits $P < 0.001^*$	1.97 \pm 3.5 ^a	3.28 \pm 4.0 ^b	3.54 \pm 4.3 ^{bc}	4.11 \pm 4.4 ^c	3.27 \pm 4.2
Food safety and insecurity $P < 0.001^*$	1.15 \pm 2.3 ^a	2.05 \pm 2.6 ^b	1.88 \pm 2.9 ^b	1.87 \pm 2.7 ^b	1.75 \pm 2.7

Values with different superscripts were significantly different at $P < .05$.

Means are result of one-way ANOVA. Superscripts are result of Tukey's HSD.

* Mean difference significant at $\alpha = .05$

Scale: 1= Never, 2=Seldom, 3=Sometimes, 4=Most of the Time, 5= Almost Always.

The food safety and insecurity scale showed a significant difference in behavior change between participants receiving six to eight lessons and nine to 12 lessons ($p \leq 0.001$), 13 to 16 lessons ($p \leq 0.001$) and more than 16 lessons ($p \leq 0.001$).

Summary

As evidenced by the results, we fail to reject the hypothesis that more than 6 lessons are needed to achieve behavior change in participants enrolled in CNEP.

CHAPTER V

DISCUSSION AND CONCLUSION

The goal of the Oklahoma CNEP “is for every enrolled family to consume a diet that promotes good health and to acquire an adequate amount of nutrient-dense foods every day through effective use of available resources” (Oklahoma State University, 2007a). The CNEP survey is used to measure the behavior change in these areas. The purpose of this study was to determine the number of lessons needed to maximize behavior change. Conclusions from this study will help program personnel in determining the minimum number of lessons needed to graduate from the program and to maximize program efficiency.

Discussion

The major finding of this study was more than six to eight lessons were needed to result in significant behavior change of CNEP participants. Further the number of lessons needed to bring on change varied by behavior component. Significant changes in meal planning and shopping habits occurred when participants received nine to 12 lessons and again after receiving more than 16 lessons. Food safety and insecurity improved significantly when participants received nine to 12 lessons and did not increase with greater lesson dosage. Positive or negative changes in each behavior component determined whether a behavior change had occurred.

Because of the transient nature of low-income individuals, more than 16 lessons may not be a realistic graduation goal for the population. This was evidenced in our study by those who did not have complete data. Participants not included in the study averaged two months in the program and five lessons while those who had graduated from the program averaged six months in the program with 14 lessons. There are a few reasons why some participants did not graduate from the program. One reason is that they enrolled in the program late in the year and did not have enough time to complete the required number of lessons before the next year started. Those who dropped out of the program could have been fast learners or were already implementing those things taught in the classes and therefore did not see a reason to continue in the program to graduation. Another reason could be that the minimum number of lessons needed to graduate is too high. As a result, the minimum level of “lesson dosage” needed to create beneficial behavior change should be tailored to the needs of this transient population. This can be done through the use of paraprofessionals helping to gauge the participant’s behavior change throughout their time in the program. Lessons can be suited more to what the participant needs as opposed to a set curriculum for everyone.

Although our findings indicate a minimum of nine to 12 lessons is needed to create the maximum behavior change, enrollment and graduation rates can still be maximized. Since the average number of lessons is already 14 and participants are in the program for an average of six months, participants can still set realistic goals for graduation. The CNEP is also flexible to allow for individual needs to be taken into consideration. Paraprofessionals can meet one-on-one or in small groups and/or teach more than one lesson during each session to accommodate the needs of the participants.

Paraprofessionals can also judge where participants are in regards to the curriculum. If a participant needs more education on specific topics, the paraprofessional can teach lessons related to those topics.

While these results support our hypothesis, the two components that emerged from the factor analysis were intriguing. The CNEP survey is divided into three parts. They are resource management, consisting of four items; food safety, consisting of two items; and nutrition behaviors, consisting of four items. As a result of this division, we anticipated the factor analysis would produce three components, or hypothetical factors, with each item falling under its respective component. In contrast the factor analysis resulted in only two components. We utilized the factor loadings data to create two behavior scales. The first scale we defined as meal planning and shopping habits because the correlated items pertained to how the participant planned his/her meals and grocery shopping trips. The second scale was defined as food safety and insecurity. Three items from the survey fell under this category. One item asks “How often do you run out of food before the end of the month?” while the other two are directly related to food safety by asking: “This question is about meat and dairy foods. How often do you let these foods sit out for more than two hours?” and “How often do you thaw frozen foods at room temperature?”

While the strong relationship between the food safety and insecurity was intriguing, other studies have confirmed that food safety and food insecurity are correlated (Trepka, Murunga, Cherry, Huffman, and Dixon, 2006; Coates et al., 2006; and Alaimo, 2005). In the study conducted by Kempson et al. (2002), families who were food insecure reported eating “expired foods, such as outdated foods and old leftovers”

(p. 1797) because they do not want to waste anything. In other words, those families who are food insecure tend to have poor food safety practices.

The number of lessons needed to maximize behavior change in the two behavior scales was shown to be different. This may be accounted for by the differing complexity of each behavior. Meal planning and shopping habits include a mix of actions requiring the participant to put more time and effort into their meals. According to Hollie, Calabrese, and Maillet, (2003), “complexity... has been negatively associated with adherence [to a dietary regimen], perhaps because of the difficulty of fitting the regimen into a person’s daily routine” (p. 5). Further, things that require a change in lifestyle, interfere with family habits, or that require extra effort, time, and skill to prepare meals increases the likelihood of non-adherence. This finding is in keeping with our results indicating changes in the meal planning and shopping habits require longer interaction with the paraprofessional.

Most individuals do not make major behavior changes all of a sudden. It takes time and effort. Setting small goals sequentially over a period of time allows participants to achieve goals and experience successes. This also helps participants learn the goal-setting process and use it at future times to continue to reach their maximum behavior change. As a result, the meal planning and shopping habits component takes longer to show an increase in behavior change compared to the food safety and insecurity component.

Changing meal planning and shopping habits requires participants to think ahead and plan for meals. Further, additional time is required for grocery lists to be made, prices compared, and using the Nutrition Facts on the food label to make healthy food

choices. Time is often a concern for low-income populations. “Households participating in the Food Stamp Program are becoming increasingly headed by a single parent or two working parents” (Mancino and Newman, 2007, p. i). As a result, these households find it difficult to allocate the needed time to prepare meals that meet dietary requirements. Mancino and Newman found that working full-time and being a single parent has a greater impact on time spent on preparing food than income does, thus reducing the amount of time spent on planning and preparation of family meals. In reality, greater time and effort put into meal planning will allow for healthier choices to be made and money savings at the grocery store. To help CNEP participants achieve these nutritional and resource management benefits CNEP administrators should consider requiring a completion of a minimum of nine to 12 lessons.

The food safety and insecurity component requires less of a lifestyle change by the participants because there is less complexity involved. The items involved in this behavior do not require much more time or effort from the participant to improve food safety practices and food security. Participants do have to plan ahead to either thaw frozen foods in the refrigerator the night before or using a microwave, but these are not behaviors that require a great deal of time and effort. Additionally, returning meat and dairy foods to the refrigerator does not require a big lifestyle change. The participants do have to become more aware of time and how long these foods have been sitting out, but do not have to change their routines as much. Another reason why the food safety and insecurity factor requires fewer lessons to become effective is that participants might be more motivated to increase their food safety in order to increase their food security. Multiple studies have shown a relationship between food safety and food insecurity

(Trepka et al., 2006; Coates et al., 2006; and Alaimo, 2005). In essence, when food safety practices are improved there is less food spoilage, reducing the likelihood of running out of food before the end of the month.

Our finding that increased “lesson dosage” increases behavior change is consistent with previous studies (Dollahite, Olson, and Scott-Pierce, 2003 and Greer and Poling, 2001). The more lessons a participant receives, the longer they are in the program. As a result, a trusting relationship is established. Participants in the program need to feel as though they are in a safe environment that supports behavior change. Not only do they need to feel safe and supported, they need someone who knows what they are going through. Indigenous paraprofessionals have a great impact on the participant’s life because they frequently have experienced some of the same trials the participants are going through and can empathize with them. This helps reduce the participants’ anxiety and creates positive attitudes for overcoming barriers. In conclusion, the CNEP is a great program that does have an impact on its participants. The use of paraprofessionals helps ensure its success and the program should be continued to help relieve the burden of hunger on low-income individuals.

Several limitations in the study should be considered. First, we looked solely at the number of lessons the participants received and did not include age, race, gender, or months in the program. Second, the data files solely consisted of CNEP adult participants, thus limiting the generalization of our findings to this population. Third, all responses to the CNEP survey were self-reported, creating opportunity for the inclusion of biased data. We also looked at the CNEP as a whole. This limitation should not be detrimental to future CNEP administrative decisions related to the number of lessons

required. The program utilizes the same curriculum for all adult EFNEP and FSNEP participants regardless of these variables.

Conclusions

After analyzing the findings of our study, the following conclusions emerged:

1. The number of lessons in the CNEP should be increased to a minimum of 9-12 lessons needed to graduate.
2. Paraprofessionals should emphasize those behaviors related to meal planning and shopping habits to help participants reach their maximum behavior change.
3. The CNEP employs the characteristics of successful programs set forth by Weimer (1996) and therefore should be continued to meet the needs of low-income families in Oklahoma.

Recommendations for Future Research

The following questions are suggested for future research:

1. Since this study looked only at the number of lessons needed to maximize behavior change, it is recommended that other factors be considered in future research including: age, race, and urban vs. rural residence.
2. Although CNEP uses identical curricula for participants enrolled in both the EFNEP and the FSNEP behavior change could be different. Comparing behavior change in these two groups is needed to identify if differences exist.
3. A few studies have been conducted to determine whether there is a difference in behavior change between individual and group instruction. Further research is needed in this area, specifically with the FSNEP, to determine which method produces greater change.

REFERENCES

- Alaimo, K. (2005). Food Insecurity in the United States: An Overview. *Topics in Clinical Nutrition*, 20(4): 281-298.
- Arnold, C.G., Sobal, J. (2000). Food Practices and Nutrition Knowledge after Graduation from the Expanded Food and Nutrition Education Program (EFNEP). *Journal of Nutrition Education*, 32(3): 130-138.
- Black, A.E., Goldberg, G.R., Jebb, S.A., Livingstone, M.B.E., Cole, T.J., Prentice, A.M. (1991). Critical Evaluation of Energy Intake Data using Fundamental Principles of Energy Physiology: 2. Evaluating the Results of Published Surveys. *European Journal of Clinical Nutrition*, 45: 583-599.
- Bremner, B., Campbell, C.C., Sobal, J. (1994). Comparison of the Beliefs and Practices of EFNEP Clients with Staff Perceptions of Clients. *Journal of Nutrition Education*, 26(3): 123-130.
- Briefel, R.R., Sempos, C.T., McDowell, M.A., Chien, S.C.-Y., Alaimo, K. (1997). Dietary Methods Research in the third National Health and Nutrition Examination Survey: Underreporting of Energy Intake. *The American Journal of Clinical Nutrition*, 65 (supplement): 1203S-1209S.
- Brink, M. S. (2000). *Expanded Food and Nutrition Education Program: A Precedent-Setting Program*. Cortland, NY: EasyWriter Publications.
- Brink, M.S., Sobal, J. (1994). Retention of Nutrition Knowledge and Practices among Adult EFNEP Participants. *Journal of Nutrition Education*, 26: 74-78.
- Cason, K.L., Scholl, J.F., Kassab, C. (2002). A comparison of program delivery methods for low income nutrition audiences. *Topics in Clinical Nutrition*, 17: 63-73.
- Chipman, H., Kendall, P.A. (1989). 20 Years of EFNEP: Changes and Challenges. *Journal of Nutrition Education*, 21(6): 265-269.
- Coates, J., Frongillo, E.A., Rogers, B.L., Webb, P., Wilde, P.E., Houser, R. (2006). Commonalities in the Experience of Household Food Insecurity across Cultures: What Are Measures Missing? *The Journal of Nutrition*, 136: 1438S-1448S.

- Cook, A., Pryer, J., Shetty, P. (2000). The Problem of Accuracy in Dietary Surveys. Analysis of the Over 65 UK National Diet and Nutrition Survey. *Journal of Epidemiology and Community Health*, 54: 611-616.
- Del Tredici, A.M., Joy, A.B., Omelich, C.L., Laughlin, S.G. (1988). Evaluation Study of the California Expanded Food and Nutrition Education Program: 24-hour food recall data. *Journal of the American Dietetic Association*, 88: 185-190.
- Dicken, K.L., Dollahite, J.S., Habicht, J.-P. (2005). Nutrition Behavior Change among EFNEP Participants is Higher at Sites That Are Well Managed and Whose Front-Line Nutrition Educators Value the Program. *The Journal of Nutrition*, 135(9): 2199-2205.
- Dollahite, J., Olson, C., Scott-Pierce, M. (2003). The Impact of Nutrition Education on Food Insecurity among Low-Income Participants in EFNEP. *Family and Consumer Sciences Research Journal*, 32: 127-139.
- Dollahite, J., Scott-Pierce, M. (2003). Outcomes of Individual vs. Group Instruction in EFNEP. *Journal of Extension*, 41: 1-10.
- Garrard, Debra. *Southern Region EFNEP Caseloads*. October 17, 2007.
- Greer, B., Poling, R. (2001). *Impact of participating in the Expanded Food and Nutrition Education Program on Food Insecurity*. Mississippi State: Mississippi State University, Southern Rural Development Center. Available at: <http://srdc.msstate.edu/publications/series.htm>. Accessed on: October 24, 2007.
- Hanula, G.M., Bryant, K. Expanded Food and Nutrition Education Program 2006. *University of Georgia Cooperative Extension*.
- Hill, R.J., Davies, P.S.W. (2001). The Validity of Self-Reported Energy Intake as Determined Using the Doubly Labelled Water Technique. *British Journal of Nutrition*, 85: 415-430.
- Hollie, B.B., Calabrese, R.J., Maillet, J.O.S. (2003). *Communication and Education Skills for Dietetics Professionals*. Baltimore, Maryland: Lippincott Williams & Wilkins.
- Kempson, K.M., Keenan, D.P., Sadani, P.S., Ridlen, S., Rosato, N.S. (2002). Food Management Practices used by People with Limited Resources to Maintain Food Sufficiency as Reported by Nutrition Educators. *Journal of the American Dietetic Association*, 102: 1795-1799.
- Kroke, A., Klipstein-Grobusch, K., Voss, S., Mosendeder, J., Thielecke, F., Noack, R., Bowing, H. (1999). Validation of a Self-Administered Food-Frequency Questionnaire Administered in the European Prospective Investigation into Cancer and Nutrition (EPIC) Study: Comparison of Energy, Protein, and Macronutrient Intakes Estimated with the

Doubly Labeled Water, Urinary Nitrogen, and Repeated 24-h Dietary Recall Methods. *The American Journal of Clinical Nutrition*, 70: 439-447.

Lof, M., Forsum, E. (2004). Validation of Energy Intake by Dietary Recall against Different Methods to Assess Energy Expenditure. *Journal of Human Nutrition and Dietetics*, 17: 471-480.

Mancino, L., Newman, C. (2007). *Who Has Time to Cook? How Family Resources Influence Food Preparation*. Washington, D.C.: Economic Research Service, U.S. Department of Agriculture.

Montgomery, S., Willis, W. (2006). *Fiscal Year 2005 Impact and Review of the Expanded Food and Nutrition Education Program*. United States Department of Agriculture, Cooperative State Research, Education, and Extension Service.

Munger, S.J., Jones, E.M. (1976). *A Progression Model for the Expanded Food and Nutrition Program*. Washington, D.C.: Extension Service, U.S. Department of Agriculture.

North Carolina State University Cooperative Extension. (October 1, 2004-September 30, 2005). NC Expanded Food and Nutrition Education Program.

Oklahoma State University (2007a). About CNEP: Overview. Available at: <http://fcs.okstate.edu/cnep/about/>. Accessed on: October 26, 2007.

Oklahoma State University (2007b). Community Nutrition Education Programs (CNEP). Available at: <http://fcs.okstate.edu/cnep/about/CNEP07.ppt>. Accessed on: October 26, 2007.

Oliver, M. (1967). Program Aides Work with the Needy: Part IV. Pilot Study in Alabama. *Journal of the American Dietetic Association*, 50: 483-486.

Price, G.M., Paul, A.A., Cole, T.J., Wadsworth, M.E.J. (1997). Characteristics of the low-energy reporters in a longitudinal national dietary survey. *British Journal of Nutrition*, 77: 833-851.

Pryer, J.A., Vrijheid, M., Nichols, R., Kiggins, M., Elliott, P. (1997). Who Are the 'Low Energy Reporters' in the Dietary and Nutritional Survey of British Adults? *International Journal of Epidemiology*, 26(1): 146-154.

Randall, M.J., Brink, M.S., Joy, A.B. (1989). EFNEP: An Investment in America's Future. *Journal of Nutrition Education*, 21(6): 276-279.

Robertson, C., Conway, R., Dennis, B., Yarnell, J., Stamler, J., Elliott, P. (2005). Attainment of Precision in Implementation of 24h Dietary Recalls: INTERMAP UK. *British Journal of Nutrition*, 94: 588-594.

Stevens, J.P. (2002). *Applied Multivariate Statistics for the Social Sciences*. Lawrence Erlbaum Associates, Inc. Mahwah, New Jersey.

Trepka, M.J., Murunga, V., Cherry, S., Huffman, F.G., Dixon, Z. (2006). Food Safety Beliefs and Barriers to Safe Food Handling among WIC Program Clients, Miami, Florida. *Journal of Nutrition Education and Behavior*, 38: 371-377.

United States Department of Agriculture (2006). Retrieved October 26, 2007, from http://www.csrees.usda.gov/nea/food/efnep/pdf/2006_impact.pdf

United States Department of Agriculture (2007a). About EFNEP. Available at: <http://www.csrees.usda.gov/nea/food/efnep/about.html>. Accessed on: October 24, 2007.

United States Department of Agriculture (2007b). About Food Stamp Nutrition Education (FSNE). Available at: <http://www.csrees.usda.gov/nea/food/fsne/about.html>. Accessed on: January 16, 2008.

University of Florida (2007). Expanded Food and Nutrition Education Program Objectives. Available at: <http://efnep.ifas.ufl.edu/about/objectives.htm>. Accessed on: January 16, 2008.

Weimer, J.P. (1996). USDA's Role in Nutrition Education and Evaluation. *FoodReview*, 19(1): 41-45.

APPENDIX

Appendix A

NEA's Name: _____

CNEP SURVEY

Participant's Name:	ID #:
Date	Check if Interview (NEA completed form) <input type="checkbox"/> Entry <input type="checkbox"/> Intermediate <input type="checkbox"/> Exit <input type="checkbox"/>

This is a survey about ways to plan and fix foods for your family. As you read each question, think about the recent past. This is not a test. There are not any wrong answers. If you do not have children, just answer the questions for yourself.

For these questions, think about how you usually do things. Please put a check in the box that best answers each question.	Never	Seldom	Some-times	Most of the time	Almost Always
(1) How often do you plan meals ahead of time?					
(2) How often do you compare prices before you buy food?					
(3) How often do you run out of food before the end of the month?					
(4) How often do you shop with a grocery list?					
(5) This question is about meat and dairy foods. How often do you let these foods sit out for more than two hours?					
(6) How often do you thaw frozen foods at room temperature?					
(7) When deciding what to feed your family, how often do you think about healthy food choices?					
(8) How often have you prepared foods without adding salt?					
(9) How often do you use the "Nutrition Facts" on the food label to make food choices?					
(10) How often do your children* eat something in the morning within 2 hours of waking up?					

*If there are no children under the age of 19 living in the home ask, "How often do you eat something in the morning within 2 hours of waking up?"

Revised 11/03

VITA

Elizabeth Colette Cragun

Candidate for the Degree of

Master of Science

Thesis: THE NUMBER OF LESSONS NEEDED TO MAXIMIZE BEHAVIOR
CHANGE AMONG COMMUNITY NUTRITION EDUCATION PROGRAM
(CNEP) PARTICIPANTS

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Date of Degree: May 2008

Institution: Oklahoma State University

Location: Stillwater, Oklahoma

Title of Study: THE NUMBER OF LESSONS NEEDED TO MAXIMIZE BEHAVIOR
CHANGE AMONG COMMUNITY NUTRITION EDUCATION PROGRAM (CNEP)
PARTICIPANTS

Pages in Study: 37

Candidate for the Degree of Master of Science

Major Field: Nutritional Sciences

Scope and Method of Study: The objective of this study is to determine the number of lessons needed in the Community Nutrition Education Program (CNEP) to produce a positive behavior change among participants. The results of this study will help CNEP personnel with program planning and delivery. We used de-identified, secondary, quantitative, data for FY 2007 from the Oklahoma CNEP. This included 4185 participants of which 2139 had complete data. The number of lessons was separated into four quartiles: (1) 6-8 lessons, (2) 9-12 lessons, (3) 13-16 lessons, and (4) >16 lessons. Pre and post CNEP surveys were used to measure nutrition related behavior change. A factor analysis was performed to identify correlated items on the survey. A one way ANOVA and Tukey's post hoc were performed to determine significance between the number of lessons taught and behavior change.

Findings and Conclusions: The factor analysis produced two components, shopping habits and food safety. The shopping habits component produced significant differences in behavior change between participants receiving 6-8 lessons and those receiving 9-12 lessons, and between participants receiving 9-12 lessons and >16 lessons. There was no significant difference seen between persons receiving 9-12 lessons and 13-16 lessons. The food safety component showed a significant difference in behavior change between participants receiving 6-8 lessons and 9-12 lessons. Although there was a significant difference in behavior change under the shopping habits component between 9-12 lessons and >16 lessons, it is concluded that the number of lessons needed to optimize behavior change and program efficiency in the CNEP is 9-12 lessons. These results can be useful in determining the minimum number of lessons needed to graduate from the program and also help determine the allocation of funds and time.

ADVISER'S APPROVAL: Dr. Deana Hildebrand
